We claim the following:

1. Use of (a) at least one dose of a first immunogenic composition comprising at least a first immunogen, wherein the at least one immunogen is capable of inducing an immune response specific for a first designated antigen; and (b) at least one dose second immunogenic composition comprising a recombinant expression vector comprising a nucleotide sequence that encodes the first immunogen, in the manufacture of a medicament for inducing an immune response in a subject, wherein the medicament is to be administered into the subject to thereby induce an immune response specific for the first designated antigen.

2. The use of claim 1, wherein the first immunogen is a first polypeptide, and said nucleotide sequence encodes a second polypeptide that is different from the first polypeptide.

3. The use of claim 1, wherein (i) the first immunogenic composition further comprises an adjuvant; (ii) the second composition further comprises an adjuvant; or (iii) each of the first composition and the second composition further comprises an adjuvant.

4. The use of either claim 1 or claim 3, wherein the second immunogenic composition is to be administered subsequent to administration of the first immunogenic composition.

5. The use of either claim 1 or claim 3, wherein the second immunogenic composition is to be administered prior to administration of the first immunogenic composition.

6. The use of either claim 1 or claim 3, wherein the first immunogenic composition and the second immunogenic composition are to be administered concurrently.

7. The use of any one of claims 1-5, wherein at least two doses of the first immunogenic composition are administered or wherein at least two doses of the second immunogenic composition are administered.

8. The use of claim 1 or claim 3, wherein (a) two doses; (b) three doses; (c) four doses; or (d) five doses of the first immunogenic composition are to be administered.

9. The use of claim 8, wherein (a) each dose of the first immunogenic composition is to be administered prior to administration of the second immunogenic composition; (b) at least one dose of the first immunogenic composition is to be administered subsequent to administration of the second immunogenic composition; (c) at least one dose of the first immunogenic composition is to be administered concurrently with administration of the second immunogenic composition; (d) at least one dose of the first immunogenic composition is to be administered prior to administration of the second immunogenic composition and each of any remaining doses of the first immunogenic composition is to be administered subsequent to administration of the second immunogenic composition; or (e) each dose of the first composition is to be administered concurrently with the second composition.

10. The use of any one of claims 1-9, wherein the immune response induced by the first immunogen comprises a CD4 T cell immune response specific for the first designated antigen.

11. The use of any one of claims 1-10, wherein the immune response induced by the first immunogen comprises a CD8 T cell immune response specific for the first designated antigen.

12. The use of any one of claims 1-11, wherein the first immunogenic composition further comprises a second immunogen, and wherein the recombinant expression vector further comprises a nucleotide sequence that encodes the second immunogen, wherein the second immunogen induces an immune response specific for a second designated antigen.

13. The use of claim 12, wherein the first designated antigen and the second designated antigen are the same.

14. The use of claim 12, wherein the first designated antigen and the second designated antigen are different.

15. The use of any one of claims 1-11, wherein the recombinant expression vector further comprises a nucleotide sequence that encodes a second immunogen capable of inducing an immune response specific for a second designated antigen.

16. The use of claim 15, wherein the first designated antigen and the second designated antigen are the same.

17. The use of claim 15, wherein the first designated antigen and the second designated antigen are different.

18. The use of any one of claims 12-17, wherein the immune response induced by the first immunogen comprises a CD4 T cell response specific for the first designated antigen.

19. The use of any one of claims 12-17, wherein the immune response induced by the second immunogen comprises a CD8 T cell response specific for the second designated antigen.

20. The use of any one of claims 3-19, wherein the adjuvant is a non-toxic lipid A-related adjuvant.

21. The use of claim 20, wherein the non-toxic lipid A-related adjuvant is glucopyranosyl lipid A (GLA).

22. The use of claim 21, wherein GLA is formulated in a stable oil-in-water emulsion.

23. The use of any one of claims 1-22, wherein the first designated antigen is (a) a tumor-associated antigen or (b) from an infectious microorganism selected from a virus, a bacterium, a fungus, and a parasite.

24. The use of claim 23, wherein the first designated antigen is a tumor-associated antigen selected from a renal cell carcinoma antigen, a prostate cancer antigen, a mesothelioma antigen, a pancreatic cancer antigen, a melanoma antigen, a breast cancer antigen, a lung cancer antigen, and an ovarian cancer antigen.

25. The use of claim 24, wherein the prostate cancer antigen is prostatic acid phosphatase, prostate specific antigen, NKX3.1, or prostate specific membrane antigen.

26. The use of claim 23, wherein the first designated antigen is from a virus.

27. The use of claim 26, wherein the virus is Herpes Simplex Virus-2 (HSV-2).

28. The use of claim 27, wherein the first designated antigen is HSV-2 UL19 polypeptide or HSV-2 gD polypeptide.

29. The use of any one of claims 12-22, wherein each of the first designated antigen and the second designated antigen is a tumor-associated antigen.

30. The use of claim 29, wherein each of the first designated antigen and the second designated antigen is selected from a renal cell carcinoma antigen, a prostate cancer antigen, a mesothelioma antigen, a pancreatic cancer antigen, a melanoma antigen, a breast cancer antigen, a lung cancer antigen, and an ovarian cancer antigen.

31. The use according to claim 30, wherein each of the first designated antigen and the second designated antigen is a prostate cancer antigen selected from prostatic acid phosphatase, prostate specific antigen, NKX3.1, or prostate specific membrane antigen.

32. The use of any one of claims 12-22, wherein each of the first designated antigen and the second designated antigen is an antigen from an infectious microorganism selected from a virus, a bacterium, a fungus, and a parasite.

33. The use of claim 32, wherein the infectious disease organism is a virus.

34. The use of claim 33, wherein the virus is Herpes Simplex Virus-2 (HSV-2).

35. The use of claim 34, wherein at least one of the first designated antigen and the second designated antigen is HSV-2 UL19 polypeptide and the other of the first designated antigen and the second designated antigen is HSV-2 gD polypeptide.

36. The use of any one of claims 1-35, wherein the recombinant expression vector is selected from a lentiviral vector genome, poxvirus vector genome, vaccinia virus vector genome, adenovirus vector genome, adenovirus-associated virus vector genome, herpes virus vector genome, and an alpha virus vector genome.

37. The use of claim 36, wherein the recombinant expression vector is incorporated into a vector particle.

38. The use of claim 37, wherein the vector particle preferentially delivers the recombinant expression vector to an antigen-presenting cell.

39. The use of claim 38, wherein the antigen-presenting cell is a dendritic cell, preferably a dendritic cell expressing DC-SIGN.

40. The use of any one of claims 37-39, wherein the vector particle is a lentiviral vector particle that comprises the lentiviral vector genome; a poxvirus vector particle that comprises the poxvirus vector genome; a vaccinia virus vector particle that comprises the vaccinia virus vector genome; an adenovirus vector particle that comprises the adenovirus vector genome; an adenovirus-associated virus vector particle that comprises the adenovirus-associated virus vector genome; a herpes virus vector particle that comprises the herpes virus vector genome; or an alpha virus vector particle that comprises the alpha virus vector genome.

41. The use of claim 40, wherein the vector particle is a lentiviral vector particle that comprises the lentiviral vector genome, and an envelope that preferentially delivers the lentiviral vector particle to a dendritic cell expressing DC-SIGN, optionally an envelope that is a variant of an Arbovirus envelope, or an alphavirus envelope.

42. The use of claim 41, wherein the vector particle is an alphavirus vector particle comprising an envelope that preferentially delivers the alphavirus vector particle to a dendritic cell expressing DC-SIGN.

43. The use of claim 42, wherein the lentiviral vector particle further comprises an envelope comprising a Sindbis virus E2 glycoprotein comprising an amino acid sequence having at least one amino acid change compared to SEQ ID NO:1, wherein residue 160 of SEQ ID NO:1 is either absent or an amino acid other than glutamic acid, and wherein the E2 glycoprotein is not a moiety of a fusion protein that comprises Sindbis virus E3 protein.

44. The use of claim 43, wherein the E2 glycoprotein binds to dendritic cell-specific intercellular adhesion molecule-3-grabbing non-integrin (DC-SIGN).

45. A preparation comprising (a) a first immunogenic composition that comprises at least a first immunogen capable of inducing an immune response specific for a first designated antigen; and (b) a second immunogenic composition that comprises a

recombinant expression vector that comprises a nucleotide sequence encoding the first immunogen.

46. The preparation according to claim 45, wherein the specific immune response induced by the first immunogen comprises a CD4 T cell response specific for the first designated antigen.

47. The preparation according to claim 45, wherein the specific immune response induced by the first immunogen comprises a CD8 T cell response specific for the first designated antigen.

48. The preparation of any one of claims 45-47, wherein the first immunogenic composition further comprises a second immunogen, and wherein the recombinant expression vector further comprises a nucleotide sequence that encodes the second immunogen, wherein the second immunogen induces an immune response specific for a second designated antigen.

49. The preparation of claim 48, wherein the first designated antigen and the second designated antigen are the same.

50. The preparation of claim 48, wherein the first designated antigen and the second designated antigen are different.

51. The preparation of claim 45, wherein the recombinant expression vector further comprises a nucleotide sequence that encodes a second immunogen capable of inducing an immune response specific for a second designated antigen.

52. The preparation of claim 51, wherein the first designated antigen and the second designated antigen are the same.

53. The preparation of claim 51, wherein the first designated antigen and the second designated antigen are different.

54. The preparation of any one of claims 51-53, wherein the immune response induced by the first immunogen comprises a CD4 T cell response specific for the first designated antigen.

55. The preparation of any one of claims 51-53, wherein the immune response induced by the second immunogen comprises a CD8 T cell response specific for the second designated antigen.

56. The preparation of any one of claims 45-55, wherein (a) the first immunogenic composition further comprises an adjuvant (b) the second immunogenic composition further comprises an adjuvant; or (c) the first immunogenic composition and the second immunogenic composition each further comprises an adjuvant.

57. The preparation of claim 56, wherein the adjuvant is a non-toxic lipid A-related adjuvant.

58. The preparation of claim 57, wherein the non-toxic lipid A-related adjuvant is glucopyranosyl lipid A (GLA).

59. The preparation of claim 58, wherein GLA is formulated in a stable oil-in-water emulsion.

60. The preparation of any one of claims 45-59, wherein the first designated antigen is (a) a tumor-associated antigen or (b) from an infectious microorganism selected from a virus, a bacterium, a fungus, and a parasite.

61. The preparation of claim 60, wherein the first designated antigen is a tumor-associated antigen selected from a renal cell carcinoma antigen, a prostate cancer antigen, a mesothelioma antigen, a pancreatic cancer antigen, a melanoma antigen, a breast cancer antigen, a lung cancer antigen, and an ovarian cancer antigen.

62. The preparation of claim 61, wherein the prostate cancer antigen is prostatic acid phosphatase, prostate specific antigen, NKX3.1, or prostate specific membrane antigen.

63. The preparation of claim 60, wherein the first designated antigen is from a virus.

64. The preparation of claim 63, wherein the virus is Herpes Simplex Virus-2 (HSV-2).

65. The preparation of claim 64, wherein the first designated antigen is HSV-2 UL19 polypeptide or HSV-2 gD polypeptide.

66. The preparation of any one of claims 49-59, wherein each of the first designated antigen and the second designated antigen is a tumor-associated antigen.

67. The preparation of claim 66, wherein each of the first designated antigen and the second designated antigen is selected from a renal cell carcinoma antigen, a prostate cancer antigen, a mesothelioma antigen, a pancreatic cancer antigen, a melanoma antigen, a breast cancer antigen, a lung cancer antigen, and an ovarian cancer antigen.

68. The preparation according to claim 67, wherein each of the first designated antigen and the second designated antigen is a prostate cancer antigen selected from prostatic acid phosphatase, prostate specific antigen, NKX3.1, and prostate specific membrane antigen.

69. The preparation of any one of claims 48-59, wherein each of the first designated antigen and the second designated antigen is an antigen from an infectious microorganism selected from a virus, a bacterium, a fungus, and a parasite.

70. The preparation of claim 69, wherein the infectious disease organism is a virus.

71. The preparation of claim 70, wherein the virus is Herpes Simplex Virus-2 (HSV-2).

72. The preparation of claim 71, wherein at least one of the first designated antigen and the second designated antigen is HSV-2 UL19 polypeptide and the other of the first designated antigen and the second designated antigen is HSV-2 gD polypeptide.

73. The preparation of any one of claims 45-72, wherein the recombinant expression vector is selected from a lentiviral vector genome, poxvirus vector genome, vaccinia virus vector genome, adenovirus vector genome, adenovirus-associated virus vector genome, herpes virus vector genome, and alpha virus vector genome.

74. The preparation of claim 73, wherein the recombinant expression vector is incorporated into a vector particle.

75. The preparation of claim 74, wherein the vector particle is capable of delivering the recombinant expression vector to an antigen-presenting cell.

76. The preparation of claim 75, wherein the antigen-presenting cell is a dendritic cell.

77. The preparation of any one of claims 74-76, wherein the vector particle is a lentiviral vector particle that comprises the lentiviral vector genome; a poxvirus vector particle that comprises the poxvirus vector genome; a vaccinia virus vector particle that comprises the vaccinia virus vector genome; an adenovirus vector particle that comprises the adenovirus vector genome; an adenovirus-associated virus vector particle that comprises the adenovirus-associated virus vector genome; a herpes virus vector particle that comprises the herpes virus vector genome; or an alpha virus vector particle that comprises the alpha virus vector genome.

78. The preparation of claim 77, wherein the vector particle is a lentiviral vector particle that comprises the lentiviral vector genome.

79. The preparation of claim 78, wherein the lentiviral vector particle further comprises an envelope comprising a Sindbis virus E2 glycoprotein comprising an amino acid sequence having at least one amino acid change compared to SEQ ID NO:1, wherein residue 160 of SEQ ID NO:1 is either absent or an amino acid other than glutamic acid, and wherein the E2 glycoprotein is not a moiety of a fusion protein that comprises Sindbis virus E3 protein.

80. The preparation of claim 79, wherein the E2 glycoprotein binds to dendritic cell-specific intercellular adhesion molecule -3-grabbing non-integrin (DC-SIGN).

81. The preparation of any one of claims 60-62 and 66-68 for use in inducing a cytotoxic T lymphocyte response against a tumor cell bearing (a) the first designated antigen; (b) the second designated antigen; or (c) the first designated antigen and the second designated antigen.

82. The preparation of any one of claims 60, 63-65, and 69-72 for use in inducing a cytotoxic T lymphocyte response against an infectious disease microorganism bearing (a) the first designated antigen; (b) the second designated antigen; or (c) the first designated antigen and the second designated antigen.

83. The preparation of any one of claims 60-62 and 66-68 for use in reducing the likelihood of occurrence or recurrence of a tumor comprising a plurality of tumor cells that bear the tumor-associated antigen.

84. The preparation of any one of claims 60, 63-65, and 69-72 for use in preventing or treating an infection caused by the infectious microorganism.

CLAIMS

We claim the following:

1. Use of (a) at least one dose of a first immunogenic composition comprising (i) a lentiviral vector comprising a nucleotide sequence that encodes a first immunogen, or an immunogenic fragment thereof, in the manufacture of a medicament for priming and boosting a CD8 T cell immune response in a subject, wherein the lentiviral vector is incorporated into a vector particle, wherein the vector particle comprises a lentiviral vector genome and an alpha virus envelope; and wherein the medicament further comprises at least one dose of a second immunogenic composition comprising (i) at least the first immunogen or an immunogenic fragment thereof and (ii) a TLR4 agonist; wherein the second immunogenic composition is to be administered subsequent to the first immunogenic composition, thereby priming and boosting a CD8 T cell immune response specific for the first immunogeninto the subject to thereby induce an immune response specific for the first immunogen.

2. The use of claim 1, wherein (i) the first immunogenic composition further comprises a second adjuvant; or (ii) the second composition further comprises an adjuvant; orboth (i) and (ii).

3. The use of any one of claims 1-2, wherein at least two doses of the first immunogenic composition are administered or wherein at least two doses of the second immunogenic composition are administered.

4. The use of claim 1, wherein (a) two doses; (b) three doses; (c) four doses; or (d) five doses of the first immunogenic composition are to be administered.

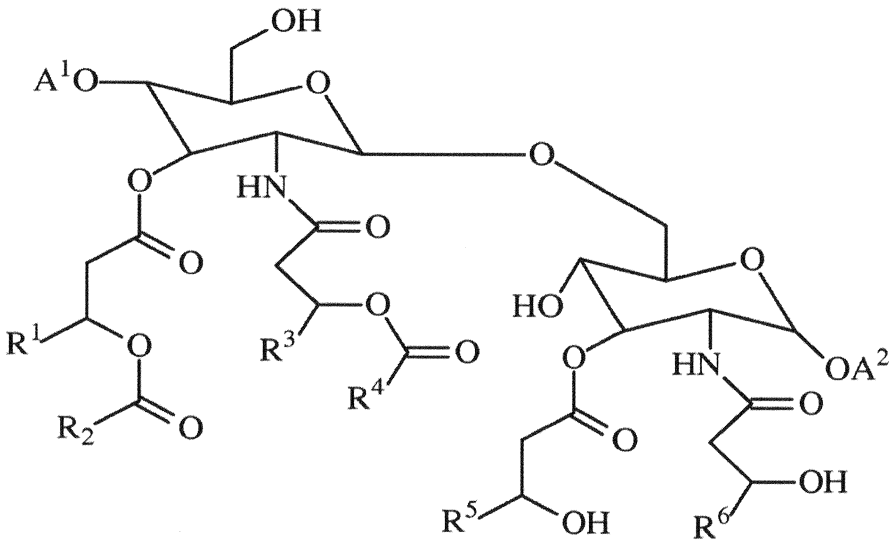
5. The use of claim 4, wherein two doses of the first immunogenic composition are to be administered prior to administration of the second immunogenic composition.

6. The use of any one of claims 1-5, wherein the immune response induced by the medicament comprises a CD4 T cell immune response specific for the first immunogen.

7. The use of any one of claims 1-6, wherein the second immunogenic composition further comprises a second immunogen, or an immunogenic fragment thereof, and wherein the lentiviral vector further comprises a nucleotide sequence that encodes the second immunogen, or an immunogenic fragment thereof, wherein the medicament induces an immune response specific for a second immunogen.

8. The use of any one of claims 7, wherein the immune response induced by the medicament comprises a CD4 T cell response specific for the second immunogen.

9. The use of any one of claims 1-8, wherein the TLR4 agonist is a compound of the following structure:



wherein A1 and A2 are independently selected from the group of hydrogen, phosphate, and phosphate salts and R1, R2, R3, R4, R5 and R6 are independently selected from the group of hydrocarbyl having 3 to 23 carbons, represented by C3-C23.

10. The use of claim 9, wherein A1 is phosphate or phosphate salt, A2 is hydrogen, R1, R3, R5 and R6 are undecyl and R2 and R4 are tridecyl.

11. The use of claim 10, wherein the compound is formulated in a stable oil-in-water emulsion.

12. The use of any one of claims 1-11, wherein the first immunogen is (a) a tumor-associated antigen or (b) from an infectious microorganism selected from a virus, a bacterium, a fungus, and a parasite.

13. The use of claim 12, wherein the first immunogen is from a virus.

14. The use of claim 13, wherein the virus is Herpes Simplex Virus-2 (HSV-2).

15. The use of claim 14, wherein the first immunogen is HSV-2 UL19 polypeptide or HSV-2 gD polypeptide.

16. The use of any one of claims 7-11, wherein each of the first immunogen and the second immunogen is an antigen from an infectious microorganism selected from a virus, a bacterium, a fungus, and a parasite.

17. The use of claim 16, wherein the infectious disease organism is a virus.

18. The use of claim 17, wherein the virus is Herpes Simplex Virus-2 (HSV-2).

19. The use of claim 18, wherein at least one of the first immunogen and the second immunogen is HSV-2 UL19 polypeptide and the other of the first immunogen and the second immunogen is HSV-2 gD polypeptide.

20. The use of claim 19, wherein the lentiviral vector particle preferentially delivers the nucleotide sequence to an antigen-presenting cell.

21. The use of claim 20, wherein the antigen-presenting cell is a dendritic cell.

22. The use of claim 1, wherein the vector particle comprises a lentiviral vector genome, and an envelope that delivers the lentiviral vector particle to a dendritic cell expressing DC-SIGN.

23. The use of claim 22, wherein the envelope comprises a Sindbis virus E2 glycoprotein comprising an amino acid sequence having at least one amino acid change compared to SEQ ID NO:1, wherein residue 160 of SEQ ID NO:1 is either absent or an amino acid other than glutamic acid, and wherein the E2 glycoprotein is not fused to Sindbis virus E3 protein.

24. The use of claim 23, wherein the E2 glycoprotein binds to dendritic cell-specific intercellular adhesion molecule-3-grabbing non-integrin (DC-SIGN).

25. The method of claim 9 wherein R1, R3, R5 and R6 are C11-C20 alkyl; and R2 and R4 are C12-C20 hydrocarbyl.

26. The method of claim 1, wherein the first immunogenic composition and the second immunogenic composition are to be administered concurrently and two doses are to be administered.

27. The method of claim 1, wherein the first composition further comprises (i) at least the first immunogen or an immunogenic fragment thereof and (ii) a TLR4 agonist, and wherein the second composition further comprises a lentiviral vector composition a nucleotide sequence that encodes the first immunogen or an immunogenic fragment thereof, wherein the lentiviral vector is incorporated into a vector particle, wherein the vector particle comprises a lentiviral vector genome and an alpha virus envelope.

28. Use of at least one dose of a first immunogenic composition comprising (i) a lentiviral vector comprising a nucleotide sequence that encodes a first immunogen or an immunogenic fragment thereof in the manufacture of a medicament for priming and boosting a

CD8 T cell immune response in a subject, said lentiviral vector is incorporated into a vector particle, wherein the vector particle comprises a lentiviral vector genome and an alpha virus envelope, and wherein the medicament is to be concurrently administered with a second immunogenic composition comprising (i) at least the first immunogen or an immunogenic fragment thereof and (ii) a TLR4 agonist; and (b) wherein the first and second immunogenic compositions of (a) are subsequently administered; thereby priming and boosting a CD8 T cell immune response specific for the first immunogen.