Claims

1. A recombinant adenovirus comprising a nucleotide sequence having:

(i) the sequence of SEQ ID NO: 10, or a complementary sequence thereto;

(ii) the sequence of SEQ ID NO: 11, or a complementary sequence thereto; or

(iii) the sequence of SEQ ID NO: 12, or a complementary sequence thereto; and

wherein the recombinant adenovirus comprises a deletion in or of an E1 region, the deletion rendering the recombinant virus a replication-defective virus.

2. The recombinant adenovirus of claim 1, wherein:

(i) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 10, or a complementary sequence thereto, further comprises a sequence having 90% or greater sequence identity to any one of SEQ ID NOs: 4, 7, 13, and 16, or a complementary sequence thereto;

(ii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 11, or a complementary sequence thereto, further comprises a sequence having 90% or greater sequence identity to any one of SEQ ID NOs: 5, 8, 14, and 17, or a complementary sequence thereto; or

(iii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 12, or a complementary sequence thereto, further comprises a sequence having 90% or greater sequence identity to any one of SEQ ID NOs: 6, 9, 15, and 18, or a complementary sequence thereto.

3. The recombinant adenovirus of claim 1, wherein:

(i) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 10, or a complementary sequence thereto, further comprises the sequence of any one of SEQ ID NOs: 4, 7, 13, and 16, or a complementary sequence thereto;

(ii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 11, or a complementary sequence thereto, further comprises the sequence of any one of SEQ ID NOs: 5, 8, 14, and 17, or a complementary sequence thereto; or

(iii) the nucleotide sequence having the sequence of SEQ ID NO: 12, or a complementary sequence thereto, further comprises the sequence of any one of SEQ ID NOs: 6, 9, 15, and 18, or a complementary sequence thereto.

4. The recombinant adenovirus of claim 1, wherein:

(i) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 10, or a complementary sequence thereto, comprises a sequence having 90% or greater sequence identity to the sequence of SEQ ID NO: 1, or a complementary sequence thereto;

(ii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 11, or a complementary sequence thereto, comprises a sequence having 90% or greater sequence identity to the sequence of SEQ ID NO: 2, or a complementary sequence thereto; or

(iii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 12, or a complementary sequence thereto, comprises a sequence having 90% or greater sequence identity to the sequence of SEQ ID NO: 3, or a complementary sequence thereto.

5. The recombinant adenovirus of claim 1, wherein:

(i) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 10, or a complementary sequence thereto, comprises the sequence of SEQ ID NO: 1, or a complementary sequence thereto;

(ii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 11, or a complementary sequence thereto, comprises the sequence of SEQ ID NO: 2, or a complementary sequence thereto; or

(iii) the recombinant adenovirus comprising the nucleotide sequence of SEQ ID NO: 12, or a complementary sequence thereto, comprises the sequence of SEQ ID NO: 3, or a complementary sequence thereto.

6. The recombinant adenovirus of any one of claims 1-5, further comprising a deletion in or of the E3 region, the E4 region, or both the E3 and E4 regions.

7. A recombinant vector comprising the nucleotide sequence of any one of claims 1-6.

8. The recombinant vector of claim 7, further comprising:

(i) the nucleotide sequence of any one of SEQ ID NOs: 34-39,

(ii) the nucleotide sequence of any one of SEQ ID NOs: 40-45, or

(iii) the nucleotide sequence of any one of SEQ ID NOs: 46-51.

9. The recombinant adenovirus of any one of claims 1-6, further comprising a heterologous nucleotide sequence encoding an antigenic or therapeutic protein of interest, or fragment thereof.

10. The recombinant adenovirus of claim 9, wherein said recombinant adenovirus promotes an antibody immune response against the antigenic or therapeutic protein of interest, or fragment thereof, encoded by the heterologous nucleotide sequence.

11. The recombinant adenovirus of claim 10, wherein said antibody immune response is determined using a D^b/AL11 tetramer binding assay.

12. The recombinant adenovirus of claim 11, wherein said antibody immune response is determined using an IFN-γ ELISPOT assay.

13. The recombinant adenovirus of any one of claims 9-12, wherein said antigenic protein, or fragment thereof, comprises a bacterial, viral, parasitic, or fungal protein, or fragment thereof.

14. The recombinant adenovirus of claim 13, wherein:

(i) said viral protein, or fragment thereof, is from a viral family selected from the group consisting of *Retroviridae*, such as human immunodeficiency virus (HIV), such as an Env, Gag, Pol, Nef, Tat, Rev, Vif, Vpr, or Vpu protein, or a fragment thereof, *Flaviviridae*, such as hepatitis C virus (HCV), yellow fever virus, Zika virus, and Japanese encephalitis virus, *Arenaviridae*, *Bunyaviridae*, *Filoviridae*, such as Ebola virus and Marburg virus, *Togaviridae*, such as rubella virus, *Poxviridae*, such as *Variola major, Variola minor,* and monkeypox virus, *Herpesviridae*, such as varicella zoster virus (VZV), cytomegalovirus (CMV), and herpes simplex virus (HSV), *Orthomyxoviridae*, such as influenza, *Coronaviridae*, *Rhabdoviridae*, such as rabies virus, *Paramyxoviridae*, such as measles virus and mumps virus, *Picornaviridae*, such as hepatitis A virus (Hep A) and poliovirus, *Hepadnaviridae*, such as hepatitis B virus (HBV), *Papillomaviridae*, such as human papillomavirus (HPV), *Parvoviridae*, *Astroviridae*, *Polyomaviridae*, *Calciviridae*, and *Reoviridae*, such as rotavirus; or

(ii) said bacterial protein, or fragment thereof, is from *Mycobacterium tuberculosis*, *Mycobacterium bovis*, *Mycobacterium africanum*, *Mycobacterium microti*, *Mycobacterium leprae*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Escherichia coli*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Francisella tularensis*, *Brucella*, *Burkholderia mallei*, *Yersinia pestis*, *Corynebacterium diphtheria*, *Neisseria meningitidis*, *Bordetella pertussis*, *Clostridium tetani*, or *Bacillus anthracis*; or

(iii) said parasitic protein, or fragment thereof, is from *Toxoplasma gondii*, *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale*, *Plasmodium malariae*, *Trypanosoma* spp., or *Legionella* spp; or

(iv) said fungal protein, or fragment thereof, is from *Aspergillus*, *Blastomyces dermatitidis*, *Candida*, *Coccidioides immitis*, *Cryptococcus neoformans*, *Histoplasma capsulatum var. capsulatum*, *Paracoccidioides brasiliensis*, *Sporothrix schenckii*, *Zygomycetes* spp., *Absidia corymbifera*, *Rhizomucor pusillus*, or *Rhizopus arrhizus*.

15. The recombinant adenovirus of claim 14, wherein said viral protein is a protein or fragment thereof from a Zika virus.

16. The recombinant adenovirus of claim 14, wherein said viral protein is an envelope glycoprotein or fragment thereof.

17. The recombinant adenovirus of claim 16, wherein said envelope glycoprotein or fragment thereof is from a Zika virus.

18. The recombinant adenovirus of any one of claims 9-17, for use in treating a subject having a disease.

19. The recombinant adenovirus for use according to claim 18, wherein said disease is acquired immune deficiency syndrome (AIDS), cancer, tuberculosis, leprosy, typhoid fever, pneumonia, meningitis, staphylococcal scalded skin syndrome (SSSS), Ritter's disease, tularemia (rabbit fever), brucellosis, Glanders disease, bubonic plague, septicemic plague, pneumonic plague, diphtheria, pertussis (whooping cough), tetanus, anthrax, hepatitis, smallpox, monkeypox, measles, mumps, rubella, chicken pox, polio, rabies, Japanese encephalitis, herpes, mononucleosis, influenza, Ebola virus disease, hemorrhagic fever, yellow fever, Marburg virus disease, toxoplasmosis, malaria, trypanosomiasis, legionellosis, aspergillosis, blastomycosis, candidiasis (thrush), coccidioidomycosis, cryptococcosis, histoplasmosis, paracoccidioidomycosis, sporotrichosis, Zika virus infection, or sinus-orbital zygomycosis.

20. The recombinant adenovirus for use according to claim 18 or 19, wherein said subject is human.

21. The recombinant adenovirus for use according to any one of claims 18-20, wherein:

(a) said recombinant adenovirus is formulated for intramuscular, intravenous, intradermal, percutaneous, intraarterial, intraperitoneal, intralesional, intracranial, intraarticular, intraprostatical, intrapleural, intratracheal, intranasal, intravitreal, intravaginal, intrarectal, topical, intratumoral, peritoneal, subcutaneous, subconjunctival, intravesicular, mucosal, intrapericardial, intraumbilical, intraocular, oral, topical, or local administration, for administration by inhalation, injection, infusion, continuous infusion, localized perfusion bathing target cells directly, catheter, lavage, or gavage, or in a creme or lipid composition; and/or

(b) said adenovirus is formulated as a pharmaceutical composition comprising a pharmaceutically acceptable carrier.

22. The recombinant adenovirus for use according to claim 21, wherein said pharmaceutical composition is formulated for administration in at least one or two doses.

23. The recombinant adenovirus for use according to claim 22, wherein said pharmaceutical composition is formulated for administration as a prime boost.

24. A method of producing a recombinant adenovirus of any one of claims 1-6 and 9-17, wherein said method comprises culturing a cell in a suitable medium; transfecting said cell with the nucleotide

sequence of any one of claims 1-6 or the recombinant vector of claim 7 or 8; allowing replication of said nucleotide sequence or vector in said cell; and harvesting produced recombinant adenovirus from said medium and/or said cell.

25. The method of claim 24, wherein said cell is a bacterial, plant, or mammalian cell.

26. The method of claim 25, wherein said mammalian cell is a Chinese hamster ovary (CHO) cell.