CLAIMS

1. An isolated polynucleotide comprising a nucleotide sequence that is at least 90% identical to, or complementary to, all or a portion of any one of SEQ ID NOs: 1-3.

2. The isolated polynucleotide of claim 1, wherein said nucleotide sequence is at least 95% identical to, or complementary to, all or a portion of any one of SEQ ID NOs: 1-3.

3. The isolated polynucleotide of claim 2, wherein said nucleotide sequence is 100% identical to, or complementary to, all or a portion of any one of SEQ ID NOs: 1-3.

4. The isolated polynucleotide of claim 3, wherein said nucleotide sequence comprises all or a portion of any one of SEQ ID NOs: 4-12, or a complementary sequence thereof.

5. The isolated polynucleotide of claim 4, wherein said nucleotide sequence comprises all or a portion of any one of SEQ ID NOs: 13-18.

6. A recombinant vector comprising an isolated polynucleotide of any one of claims 1-5.

7. The recombinant vector of claim 6, wherein said vector is an sAd4297 adenoviral vector comprising any one of SEQ ID NOs: 34-39.

8. The recombinant vector of claim 6, wherein said vector is an sAd4310A adenoviral vector comprising any one of SEQ ID NOs: 40-45.

9. The recombinant vector of claim 6, wherein said vector is an sAd4312 adenoviral vector comprising any one of SEQ ID NOs: 46-51.

10. A recombinant adenovirus comprising an isolated polynucleotide of any one of claims 1-5.

11. The recombinant adenovirus of claim 10, wherein said isolated polynucleotide comprises a deletion in or of the E1 region, said deletion rendering said recombinant virus a replication-defective virus.

12. The recombinant adenovirus of claim 11, wherein said isolated polynucleotide comprises a deletion in or of the E3 region and/or E4 region.

13. The recombinant adenovirus of claim 11 or 12, further comprising a heterologous nucleotide sequence encoding an antigenic or therapeutic gene product of interest, or fragment thereof.

14. The recombinant adenovirus of claim 13, wherein said antigenic gene product, or fragment thereof, comprises a bacterial, viral, parasitic, or fungal protein, or fragment thereof.

15. The recombinant adenovirus of claim 14, wherein 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*.

16. The recombinant adenovirus of claim 14, wherein said viral protein, or fragment thereof, is from a viral family selected from the group consisting of *Retroviridae*, *Flaviviridae*, *Arenaviridae*, *Bunyaviridae*, *Filoviridae*, *Togaviridae*, *Poxviridae*, *Herpesviridae*, *Orthomyxoviridae*, *Coronaviridae*, *Rhabdoviridae*, *Paramyxoviridae*, *Picornaviridae*, *Hepadnaviridae*, *Papillomaviridae*, *Parvoviridae*, *Astroviridae*, *Polyomaviridae*, *Calciviridae*, and *Reoviridae*.

17. The recombinant adenovirus of claim 16, wherein said viral protein, or fragment thereof, is from human immunodeficiency virus (HIV), human papillomavirus (HPV), hepatitis A virus (Hep A), hepatitis B virus (HBV), hepatitis C virus (HCV), *Variola major*, *Variola minor*, monkeypox virus, measles virus, rubella virus, mumps virus, varicella zoster virus (VZV), poliovirus, rabies virus, Japanese encephalitis virus, herpes simplex virus (HSV), cytomegalovirus (CMV), rotavirus, influenza, Ebola virus, yellow fever virus, or Marburg virus.

18. The recombinant adenovirus of claim 17, wherein said viral protein, or fragment thereof, from HIV is Gag, Pol, Env, Nef, Tat, Rev, Vif, Vpr, or Vpu.

19. The recombinant adenovirus of claim 14, wherein said parasitic protein, or fragment thereof, is from *Toxoplasma gondii*, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, *Trypanosoma* spp., or *Legionella* spp.

20. The recombinant adenovirus of claim 14, wherein 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*.

21. A method of treating a subject having a disease, said method comprising administering the recombinant adenovirus of any one of claims 10-20 to said subject.

22. The method of claim 21, wherein said recombinant adenovirus comprises an antigenic gene product, or fragment thereof, that promotes an immune response in said subject against an infective agent.

23. The method of claim 21, wherein said infective agent is a bacterium, a virus, a parasite, or a fungus.

24. The method of claim 23, wherein said bacterium is *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*.

25. The method of claim 23, wherein said virus is a retrovirus, flavivirus, arenavirus, bunyavirus, filovirus, togavirus, poxvirus, herpesvirus, orthomyxovirus, coronavirus, rhabdovirus, paramyxovirus, picornavirus, hepadnavirus, papillomavirus, parvovirus, astrovirus, polyomavirus, calicivirus, or reovirus.

26. The method of claim 25, wherein said retrovirus is human immunodeficiency virus (HIV).

27. The method of claim 23, wherein said virus is human papillomavirus (HPV), hepatitis A virus (Hep A), hepatitis B virus (HBV), hepatitis C virus (HCV), *Variola major*, *Variola minor*, monkeypox virus, measles virus, rubella virus, mumps virus, varicella zoster virus (VZV), poliovirus, rabies virus, Japanese encephalitis virus, herpes simplex virus (HSV), cytomegalovirus (CMV), rotavirus, influenza, Ebola virus, yellow fever virus, or Marburg virus.

28. The method of claim 23, wherein said parasite is *Toxoplasma gondii*, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, *Trypanosoma* spp., or *Legionella* spp.

29. The method of claim 23, wherein said fungus is *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*.

30. The method of claim 21, 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, or sinus-orbital zygomycosis.

31. The method of any one of claims 21-30, wherein said subject is human.

32. The method of any one of claims 21-31, wherein said adenovirus is administered intramuscularly, intravenously, intradermally, percutaneously, intraarterially, intraperitoneally, intralesionally, intracranially, intraarticularly, intraprostatically, intrapleurally, intratracheally, intranasally, intravitreally, intravaginally,

intrarectally, topically, intratumorally, peritoneally, subcutaneously, subconjunctivally, intravesicularlly, mucosally, intrapericardially, intraumbilically, intraocularly, orally, topically, locally, by inhalation, by injection, by infusion, by continuous infusion, by localized perfusion bathing target cells directly, by catheter, by lavage, by gavage, in cremes, or in lipid compositions.

33. The method of any one of claims 21-32, wherein said adenovirus is administered as a pharmaceutical composition comprising a pharmaceutically acceptable carrier.

34. The method of claim 33, wherein said subject is administered at least one dose of said pharmaceutical composition.

35. The method of claim 34, wherein said subject is administered at least two doses of said pharmaceutical composition.

36. The method of claim 35, wherein said pharmaceutical composition is administered to said subject as a prime boost.

37. A method of producing a recombinant adenovirus according to any one of claims 10-20, wherein said method comprises culturing a cell in a suitable medium; transfecting said cell with an isolated polynucleotide according to any one of claims 1-5 or a recombinant vector according to any one of claims 6-9; allowing replication of said polynucleotide or vector in said cell; and harvesting produced recombinant adenovirus from said medium and/or said cell.

38. The method of claim 37, wherein said cell is a bacterial, plant, or mammalian cell.

39. The method of claim 38, wherein said mammalian cell is a PER.55K cell or a Chinese hamster ovary (CHO) cell.

CLAIMS

1. An isolated polynucleotide comprising a nucleotide sequence that is at least 90% identical to, or complementary to, at least 300 contiguous nucleotides of anyone of SEQ ID NOs: 2, 1, and 3.

2. The isolated polynucleotide of claim 1, wherein said nucleotide sequence is at least 95% or 100% identical to, or complementary to, at least 300 contiguous nucleotides of any one of SEQ ID NOs: 2, 1, and 3, optionally wherein said nucleotide sequence comprises all or a portion of any one of SEQ ID NOs: 4-18.

3. A recombinant vector comprising an isolated polynucleotide of claim 1 or 2.

4. The recombinant vector of claim 3, wherein said vector is
(i) an sAd4310A adenoviral vector comprising any one of SEQ ID NOs: 40-45, or
(ii) an sAd4287 adenoviral vector comprising any one of SEQ ID NOs: 34-39,
(iii) an sAd4312 adenoviral vector comprising any one of SEQ ID NOs: 46-51.

5. A recombinant adenovirus comprising an isolated polynucleotide of claim 1 or 2.

6. The recombinant adenovirus of claim 5, wherein said isolated polynucleotide comprises a deletion in or of the E1 region, said deletion rendering said recombinant virus a replication-defective virus, optionally wherein said isolated polynucleotide comprises a deletion in or of the E3 region and/or E4 region and/or said recombinant adenovirus further comprises a heterologous nucleotide sequence encoding an antigenic or therapeutic gene product of interest, or fragment thereof.

7. The recombinant adenovirus of claim 6, wherein said antigenic gene product, or fragment thereof, comprises a bacterial, viral, parasitic, or fungal protein, or fragment thereof, optionally 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, 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.*

8. The recombinant adenovirus of any one of claims 5-7, for use in treating a subject having a disease.

9. The recombinant adenovirus for use according to claim 8, wherein said recombinant adenovirus comprises an antigenic gene product, or fragment thereof, that promotes an immune response in said subject against an infective agent, optionally wherein said infective agent is:

(i) a virus 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, 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) a bacterium, such as a *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) a parasite, such as *Toxoplasma gondii, Plasmodium falciparum , Plasmodium vivax, Plasmodium ovale, Plasmodium malariae, Trypanosoma* spp., or *Legionella* spp; or

(iv) a fungus, such as *Aspergillus, Blastomyces dermatitidis, Candida, Coccidioides immitis, Cryptococcus neoformans, Histoplasma capsula tum var. capsulatum, Paracoccidioides brasiliensis, Sporothrix schenckii, Zygomycetes* spp., *Absidia corymbifera, Rhizomucor pusillus,* or *Rhizopus arrhizus.*

10. The recombinant adenovirus for use according to claim 8 or 9, 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, or sinus-orbital zygomycosis.

11. The recombinant adenovirus for use according to any one of claims 8-10, wherein said subject is human.

12. The recombinant adenovirus for use according to any one of claims 8-11, 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.

13. The recombinant adenovirus for use according to claim 12, wherein said pharmaceutical composition is formulated for administration in at least one or two doses, optionally wherein said pharmaceutical composition is formulated for administration as prime boost.

14. A method of producing a recombinant adenovirus according to any one of claims 5-7, wherein said method comprises culturing a cell in a suitable medium; transfecting said cell with an isolated polynucleotide according to claim 1 or 2 or a recombinant vector according to claim 3 or 4 allowing replication of said polynucleotide or vector in said cell; and harvesting produced recombinant adenovirus from said medium and/or said cell.

15. The method of claim 14, wherein said cell is a bacterial, plant, or mammalian cell, optionally wherein said mammalian cell is a Chinese hamster ovary (CHO) cell.