CLAIMS

What is claimed is:

1. A polynucleotide encoding a truncated hepatitis B virus (HBV) polymerase polypeptide, the polypeptide comprising an inactivated reverse transcriptase domain and an inactivated RNase H, wherein the polypeptide is no longer than 600 amino acids in length and does not comprise all of the terminal protein (TP) domain and does not comprise all or part of the Spacer domain, wherein the polypeptide comprises or consists of the amino acid sequence of any one of SEQ ID NOs: 13-14.

2. The polynucleotide of claim 1, comprising or consisting of the nucleic acid sequence of any one of SEQ ID NOs: 29 and 89-94, or the nucleic acid sequence that is at least 99% identical to the full length of any one of SEQ ID NOs: 29 and 89-94.

3. An expression cassette, comprising a polynucleotide of claim 1 operably linked to one or more regulatory sequences.

4. A vector comprising one or more polynucleotides of claim 1.

5. The vector of claim 4, wherein the vector is a viral vector.

6. The vector of claim 5, wherein the viral vector is an arenavirus vector selected from Lymphocytic choriomeningitis mammarenavirus (LCMV), Pichinde mammarenavirus (PICV), Guanarito virus (GTOV), Junin virus (JUNV), Lassa virus (LASV), Lujo virus (LUJV), Machupo virus (MACV), Sabia virus (SABV), and Whitewater Arroyo virus (WWAV).

7. The vector of claim 6, wherein the viral vector is an arenavirus vector selected from Lymphocytic choriomeningitis mammarenavirus (LCMV) or Pichinde mammarenavirus (PICV).

8. The vector of claim 5, wherein the viral vector is a replication-defective arenavirus having a bi-segmented genome.

9. An isolated host cell comprising the vector of claim 5.

10. A kit comprising one or more unitary doses of the vector of claim 5.

11. A polynucleotide encoding a fusion protein comprising or consisting of the amino acid sequence of SEQ ID NO: 41, or the amino acid sequence that is at least 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of SEQ ID NO: 41, the fusion protein comprising in sequential order from the N-terminus to the C-terminus, an HBV core polypeptide and an HBV small surface antigen (sAg) polypeptide, wherein the fusion protein is no longer than 450 amino acids in length, does not comprise an HBV pre-S1 polypeptide and/or an HBV pre-S2 polypeptide, and wherein the core polypeptide is from an HBV genotype D and the sAg polypeptide is from an HBV genotype D, wherein the polynucleotide comprises or consists of the nucleic acid sequence of SEQ ID NO: 37, or the nucleic acid sequence that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of SEQ ID NO: 37.

12. A truncated hepatitis B virus (HBV) polymerase polypeptide comprising an inactivated reverse transcriptase domain and an inactivated RNase H, wherein the polypeptide is no longer than 600 amino acids in length and does not comprise all of the terminal protein (TP) domain and does not comprise all or part of the Spacer domain, wherein the polypeptide comprises or consists of the amino acid sequence of any one of SEQ ID NOs: 13-14.

13. A fusion protein comprising in sequential order from the N-terminus to the C-terminus, an HBV core polypeptide and an HBV small surface antigen (sAg) polypeptide, wherein the fusion protein is no longer than 450 amino acids in length, does not comprise an HBV pre-S1 polypeptide and/or an HBV pre-S2 polypeptide, and wherein: the core polypeptide is from an HBV genotype D and the sAg polypeptide is from an HBV genotype D, wherein the fusion protein comprises or consists of the amino acid sequence of any one of SEQ ID NOs: 40-41, or the amino acid sequence that is at least 97%, 98% or 99% identical to the full length of any one of SEQ ID NOs: 40-41.

14. A polynucleotide encoding the core-sAg fusion protein of claim 13.

15. An expression cassette, comprising the polynucleotide of claim 14 operably linked to one or more regulatory sequences.

16. A vector comprising one or more polynucleotides of claim 14.

17. The vector of claim 16, wherein the vector is a viral vector.

18. The vector of claim 17, wherein the viral vector is an arenavirus vector selected from Lymphocytic choriomeningitis mammarenavirus (LCMV), Pichinde mammarenavirus (PICV), Guanarito virus (GTOV), Junin virus (JUNV), Lassa virus (LASV), Lujo virus (LUJV), Machupo virus (MACV), Sabia virus (SABV), and Whitewater Arroyo virus (WWAV).

19. The vector of claim 18, wherein the viral vector is an arenavirus vector selected from Lymphocytic choriomeningitis mammarenavirus (LCMV) or Pichinde mammarenavirus (PICV).

20. An arenavirus vector comprising a polynucleotide encoding an HBV core-sAg fusion polypeptide comprising or consisting of the amino acid sequence of any one of SEQ ID NOs: 40-41, or the amino acid sequence that is at least 97%, 98% or 99% identical to the full length of any one of SEQ ID NOs: 40-41, and wherein the sAg polypeptide is no longer than 450 amino acids in length and does not comprise an HBV pre-S1 polypeptide and/or an HBV pre-S2 polypeptide.

21. An arenavirus vector comprising a polynucleotide encoding an HBV core-sAg fusion polypeptide comprising or consisting of the amino acid sequence of any one of SEQ ID NO: 41, or the amino acid sequence that is at least 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of any one of SEQ ID NOs: 41, and wherein the sAg polypeptide does not comprise an HBV pre-S1 polypeptide and/or an HBV pre-S2 polypeptide.

22. The arenavirus vector of claim 20, wherein the polynucleotide comprises or consists of the nucleic acid sequence of any one of SEQ ID NOs: 35-37, or that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of any one of SEQ ID NOs: 35-37.

23. The arenavirus vector of claim 20, wherein the polynucleotide comprises or consists of the nucleic acid sequence of SEQ ID NO: 37, or that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of SEQ ID NO: 37.

24. The arenavirus vector of claim 20, wherein the vector has a bisegmented genome and further comprises a polynucleotide encoding a truncated HBV polymerase comprising or consisting of the amino acid sequence of any one of SEQ ID NOs: 13-14 and wherein the truncated HBV polymerase is no longer than 600 amino acids in length and does not comprise all of an HBV polymerase terminal protein (TP) domain and does not comprise all or part of an HBV polymerase Spacer domain.

25. The arenavirus vector of claim 24, wherein the polynucleotide comprises or consists of the nucleic acid sequence of any one of SEQ ID NOs: 29 and 89-94, or that is at least 99% identical to the full length of any one of SEQ ID NOs: 29 and 89-94.

26. The arenavirus vector of claim 24, wherein the arenavirus vector is a Lymphocytic choriomeningitis mammarenavirus (LCMV) vector and the polynucleotide comprises or consists of the nucleic acid sequence of SEQ ID NO: 29, or that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of SEQ ID NO: 29.

27. The arenavirus vector of claim 24, wherein the arenavirus vector is a Pichinde mammarenavirus (PICV) vector and the polynucleotide comprises or consists of the nucleic acid sequence of SEQ ID NO: 90, or that is at least 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of SEQ ID NO: 90.

28. An arenavirus vector comprising a polynucleotide encoding a truncated HBV polymerase comprising or consisting of the amino acid sequence of any one of SEQ ID NOs: 13-14, and wherein the truncated HBV polymerase is no longer than 600 amino acids in length and does not comprise all of an HBV polymerase terminal protein (TP) domain and does not comprise all or part of an HBV polymerase Spacer domain.

29. The arenavirus vector of claim 28, wherein the polynucleotide comprises or consists of the nucleic acid sequence of any one of SEQ ID NOs: 29 and 89-94, or that is at least 99% identical to the full length of any one of SEQ ID NOs: 29 and 89-94.

30. The arenavirus vector of claim 28, wherein the arenavirus vector is a Lymphocytic choriomeningitis mammarenavirus (LCMV) vector and the polynucleotide comprises or consists of the nucleic acid sequence of SEQ ID NO: 29, or the nucleic acid sequence that is at least 99% identical to the full length of any one of SEQ ID NO: 29.

31. The arenavirus vector of claim 28, wherein the arenavirus vector is a Pichinde mammarenavirus (PICV) vector and the polynucleotide comprises or consists of the nucleic acid sequence of SEQ ID NO: 90, or the nucleic acid sequence that is at least 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of SEQ ID NO: 90.

32. The arenavirus vector of claim 20, wherein the arenavirus vector is replication-defective, replication-deficient, or replication-incompetent.

33. An isolated host cell comprising one or more vectors of claim 20.

34. A kit comprising one or more unitary doses of one or more vectors of claim 20.

35. An immunogenic composition comprising a first viral expression vector and a second viral expression vector, wherein: the first viral expression vector comprises a polynucleotide encoding a truncated HBV polymerase polypeptide mutant, wherein the polypeptide is no longer than 600 amino acids in length, does not comprise all of the terminal protein (TP) domain and does not comprise all or part of the Spacer domain, wherein the polypeptide comprises or consists of the amino acid sequence of any one of SEQ ID NOs: 13-14; and the second viral expression vector comprises a polynucleotide encoding a core-sAg fusion protein comprising in sequential order from the N-terminus to the C terminus, an HBV core polypeptide and an HBV small surface antigen (sAg) polypeptide, wherein the fusion protein is no longer than 450 amino acids in length, and wherein the core polypeptide is from an HBV genotype D and the sAg polypeptide is from an HBV genotype D, wherein the fusion protein comprises or consists of the amino acid sequence of any one of SEQ ID NOs: 40-41, or

the amino acid sequence that is at least 97%, 98% or 99% identical to the full length of any one of SEQ ID NOs: 40-41.

36. The immunogenic composition of claim 35, comprising a first viral expression vector and a second viral expression vector, wherein: the first viral expression vector comprises a polynucleotide encoding an HBV polymerase polypeptide mutant comprising or consisting of the amino acid sequence of SEQ ID NO: 13; and the second viral expression vector comprises a polynucleotide encoding the core-sAg fusion protein comprising or consisting of the amino acid sequence of SEQ ID NO: 41, or the amino acid sequence that is at least 97%, 98% or 99% identical to the full length of SEQ ID NO: 41.

37. The immunogenic composition of claim 35, comprising a first viral expression vector and a second viral expression vector, wherein: a) the first viral expression vector comprises a polynucleotide comprising or consisting of the nucleic acid sequence of any one of SEQ ID NOs: 29, 32, 89, 90, 91, 92, 93 and 94, or the nucleic acid sequence that is at least 99% identical to the full length of any one of SEQ ID NOs: 29, 32, 89, 90, 91, 92, 93 and 94; b) the second viral expression vector comprises a polynucleotide comprising or consisting of the nucleic acid sequence of any one of SEQ ID NOs: 33-37 or the nucleic acid sequence that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of any one of SEQ ID NOs: 33-37.

38. The immunogenic composition of claim 35, comprising a first viral expression vector and a second viral expression vector, wherein: a) the first viral expression vector comprises a polynucleotide comprising or consisting of the nucleic acid sequence of SEQ ID NOs: 29, 89, 90 or 92, or the nucleic acid sequence that is at least 99% identical to the full length of SEQ ID NOs: 29, 89, 90 or 92; and b) the second viral expression vector comprises a polynucleotide comprising or consisting of the nucleic acid sequence of SEQ ID NO: 37 or the nucleic acid sequence that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identical to the full length of any one of SEQ ID NO: 37.

39. The immunogenic composition of claim 35, wherein the first viral expression vector and the second viral expression vector are independently from a taxonomic family selected from Adenoviridae, Arenaviridae, Herpesviridae, Poxviridae, Flaviviridae, Rhabdoviridae, and Togaviridae.

40. The immunogenic composition of claim 35, wherein the first viral expression vector and the second viral expression vector are from the same taxonomic family.

41. The immunogenic composition of claim 40, wherein the first viral expression vector and the second viral expression vector are from Arenaviridae.

42. The immunogenic composition of claim 40, wherein the first viral expression vector and the second viral expression vector are independently from an arenavirus vector selected from Lymphocytic choriomeningitis mammarenavirus (LCMV), Pichinde mammarenavirus (PICV), Guanarito virus (GTOV), Junin virus (JUNV), Lassa virus (LASV), Lujo virus (LUJV), Machupo virus (MACV), Sabia virus (SABV), and Whitewater Arroyo virus (WWAV).

43. The immunogenic composition of claim 40, wherein the first viral expression vector and the second viral expression vector are from an arenavirus vector selected from Lymphocytic choriomeningitis mammarenavirus (LCMV) or Pichinde mammarenavirus (PICV).

44. The immunogenic composition of claim 40, wherein the first viral expression vector and the second viral expression vector are replication-defective or replication-deficient.

45. The immunogenic composition of claim 40, wherein the first viral expression vector and the second viral expression vector are replication-attenuated.

46. The immunogenic composition of claim 35, wherein the first viral expression vector and the second viral expression vector are from different taxonomic families.

47. The immunogenic composition of claim 35, wherein the first viral expression vector and the second viral expression vector are provided in a ratio in the range of from 1:10 to 10:1.

48. The immunogenic composition of claim 35, comprising in the range of about 10.sup.3 to about 10.sup.12 viral focus forming units (ffu) or plaque forming units (pfu) or infectious units (iu) or viral particles (vp) per milliliter of each of the first viral expression vector and the second viral expression vector.

49. The immunogenic composition of claim 35, further comprising one or more of an adjuvant, a detergent, a micelle-forming agent, and an oil.

50. The immunogenic composition of claim 35, formulated for administration via a route selected from the group consisting of intravenous, intramuscular, intradermal, subcutaneous and mucosal.

51. The immunogenic composition of claim 35, formulated as a liquid.

52. The immunogenic composition of claim 35, wherein the composition is lyophilized.

53. A kit comprising one or more unitary doses of the immunogenic composition of claim 35.