CLAIMS:

1. A pharmaceutical composition comprising:

i. a polyepitope protein comprising two or more amino acid sequences of cytotoxic T-cell (CTL) epitopes from herpesvirus antigens, wherein the protein comprises proteasome liberation amino acids or amino acid sequences between at least two of said two or more CTL epitopes, wherein the protein is capable of eliciting a CTL response upon administration to a subject as an exogenous protein; or a nucleic acid encoding the polyepitope protein;

ii. an immunogenic glycoprotein or fragment thereof; or a nucleic acid encoding the immunogenic glycoprotein or fragment thereof; and

iii. an adjuvant; or a nucleic acid encoding the adjuvant.

2. The pharmaceutical composition of claim 1, wherein the composition comprises the polyepitope protein, the immunogenic glycoprotein or fragment thereof, and the adjuvant.

3. The pharmaceutical composition of claim 1, wherein the composition comprises one or more nucleic acid sequences encoding the polyepitope protein, the immunogenic glycoprotein or fragment thereof, and the adjuvant.

4. The pharmaceutical composition of claim 3, wherein the nucleic acid sequence encodes one or more of the polyepitope protein, the immunogenic glycoprotein or fragment thereof, and the adjuvant.

5. The pharmaceutical composition of any one of claims 1-4, wherein the immunogenic glycoprotein is derived from EBV, optionally

wherein the immunogenic glycoprotein comprises at least one of glycoprotein 350 (gp350), glycoprotein B (gB), glycoprotein H (gH), glycoprotein (gL), gHgL complex, glycoprotein 42 (gp42), any fragment thereof, or any combination thereof.

6. The pharmaceutical composition of claim 5, wherein the immunogenic glycoprotein comprises the amino acid sequence set forth in SEQ ID NO. 43; or

wherein the nucleic acid encoding the immunogenic glycoprotein comprises the nucleic acid sequence set forth in SEQ ID NO. 44.

7. The pharmaceutical composition of any one of claims 1-6, wherein the adjuvant comprises at least one of a toll-like receptor (TLR) agonist, a cationic anti-microbial peptide (CAMP), Adjuvant 65, α-GalCer, aluminum phosphate, aluminum hydroxide, calcium phosphate, β-Glucan Peptide, CpG DNA, GPI-0100, lipid A, monophosphorylated lipid A (MPL), lipopolysaccharide, Lipovant, Montanide, N-acetyl-muramyl-L-alanyl-D-isoglutamine, Pam3CSK4, quil A, or trehalose dimycolate.

8. The pharmaceutical composition of claim 7, wherein the adjuvant comprises a TLR9 agonist.

9. The pharmaceutical composition of 8, wherein the TLR9 agonist is a CpG ODN or an amphiphilic CpG ODN.

10. The pharmaceutical composition of claim 9, wherein the nucleic acid encoding the CpG ODN comprises the nucleic acid sequence set forth in SEQ ID NO. 45.

11. A multivalent vaccine, comprising the pharmaceutical composition of any one of claims 1-10.

12. An isolated nucleic acid encoding the polyepitope protein of any one of claims 1-11, comprising a nucleic acid sequence selected from SEQ ID NOs. 22-42.

13. An expression vector comprising the isolated nucleic acid of claim 12 operably linked to one or more regulatory sequences.

14. A host cell comprising the expression vector of claim 13.

15. A method of producing the polyepitope protein of any one of claims 1-11, wherein said method includes steps for purifying the polyepitope protein under conditions that maintain the polyepitope protein in a substantially non-aggregated form.

16. A prophylactic or therapeutic composition, the composition comprising:

i. a polyepitope protein comprising amino acid sequences derived from two or more cytotoxic T-cell (CTL) epitopes, wherein the polyepitope protein comprises the amino acid sequences set forth in SEQ ID NOs. 1 and 11; or a nucleic acid encoding the polyepitope protein;

ii. at least one herpesvirus glycoprotein; or a nucleic acid encoding the at least one herpesvirus glycoprotein; and

iii. at least one adjuvant; or a nucleic acid encoding the at least one adjuvant; wherein the composition elicits an immunogenic response in a subject against a herpesvirus.

17. The composition of claim 16, wherein the composition comprises the polyepitope protein, the at least one herpesvirus glycoprotein, and the at least one adjuvant.

18. The composition of claim 16, wherein the composition comprises one or more nucleic acid sequences encoding the polyepitope protein, the at least one herpesvirus glycoprotein, and the at least one adjuvant.

19. The composition of claim 18, wherein the nucleic acid sequence encodes one or more of the polyepitope protein, the at least one herpesvirus glycoprotein, and the at least one adjuvant.

20. The composition of any one of claims 16-19, wherein the nucleic acid encoding the polyepitope protein comprises the nucleic acid sequences set forth in SEQ ID NOs. 22 and 32.

21. The composition of any one of claims 16-20, wherein the polyepitope protein further comprises at least one of the CTL epitope amino acid sequences set forth in SEQ ID NOs. 12-20; or

wherein the nucleic acid encoding the polyepitope protein further comprises at least one of the CTL epitope nucleic acid sequences set forth in SEQ ID NOs. 33-41.

22. The composition of any one of claims 16-21, wherein the polyepitope protein comprises each of the CTL epitope amino acid sequences set forth in SEQ ID NOs. 1-20, or

the amino acid sequence set forth in SEQ ID NO. 21; or

wherein the nucleic acid encoding the polyepitope protein comprises each of the CTL epitope nucleic acid sequences set forth in SEQ ID NOs. 22-41, or the nucleic acid sequences set forth in SEQ ID NO. 42.

23. The composition of any one of claims 16-22, wherein each of the epitopes of the polyepitope protein are restricted by any one of the HLA class I specificities selected from HLA A*03, HLA A11, HLA A*0201, HLA A*1101, HLA A*2301, HLA A*3002, HLA B27, HLA B35.08/B35.01, HLA B*44:0, HLA B57*03, HLA B*0702, HLA B*0801, HLA B*1501, HLA B*3501, HLA B*3508, HLA B*4001, HLA B*4402, HLA B*4402, HLA B*4403, HLA B*4405, HLA B*5301, HLA B*5701, or HLA B*5801.

24. The composition of any one of claims 16-23, wherein the herpesvirus glycoprotein is derived from EBV optionally selected from

gp350, gB, gH, gL, gHgL complex, gp42, any fragment thereof, or any combination thereof.

25. The composition of claim 24, wherein the glycoprotein comprises the amino acid sequence set forth in SEQ ID NO. 43; or

wherein the nucleic acid encoding the glycoprotein comprises the nucleic acid sequence set forth in SEQ ID NO. 44.

26. The composition of any one of claims 16-25, wherein the adjuvant comprises a TLR agonist.

27. The composition of claim 26, wherein the TLR agonist comprises a CpG ODN or a CpG ODN conjugated to a lipid.

28. The composition of claim 27, wherein the nucleic acid encoding the CpG ODN comprises the nucleic acid sequence set forth in SEQ ID NO. 45.

29. A multivalent EBV vaccine comprising:

i. a polyepitope protein as set forth in SEQ ID NO. 21; or a nucleic acid encoding the polyepitope protein;

ii. at least one EBV glycoprotein; or a nucleic acid encoding the at least one EBV glycoprotein; and

iii. at least one adjuvant; or a nucleic acid encoding the at least one adjuvant.

30. The multivalent EBV vaccine of claim 29, wherein the composition comprises the polyepitope protein, the at least one EBV glycoprotein, and the at least one adjuvant.

31. The multivalent EBV vaccine of claim 29, wherein the composition comprises one or more nucleic acid sequences encoding the polyepitope protein, the at least one EBV glycoprotein, and the at least one adjuvant.

32. The multivalent EBV vaccine of claim 31, wherein the nucleic acid sequence encodes one or more of the polyepitope protein, the at least one EBV glycoprotein, and the at least one adjuvant.

33. The multivalent EBV vaccine of any one of claims 29-32, wherein the nucleic acid encoding the polyepitope protein comprises the nucleic acid sequence set forth in SEQ ID NO. 42.

34. The multivalent EBV vaccine of any one of claims 29-33, wherein the EBV glycoprotein is selected from gp350, gB, gH, gL, gHgL complex, gp42, any fragment thereof, or any combination thereof.

35. The multivalent EBV vaccine of claim 34, wherein the glycoprotein comprises the amino acid sequence set forth in SEQ ID NO. 43; or

wherein the nucleic acid encoding the glycoprotein comprises the nucleic acid sequence set forth in SEQ ID NO. 44.

36. The multivalent EBV vaccine of any one of claims 29-35, wherein the adjuvant comprises a TLR agonist.

37. The multivalent EBV vaccine of claim 36, wherein the TLR agonist is a CpG ODN or a CpG ODN conjugated to a lipid.

38. The multivalent EBV vaccine of claim 37, wherein the nucleic acid encoding the CpG ODN comprises the nucleic acid sequence set forth in SEQ ID NO. 45.

39. A method for generating a composition for the prophylactic or therapeutic treatment of herpesvirus infection, wherein the method comprises combining an isolated polyepitope protein, or a nucleic acid encoding the isolated polyepitope protein, at least one herpesvirus glycoprotein, or a nucleic acid encoding the at least one herpesvirus glycoprotein, at least one adjuvant comprising a TLR agonist, or a nucleic acid encoding the at least one adjuvant, and a pharmaceutically acceptable excipient, in a formulation suitable for administration to a subject;

wherein the polyepitope protein comprises at least one of the CTL epitope amino acid sequences set forth in SEQ ID NOs. 1 and 11.

40. The method of claim 39, wherein the nucleic acid encoding the polyepitope protein comprises at least one of the nucleic acid sequences set forth in SEQ ID NOs. 22-41, or any combination thereof.

41. The method of claim 39, wherein the nucleic acid encoding the polyepitope protein comprises the nucleic acid sequence set forth in SEQ ID NO. 42.

42. The method of any one of claims 39-41, wherein the polyepitope protein comprises the amino acid sequence set forth in SEQ ID NO. 21.

43. The method of any one of claims 39-42, wherein the herpesvirus glycoprotein is derived from EBV, optionally selected from

gp350, gB, gH, gL, gHgL complex, gp42, any fragment thereof, or any combination thereof.

44. The method of claim 43, wherein the glycoprotein comprises the amino acid sequence set forth in SEQ ID NO. 43; or

wherein the nucleic acid encoding the glycoprotein comprises the nucleic acid sequence set forth in SEQ ID NO. 44.

45. The method of any one of claims 39-44, wherein the adjuvant comprises a TLR9 agonist.

46. The method of claim 45, wherein the TLR9 agonist is a CpG ODN or a CpG ODN conjugated to a lipid.

47. The method of claim 46, wherein the nucleic acid encoding the CpG ODN comprises the nucleic acid sequence set forth in SEQ ID NO. 45.

48. Use of a composition in the manufacture of a medicament for the prophylactic or therapeutic treatment of a herpesvirus infection in a subject, wherein the medicament comprises:

i. a polyepitope protein comprising amino acid sequences derived from two or more cytotoxic T-cell (CTL) epitopes, wherein the polyepitope protein comprises the amino acid sequences set forth in SEQ ID NOs. 1 and 11; or a nucleic acid encoding the polyepitope protein;

ii. at least one herpesvirus glycoprotein; or a nucleic acid encoding the herpesvirus glycoprotein; and

iii. an adjuvant; or a nucleic acid encoding the adjuvant.

49. The use of claim 48, wherein the nucleic acid encoding the polyepitope protein comprises the nucleic acid sequences set forth in SEQ ID NOs. 22 and 32.

50. The use of claim 48 or 49, wherein the polyepitope protein further comprises at least one of the CTL epitope amino acid sequences set forth in SEQ ID NOs. 1-20, or any combination thereof; or

wherein the nucleic acid encoding the polyepitope protein further comprises at least one of the CTL epitope nucleic acid sequences set forth in SEQ ID NOs. 22-41, or any combination thereof.

51. The use of any one of claims 48-50, wherein the polyepitope protein comprises the amino acid sequence set forth in SEQ ID NO. 21; or

wherein the nucleic acid encoding the polyepitope protein comprises the nucleic acid sequence set forth in SEQ ID NO. 42.

52. The use of any one of claims 48-51, wherein each of the epitopes are restricted by any one of the HLA class I specificities selected from HLA class I specificities selected from HLA

A*03, HLA A11, HLA A*0201, HLA A*1101, HLA A*2301, HLA A*3002, HLA B27, HLA B35.08/B35.01, HLA B*44:0, HLA B57*03, HLA B*0702, HLA B*0801, HLA B*1501, HLA B*3501, HLA B*3508, HLA B*4001, HLA B*4402, HLA B*4402, HLA B*4403, HLA B*4405, HLA B*5301, HLA B*5701, or HLA B*5801.

53. The use of any one of claims 48-52, wherein the composition comprises 20-50 µg of the polyepitope protein.

54. The use of claim 53, wherein the composition comprises 40 µg of the polyepitope protein.

55. The use of any one of claims 48-54, wherein the glycoprotein is selected from gp350, gB, gH, gL, gHgL complex, gp42, any fragment thereof, or any combination thereof.

56. The use of claim 55, wherein the glycoprotein comprises the amino acid sequence set forth in SEQ ID NO. 43; or

wherein the nucleic acid encoding the glycoprotein comprises the nucleic acid sequence set forth in SEQ ID NO. 44.

57. The use of any one of claims 48-56, wherein the adjuvant comprises a TLR agonist.

58. The use of claim 57, wherein the TLR agonist is a CpG ODN or a CpG ODN conjugated to a lipid.

59. The use of claim 58, wherein the nucleic acid encoding the CpG ODN comprises the nucleic acid sequence set forth in SEQ ID NO. 45.