during long term storage in a liquid state at temperatures ranging from just above freezing to ambient temperatures would be operationally advantageous as well as greatly increase convenience and flexibility for the health care provider and patient. The invention fulfills this need by providing such compositions.

SUMMARY OF THE INVENTION

[0007] Disclosed is a live virus composition comprising a herpes simplex virus, a protein, at least one sugar, sodium chloride and sodium phosphate at pH 7-8. In one aspect, the present invention refers to a live virus composition comprising: a herpes simplex virus, a protein, wherein the protein is partially hydrolyzed gelatin or human serum albumin, at least one sugar, sodium chloride, and sodium phosphate or potassium phosphate, wherein the composition is at pH 7-8. Disclosed is a live virus composition comprising a herpes simplex virus, a protein, at least one sugar, and phosphate buffer at pH 7-8. In another aspect, the present invention refers to a live virus composition comprising a herpes simplex virus, a protein, at least one sugar, and phosphate buffer at pH 7-8, wherein the protein is partially hydrolyzed gelatin or human serum albumin. In still another e aspect, the present invention refers to a live virus composition comprising: a herpes simplex 1 virus; partially hydrolyzed gelatin at a concentration of 3% (w/v); sorbitol at a concentration of 3% (w/v); sodium chloride at a concentration of 50 to 250 mM; and wherein said composition is at pH 7.4. In another aspect, the present invention refers to a frozen live virus composition comprising: a herpes simplex 1 virus; partially hydrolyzed gelatin at a concentration of 3% (w/v); sorbitol at a concentration of 3% (w/v); sodium chloride at a concentration of 50 to 250 mM; and wherein said composition is at pH 7.4. In another aspect, the present invention refers to a live virus composition comprising: a herpes simplex 1 virus; human serum albumin at a concentration of 0.25% to 2% (w/v); sorbitol at a concentration of 3% (w/v); sodium chloride at a concentration of 50 to 250 mM; and wherein said composition is at pH 7.4. In another aspect, the present invention refers to a frozen live virus composition comprising: a herpes simplex 1 virus; human serum albumin at a concentration of 0.25% to 2% (w/v); sorbitol at a concentration of 3% (w/v); sodium chloride at a concentration of 50 to 250 mM; and wherein said composition is at pH 7.4. In another aspect, the present invention refers to a frozen live virus composition comprising: a herpes simplex 1 virus; human serum albumin at a concentration of 0.25% to 2% (w/v); sorbitol at a concentration of 3% (w/v); sodium chloride at a concentration of 50 to 250 mM; and wherein said composition is at pH 7.4. In another aspect, the present invention refers to a frozen live virus composition comprising: a herpes simplex 1 virus; human serum albumin at a concentration of 0.25% to 2% (w/v); trehalose at a concentration of 15% (w/v); sodium chloride at a concentration of 137 mM; and wherein said composition is at pH 7.4. In another aspect, the present invention refers to a live virus composition comprising: a herpes simplex 1 virus; human serum albumin at a concentration of 0.25% to 2% (w/v); sorbitol at a concentration of 0.5% to 3% (w/v); myo-inositol at a concentration of 4% (w/v); sodium chloride; and wherein said composition is at pH 7.4. In another aspect, the present invention

Claims

1. A live virus composition comprising:
a herpes simplex virus,
a protein, wherein the protein is partially hydrolyzed gelatin or human serum albumin,
at least one sugar,
sodium chloride, and
sodium phosphate or potassium phosphate,
wherein the composition is at pH 7-8.

2. The live virus composition according to claim 1, wherein the composition is frozen.

3. The live virus composition according to claim 1 or 2, wherein the composition is at pH 7.4.

4. A live virus composition comprising a herpes simplex virus, a protein, at least one sugar, and phosphate buffer at pH 7-8, wherein the protein is partially hydrolyzed gelatin or human serum albumin.

5. The live virus composition of claim 4, wherein the phosphate buffer comprises potassium phosphate.

6. The live virus composition according to claim 4 or 5, wherein the composition is frozen.

7. The live virus composition according to any one of claims 4-6, wherein the composition is at pH 7.4.

8. The live virus composition according to any one of claims 1-7, wherein said herpes simplex virus is a herpes simplex 1 virus.

9. The live virus composition according to any one of claims 1-7, wherein the herpes simplex virus is selected from the group consisting of talimogene laherparepvec, Seprehvir™ , G207, OrienX010, NV1020, M032, ImmunoVEX and OncoVEX$^{GALV/CD}$.

10. The live virus composition according to any one of claims 1-7, wherein the herpes simplex virus is talimogene laherparepvec.

11. The live virus composition according to any one of claims 1-10, wherein said composition comprises partially hydrolyzed gelatin at a concentration of 0.1% to 3% (w/v).

12. The live virus composition according to any one of claims 1-10, wherein said composition comprises partially hydrolyzed gelatin at a concentration of 0.01% to 1% (w/v).

13. The live virus composition according to any one of claims 1-10, wherein said composition comprises partially hydrolyzed gelatin at a concentration of 3% (w/v).

14. The live virus composition according to any one of claims 1-10, wherein said composition comprises human serum albumin at a concentration of 0.25% to 2.5%.

15. The live virus composition according to any one of claims 1-10, wherein said composition comprises human serum albumin at a concentration of 0.25% to 2% (w/v).

16. The live virus composition according to any one of claims 1-10, wherein said composition comprises human serum albumin at a concentration of 0.25% to 1% (w/v).

17. The live virus composition according to any one of claim 1-10, wherein the at least one sugar is sorbitol, myo-inositol, trehalose or sucrose.

18. The live virus composition according to claim 17, wherein said composition comprises sorbitol at a concentration of 0.5% to 4% (w/v).

19. The live virus composition according to claim 17, wherein said composition comprises sorbitol at a concentration of 0.5% to 3% (w/v).

20. The live virus composition according to claim 17, wherein said composition comprises sorbitol at a concentration of 3% (w/v).

21. The live virus composition according to claim 17, wherein said composition comprises sorbitol at a concentration of 2% (w/v).

22. The live virus composition according to claim 17, wherein said composition comprises myo-inositol at a concentration of 4% (w/v).

23. The live virus composition according to claim 17, wherein said composition comprises trehalose at a concentration of 9% or 15% (w/v).

24. The live virus composition according to claim 17, wherein said composition comprises trehalose at a concentration of 15% (w/v).

25. The live virus composition according to claim 17, wherein said composition comprises sucrose at a concentration of 9% (w/v) to 15% (w/v).

26. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium chloride at a concentration of 130 to 160 mM.

27. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium chloride at a concentration of 50 to 250 mM.

28. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium chloride at a concentration of 137 mM.

29. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium chloride at a concentration of 145 mM.

30. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium phosphate at a concentration of 10 to 300 mM.

31. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium phosphate at a concentration of 70 to 130 mM.

32. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium phosphate at a concentration of 80 to 120 mM.

33. The live virus composition according to any one of claims 1-10, wherein said composition comprises sodium phosphate at a concentration of 102 mM.

34. The live virus composition according to any one of claims 11-13, wherein the partially hydrolyzed gelatin is porcine.

35. A live virus composition comprising:

a herpes simplex 1 virus;

partially hydrolyzed gelatin at a concentration of 3% (w/v);

sorbitol at a concentration of 3% (w/v);

sodium chloride at a concentration of 50 to 250 mM; and

wherein said composition is at pH 7.4.

36. A frozen live virus composition comprising:

a herpes simplex 1 virus;

partially hydrolyzed gelatin at a concentration of 3% (w/v);

sorbitol at a concentration of 3% (w/v);

sodium chloride at a concentration of 50 to 250 mM; and

wherein said composition is at pH 7.4.

37. A live virus composition comprising:

a herpes simplex 1 virus;

human serum albumin at a concentration of 0.25% to 2% (w/v);

sorbitol at a concentration of 3% (w/v);

sodium chloride at a concentration of 50 to 250 mM; and

wherein said composition is at pH 7.4.

38. A frozen live virus composition comprising:

a herpes simplex 1 virus;

human serum albumin at a concentration of 0.25% to 2% (w/v);

sorbitol at a concentration of 3% (w/v);

sodium chloride at a concentration of 50 to 250 mM; and

wherein said composition is at pH 7.4.

39. A live virus composition comprising:

a herpes simplex 1 virus;

human serum albumin at a concentration of 0.25% to 2% (w/v);

trehalose at a concentration of 15% (w/v);

sodium chloride at a concentration of 137 mM; and

wherein said composition is at pH 7.4.

40. A frozen live virus composition comprising:

a herpes simplex 1 virus;

human serum albumin at a concentration of 0.25% to 2% (w/v);

trehalose at a concentration of 15% (w/v);

sodium chloride at a concentration of 137 mM; and

wherein said composition is at pH 7.4.

41. A live virus composition comprising:

a herpes simplex 1 virus;

human serum albumin at a concentration of 0.25% to 2% (w/v);

sorbitol at a concentration of 0.5% to 3% (w/v);

myo-inositol at a concentration of 4% (w/v);

sodium chloride; and

wherein said composition is at pH 7.4.

42. A frozen live virus composition comprising:

a herpes simplex 1 virus;

human serum albumin at a concentration of 0.25% to 2% (w/v);

sorbitol at a concentration of 0.5% to 3% (w/v);

myo-inositol at a concentration of 4% (w/v);

sodium chloride; and

wherein said composition is at pH 7.4.

43. The live virus composition according to any one of claims 35-42, wherein the herpes simplex virus is talimogene laherparepvec.

44. Use of a composition according to any one of claims 1-43 in the manufacture of a medicament for killing tumor cells.

45. The use according to claim 44, wherein said composition further comprises a check point inhibitor.

46. The use according to claim 44 or 45, wherein said tumor cells are astrocytoma, oligodendroglioma, meningioma, neurofibroma,glioblastoma, ependymoma, Schwannoma, neurofibrosarcoma, medulloblastoma, melanoma cells, pancreatic cancer cells, prostate

carcinoma cells, breast cancer cells, lung cancer cells, colon cancer cells, hepatoma cells, mesothelioma, bladder cancer cells, or epidermoid carcinoma cells.

47. A composition according to any one of claims 1-43 for use in therapy.