CLAIMS

We claim:

1. A composition comprising an isolated lysophosphatidylcholine (LPC) with a single acyl chain, and a TLR7/8 agonist, wherein the acyl chain is a C13-C24 acyl chain.

2. The composition of claim 1, wherein the acyl chain is a C18-C22 acyl chain or a C21-C24 acyl chain.

3. The composition of claim 1 or claim 2, further comprising an antigen.

4. The composition of any one of claims 1-3, further comprising dendritic cells.

5. The composition of any one of claims 1-4, wherein the acyl chain is a C22 acyl chain.

6. The composition of any one of claims 1-5, wherein the acyl chain is fully saturated.

7. The composition of any one of claims 1-6, wherein the LPC comprises 1-behenoyl-2-hydroxy-*sn*-glycero-3-phosphocholine [LPC(22:0)].

8. The composition of any one of claims 1-7, wherein the TLR7/8 agonist is a small molecule with a molecule weight of 900 daltons or less.

9. The composition of claim 8, wherein the TLR7/8 agonist comprises an imidazoquinoline compound.

10. The composition of claim 9, wherein the TLR7/8 agonist comprises resiquimod (R848).

11. The composition of claim 7, wherein the LPC comprises LPC(22:0), and the TLR7/8 agonist comprises resiquimod (R848).

12. The composition of any one of claims 1-11, wherein the antigen is present in a biological sample obtained from an individual.

13. The composition of claim 12, wherein the biological sample comprises biopsy tissue.

14. The composition of claim 12, wherein the biological sample comprises cells.

15. The composition of claim 12, wherein the biological sample does not comprise cells.

16. The composition of claim 12, wherein the biological sample comprises pus from an abscess.

17. The composition of any one of claims 1-16, wherein the antigen comprises a proteinaceous antigen.

18. The composition of claim 17, wherein the antigen comprises a tumor antigen.

19. The composition of claim 18, wherein the tumor antigen comprises a synthetic or recombinant neoantigen.

20. The composition of claim 18, wherein the tumor antigen comprises a tumor cell lysate.

21. The composition of claim 17, wherein the antigen comprises a microbial antigen and the microbial antigen comprises one or more of a viral antigen, a bacterial antigen, a protozoan antigen, and a fungal antigen.

22. The composition of claim 21, wherein the microbial antigen comprises a purified or recombinant surface protein.

23. The composition of claim 21, wherein the microbial antigen comprises an inactivated, whole virus.

24. The composition of any one of claims 1-23, wherein the composition does not comprise:
i) liposomes;
ii) LPS or MPLA;

iii) oxPAPC or a species of oxPAPC; and/or
iv) HOdiA-PC, KOdiA-PC, HOOA-PC, KOOA-PC, and/or PGPC.

25. The composition of any one of claims 1-24, further comprising an adjuvant, wherein the adjuvant comprises an aluminum salt adjuvant, a squalene-in-water emulsion, a saponin, or combinations thereof.

26. A pharmaceutical formulation comprising the composition of any one of claims 1-25 and a pharmaceutically acceptable excipient.

27. A method for production of hyperactivated dendritic cells, the method comprising contacting the dendritic cells with an effective amount of the composition of any one of claims 1-25 or the formulation of claim 26 for production of hyperactivated dendritic cells, wherein the hyperactivated dendritic cells secrete IL-1beta without undergoing pyroptosis.

28. The method of claim 27, wherein the dendritic cells are contacted ex vivo.

29. The method of claim 27, wherein the dendritic cells are contacted in vitro.

30. A pharmaceutical formulation comprising at least 10^3, 10^4, 10^5 or 10^6 of the hyperactivated dendritic cells produced by the method of claim 28, and a pharmaceutically acceptable excipient.

31. Use of the formulation of claim 26 in the manufacture of a medicament for inducing an immune response against the antigen in an individual in need thereof.

32. Use of the formulation of claim 26 in the manufacture of a medicament for inducing an anti-tumor immune response in an individual in need thereof, wherein the individual is or was tumor-bearing.

33. Use of the formulation of claim 26 in the manufacture of a medicament for inducing an anti-microbe immune response in an individual in need thereof.

34. The use of any one of claims 31-33, wherein the individual is a mammalian subject.

35. The use of any one of claims 31-33, wherein the individual is a human subject.

36. A method of preparing an immunogenic composition, the method comprising:

a) preparing a tumor cell-enriched suspension from a tumor obtained from a mammalian subject;

b) lysing cells from the tumor cell-enriched suspension to obtain a tumor cell lysate; and

c) contacting the tumor cell lysate with the composition of any one of claims 1-25 or the formulation of claim 26.

37. The method of claim 36, wherein the cells are lysed in step b) by one or more freeze-thaw cycles.

38. An immunogenic composition prepared by the method of claim 36 or claim 37.

39. Use of the immunogenic composition of claim 38 in the manufacture of a medicament for eliciting an anti-cancer immune response in a mammalian subject with cancer.

40. The use of claim 39, wherein the cancer is a non-hematologic cancer.

41. The use of claim 40, wherein the non-hematologic cancer is a carcinoma, a sarcoma, or a melanoma.

42. The use of claim 39, wherein the cancer is a lymphoma.

43. The composition, formulation, method or use of any one of claims 1-42, comprising a surfactant.

44. The composition, formulation, method or use of claim 43, wherein the surfactant comprises a non-ionic surfactant.

45. The composition, formulation, method or use of claim 44, wherein the non-ionic surfactant comprises an ethylene oxide-propylene oxide copolymer.

46. The composition, formulation, method or use of claim 44, wherein the non-ionic surfactant comprises one or more of Poloxamer 407, Poloxamer 188, and P123.

47. The composition, formulation, method or use of claim 44, wherein the non-ionic surfactant comprises Poloxamer 407.

48. The composition, formulation, method or use of any one of claims 44-47, wherein i) the LPC is dissolved in an alcohol to form an LPC alcohol solution; ii) the LPC alcohol solution is mixed with the non-ionic surfactant to form a mixture; and iii) the alcohol is evaporated from the mixture to form particles comprising the LPC and the non-ionic surfactant.

49. The composition, formulation, method or use of any one of claims 44-48, wherein the non-ionic surfactant is present in an amount of about 2.5% to 25% (w/w), optionally about 5% to 20% (w/w), optionally about 15% (w/w).

50. The composition, formulation, method or use of any one of claims 44-49, wherein the LPC and non-ionic surfactant are present in particles with a diameter of about 1000 to 2000 nanometers, optionally with a diameter of about 1500 nanometers.