Claims

1. A pharmaceutical composition, comprising:

at least one hydrophobic camptothecin derivative or a pharmaceutically acceptable salt of said derivative; and

at least one polyethylene glycol (PEG) conjugated phospholipid;

wherein the molar ratio of said PEG conjugated phospholipid to said hydrophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is greater than 0.45:1; and wherein said hydrophobic camptothecin derivative is a compound selected from the group consisting of: TLC388HCl; TLC1988HCl; and mixtures thereof.

2. The pharmaceutical composition of claim 1, further comprising at least one pH adjusting agent.

3. The pharmaceutical composition of claim 2, wherein the pH adjusting agent is tartaric acid.

4. The pharmaceutical composition of claim 2 or 3, wherein the pH adjusting agent is citric acid.

5. The pharmaceutical composition of any one of claims 1 to 4, further comprising at least one pharmaceutically acceptable excipient or carrier.

6. The pharmaceutical composition of any one of claims 1 to 5, wherein the molar ratio of said PEG conjugated phospholipid to said hydrophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is about 0.45:1 to about 1.5:1.

7. The pharmaceutical composition of any one of claims 1 to 6, wherein the molar ratio of said PEG conjugated phospholipid to said hydrophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is about 0.60:1 to about 1.00:1.

8. The pharmaceutical composition of any one of claims 1 to 7, wherein the molar ratio of said PEG conjugated phospholipid to said hydrophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is about 0.70:1 to about 0.90:1.

9. The pharmaceutical composition of any one of claims 1 to 8, wherein said pharmaceutical composition has a pH less than 4.

10. The pharmaceutical composition of any one of claims 1 to 9, wherein the PEG conjugated phospholipid comprises a PEG moiety having a molecular weight from about 1,000 to about 20,000 daltons conjugated to a phospholipid moiety.

11. The pharmaceutical composition of any one of claims 1 to 10, wherein the PEG conjugated phospholipid is a PEG-distearoylphosphatidylethanolamine (DSPE) conjugate.

12. The pharmaceutical composition of claim 11, wherein the PEG-distearoylphosphatidylethanolamine conjugate is a methoxyl PEG-distearoylphosphatidylethanolamine conjugate.

13. The pharmaceutical composition of any one of claims 1 to 12, wherein the hydrophobic camptothecin derivative or the pharmaceutically acceptable salt of said hydrophobic camptothecin derivative and PEG conjugated phospholipid form micelles with a size less than 40 nm.

14. A plurality of micelles, wherein each of said micelles comprises a pharmaceutical composition of claim 1.

15. The plurality of micelles of claim 14, further comprising at least one pH adjusting agent.

16. The plurality of micelles of claim 15, wherein the pH adjusting agent is tartaric acid.

17. The plurality of micelles of claim 15, wherein the pH adjusting agent is citric acid.

18. The plurality of micelles of any one of claims 14 to 17, further comprising at least one pharmaceutically acceptable excipient or carrier.

19. The plurality of micelles of any one of claims 14 to 18, wherein the molar ratio of said PEG conjugated phospholipid to said hydrophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is about 0.45:1 to about 1.5:1.

20. The plurality of micelles of any one of claims 14 to 19, wherein the molar ratio of said PEG conjugated phospholipid to said hydrdophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is about 0.60:1 to about 1.00:1.

21. The plurality of micelles of any one of claims 14 to 20, wherein the molar ratio of said PEG conjugated phospholipid to said hydrophobic camptothecin derivative or said pharmaceutically acceptable salt of said hydrophobic camptothecin derivative is about 0.70: 1 to about 0.90:1.

22. The plurality of micelles of any one of claims 14 to 21, wherein said pharmaceutical composition has a pH less than 4.

23. The plurality of micelles of any one of claims 14 to 22, wherein the PEG conjugated phospholipid comprises a PEG moiety having a molecular weight from about 1,000 to about 20,000 daltons conjugated to a phospholipid moiety

24. The plurality of micelles of any one of claim 14 to 23, wherein the PEG conjugated phospholipid is PEG-distearoylphosphatidylethanolamine conjugate.

25. The plurality of micelles of claim 24, wherein the PEG-distearoylphosphatidylethanolamine conjugate is a methoxyl PEG-distearoylphosphatidylethanolamine conjugate.

26. The plurality of micelles of any one of claims 14 to 25, wherein the micelles has a size less than 40 nm.

27. A pharmaceutical composition, comprising:

at least one compound selected from the group consisting of TLC388HCl or a pharmaceutically acceptable salt of TLC388 HCl;

methoxyl PEG-distearoylphosphatidylethanolamine conjugate; and

citric acid;

wherein the molar ratio of said methoxyl PEG conjugated phospholipid to said TLC388HCl or a pharmaceutically acceptable salt of TLC388 HCl is from about 0.45: 1 to about 0.9:1.

28. Use of the pharmaceutical composition of any one of claims 1 to 13 and 27 for inhibiting growth of cancer cells

in a subject in need thereof, wherein an effective amount of the pharmaceutical composition is formulated for use.

29. The use of claim 28,

wherein said cancer cells are further exposed to one or more anti-cancer agents.

30. The use of claim 29, wherein said anti-cancer agent is ionizing radiation.

31. The use of claim 29, wherein said anti-cancer agent is conventional chemotherapy.

32. The use of claim 29, wherein said anti-cancer agent is targeted cancer therapy.