

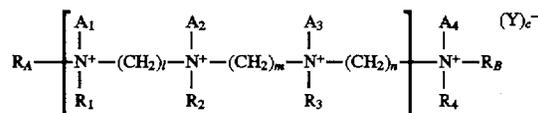
TABLE 4

TRANSFECTION RESULTS WITH JURKAT CELLS		
Lipid (Molar ratio)	Optimal Lipid Conc. (μg)	CAT Activity (mUnits CAT/5 μl)
Compound 3:DOPE	6	19.8
DOTMA:DOPE (1:1)	5	5.0
DOSPA:DOPE (1.5:1)	25	19.2

Cells (1×10^6) were transfected with 2 μg of pCMVCAT DNA as described above, using the indicated lipid formulations. At 48 hr post-transfection, cell lysates were prepared and 5 μl aliquots were assayed for CAT enzyme activity.

We claim:

1. A compound having the formula



where x is an integer ranging from 1 to about 20; Y is an anion; and c is the number of positive charges in the compound divided by the valence of the anion; l, m and n are integers from 1 to about 6, except that at least one of l, m or n is 3 or less; R_A and R_B are selected from the group consisting of H or an alkyl, hydroxyalkyl, or thiol-substituted alkyl group having from 1 to about 6 carbon atoms; R_1 - R_4 , independently of one another, are alkyl groups having 1 to 6 carbon atoms; A_1 - A_4 , independently of one another, are straight-chain or branched alkyl, alkenyl or alkynyl groups having from 6 to about 22 carbon atoms, except that when x is 1 or 2, and when l, m, or n is an integer from 3 to 6, then A_1 , A_2 , A_3 , and A_4 cannot be an alkyl group having less than 14 carbon atoms.

2. The compound of claim 1 wherein x is an integer ranging from 1 to about 20; l, m, and n are 3 or 4; and A_1 - A_4 , independently of one another, are straight-chain or branched alkyls having 14 or more carbon atoms.

3. The compound of claim 1 wherein x is, an integer ranging from 1 to 10.

4. The compound of claim 1 wherein x is 1.

5. The compound of claim 4 wherein l, m, and n are 3 or 4, and A_1 - A_4 , independently of one another, are straight-chain or branched alkyls having 14 or more carbon atoms.

6. The compound of claim 5 wherein R_A and R_B are H.

7. The compound of claim 6 wherein R_1 - R_4 are methyl groups.

8. The compound of claim 7 wherein A_1 - A_4 are straight-chain alkyl groups having from 16-22 carbons.

9. The compound of claim 1 wherein A_1 - A_4 , independently of one another, are straight-chain alkyl, alkenyl or alkynyl groups.

10. The compound of claim 9 wherein A_1 - A_4 , independently of one another, are straight-chain alkyl, alkenyl or alkynyl groups having from 13 to about 22 carbon atoms.

11. The compound of claim 10 wherein A_1 - A_4 , independently of one another, are straight-chain alkyl groups.

12. The compound of claim 1 which comprises the N, N^I, N^{II}, N^{III} -tetramethyl-N, N^I, N^{II}, N^{III} -tetrapalmitylsperminetetraammonium cation.

13. The compound of claim 12 which is N, N^I, N^{II}, N^{III} -tetramethyl-N, N^I, N^{II}, N^{III} -tetrapalmitylsperminetetraammonium iodide.

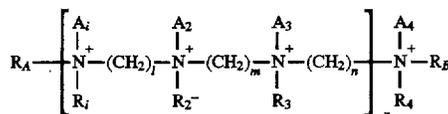
14. The compound of claim 1 where l, m and n are 3.

15. The compound of claim 1 where x is 1 or 2.

16. The compound of claim 12 where l, m, n are 3 or 4 and R_1 - R_4 are methyls.

17. The compound of claim 1 wherein A_1 - A_4 , independently of one another, are alkyl groups/having more than 14 carbon atoms.

18. A polycation having the formula:



where x is an integer ranging from 1 to about 20; l, m and n are integers from 1 to about 6, except that at least one of l, m or n is 3 or less; R_A and R_B are selected from the group consisting of H or an alkyl, hydroxyalkyl, or thiol-substituted alkyl group having from 1 to about 6 carbon atoms; R_1 - R_4 , independently of one another, are alkyl groups having 1 to 6 carbon atoms; A_1 - A_4 , independently of one another, are straight-chain or branched alkyl, alkenyl or alkynyl groups having from 6 to about 22 carbon atoms, except that when x is 1 or 2, when l, m, or n is an integer from 3 to 6, then A_1 , A_2 , A_3 , and A_4 cannot be an alkyl group having less than 14 carbon atoms.

19. The polycation of claim 18 wherein x is an integer ranging from 1 to about 20; l, m, n are 3 or 4; and A_1 - A_4 , independently of one another are straight-chain or branched alkyls having 14 or more carbon atoms.

20. The polycation of claim 18 wherein x is an integer from 1 to 10.

21. The polycation of claim 18 wherein x is 1 or 2.

22. The polycation of claim 18 wherein x is 1.

23. The polycation of claim 22 wherein l, m, n are 3 or 4; and A_1 - A_4 , independently of one another are straight-chain or branched alkyls having 14 or more carbon atoms.

24. The polycation of claim 18 where R_A and R_B are H.

25. The polycation of claim 18 where R_1 - R_4 are methyls.

26. The polycation of claim 18 where A_1 - A_4 are straight-chain alkyls having from 13-22 carbon atoms.

27. The polycation of claim 18 where A_1 - A_4 are straight-chain alkyls having from 16-22 carbon atoms.

28. The polycation of claim 18 where x is 1, R_A and R_B are H, R_1 - R_4 are methyls and A_1 - A_4 are straight-chain alkyls having from 16-22 carbon atoms.

29. The polycation of claim 18 where x is 1, R_A and R_B are H, R_1 - R_4 are methyls and A_1 - A_4 are palmityl groups.

30. A lipid aggregate comprising a compound of claim 1 and a second compound which is a lipid aggregate-forming compound.

31. A lipid aggregate of claim 30 wherein said second compound is a neutral lipid.

32. A lipid aggregate of claim 30 wherein said second compound is DOPE.

33. A lipid aggregate of claim 32 comprising N, N^I, N^{II}, N^{III} -tetramethyl-N, N^I, N^{II}, N^{III} -tetrapalmitylspermine.

34. A composition for transfecting a cell with a nucleic acid which comprises a nucleic acid and one or more compounds of claim 1.

35. A composition for transfecting a cell with a nucleic acid which comprises a nucleic acid and one or more compounds of claim 2.

36. A composition for transfecting a cell with a nucleic acid which comprises a nucleic acid and one or more compounds of claim 5.

37. A composition for transfecting a cell with a nucleic acid which comprises a nucleic acid and one or more compounds of claim 8.