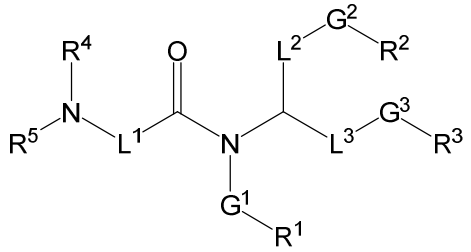
CLAIMS

1. A compound having the following structure (I):



(I)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof, wherein:

R^1 is optionally substituted C_1-C_{24} alkyl or optionally substituted C_2-C_{24} alkenyl;

R^2 and R^3 are each independently optionally substituted C_1-C_{36} alkyl;

R^4 and R^5 are each independently optionally substituted C_1-C_6 alkyl, or R^4 and R^5 join, along with the nitrogen atom to which they are attached, to form an optionally substituted heterocyclyl ring or an optionally substituted heteroaryl ring;

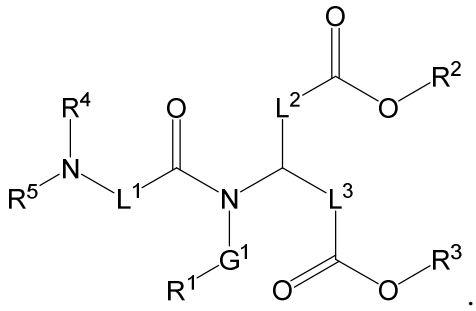
L^1, L^2, and L^3 are each independently optionally substituted C_1-C_{18} alkylene;

G^1 is a direct bond, -$(CH_2)_n$O(C=O)-, -$(CH_2)_n$(C=O)O-, or –(C=O)-;

G^2 and G^3 are each independently -(C=O)O- or -O(C=O)-; and

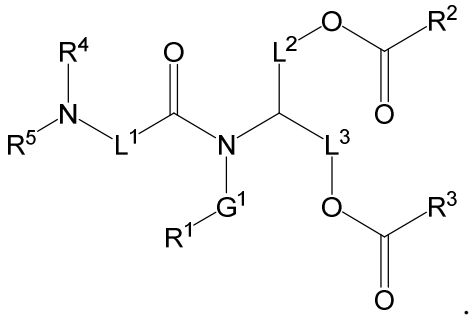
n is an integer greater than 0.

2. The compound of claim 1, having the following structure (IA):



(IA)

3. The compound of claim 1, having the following structure (IB):



(IB)

4. The compound of claim 1, wherein R^1 is optionally substituted C_6-C_{18} alkyl or optionally substituted C_{14}-C_{18} alkenyl.

5. The compound of claim 1, wherein G^1 is a direct bond, -$(CH_2)_nO(C=O)$-, or -$(CH_2)_n(C=O)O$-.

6. The compound of claim 5, wherein G^1 is a direct bond.

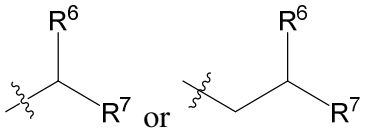
7. The compound of claim 5, wherein G^1 is -$(CH_2)_n(C=O)O$- and n is greater than 1.

8. The compound of claim 1, wherein L^1 is unsubstituted C_1-C_6 alkylene.

9. The compound of claim 1, wherein R^2 and R^3 are both unsubstituted C_8-C_{24} alkyl.

10. The compound of claim 1, wherein R^2 and R^3 are optionally substituted branched C_1-C_{36} alkyl.

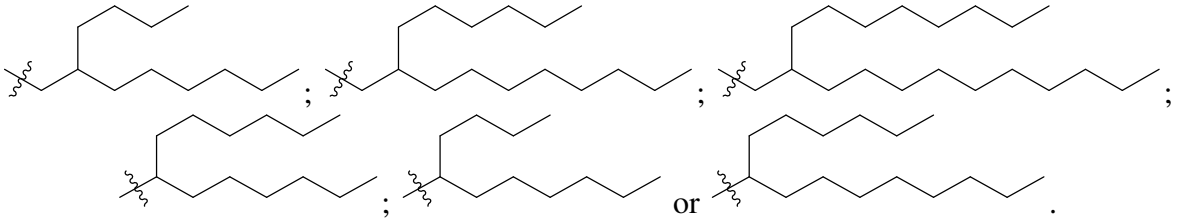
11. The compound of claim 1, wherein R^2 and R^3 each independently have one of the following structures:



wherein:

R^6 and R^7 are each independently unsubstituted C_2-C_{12} alkyl.

12. The compound of claim 11, wherein R^2 and R^3 each independently have one of the following structures:



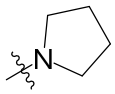
13. The compound of claim 1, wherein L^2 and L^3 are each independently unsubstituted C_4-C_{10} alkylene.

14. The compound of claim 1, wherein R^4 and R^5 are each independently unsubstituted C_1-C_6 alkyl.

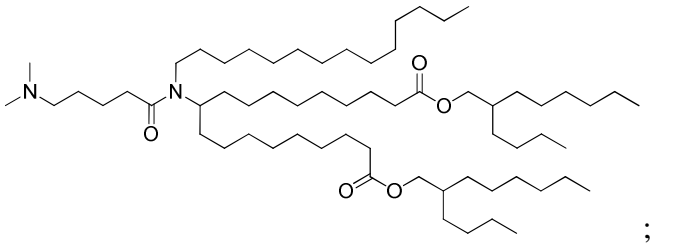
15. The compound of claim 14, wherein R^4 and R^5 are both methyl, ethyl or n-butyl.

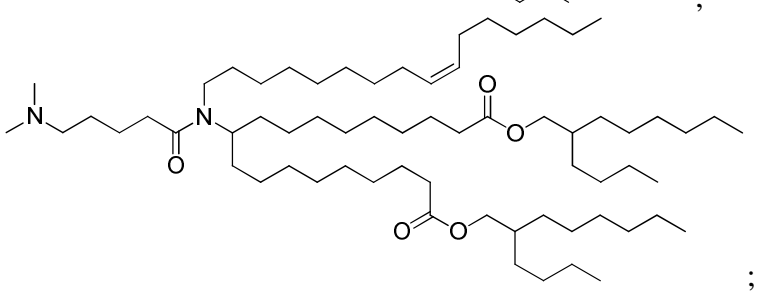
16. The compound of claim 1, wherein R^4 and R^5 join, along with the nitrogen atom to which they are attached, to form an optionally substituted heterocyclyl ring.

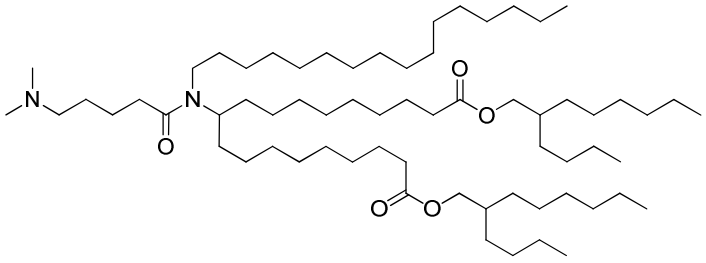
17. The compound of claim 16, wherein the optionally substituted heterocyclyl ring has the following structure:

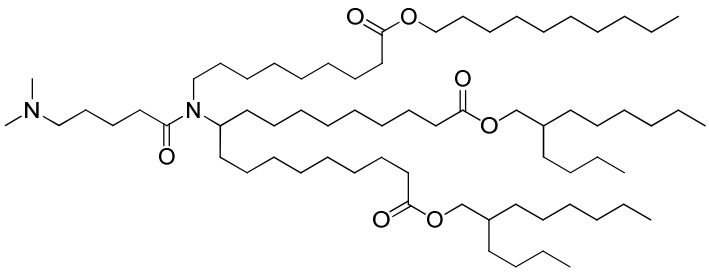

.

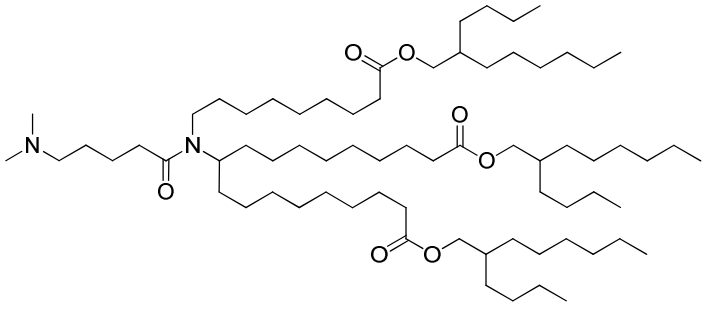
18. The compound of claim 1, wherein the compound has one of the following structures:

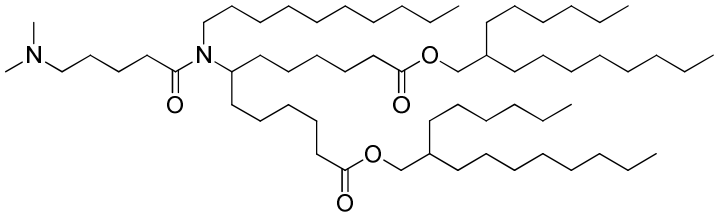
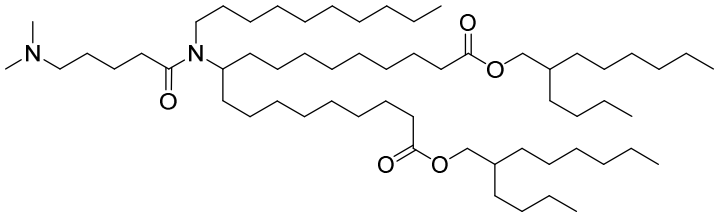
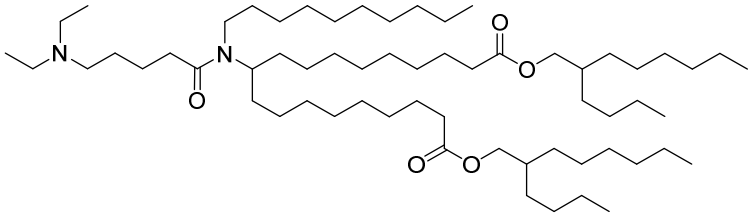
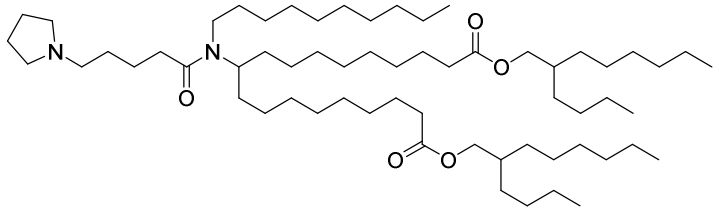
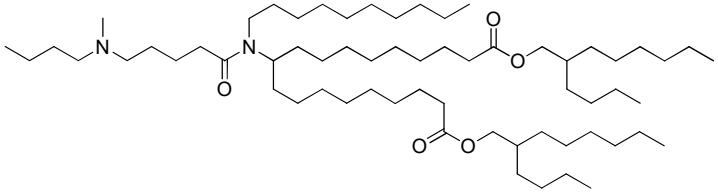
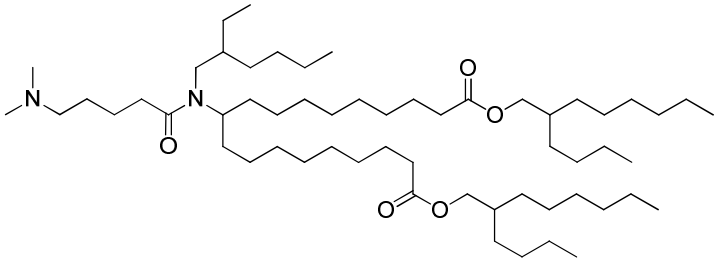
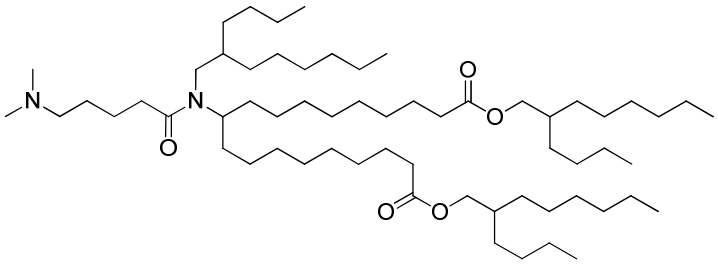

;

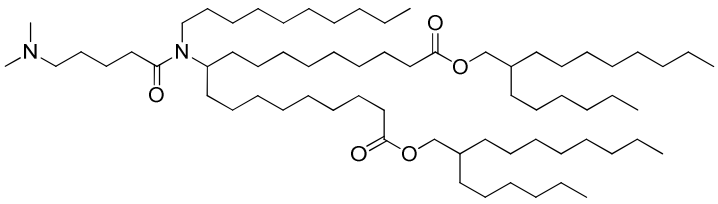
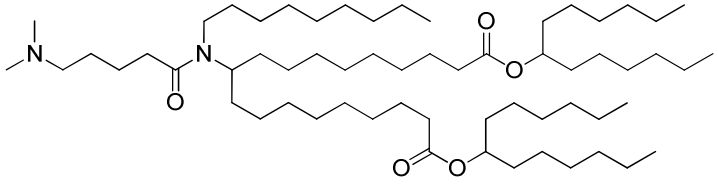
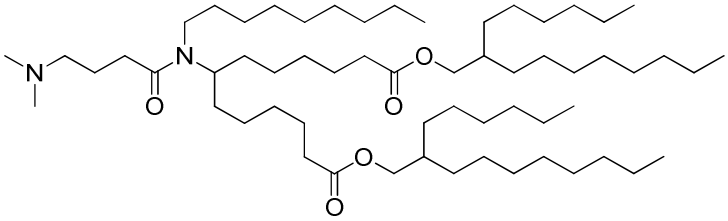
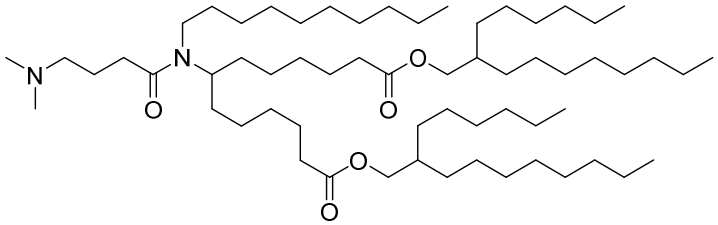
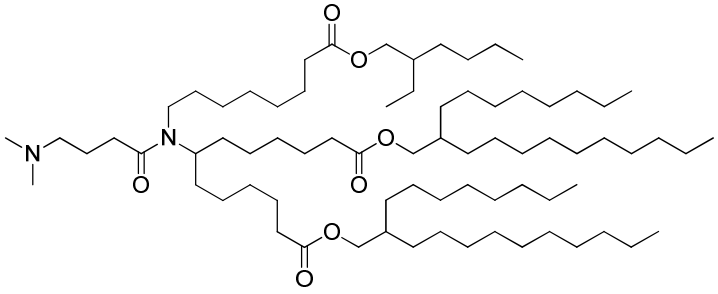
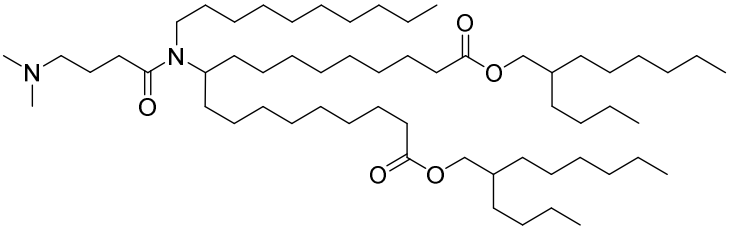
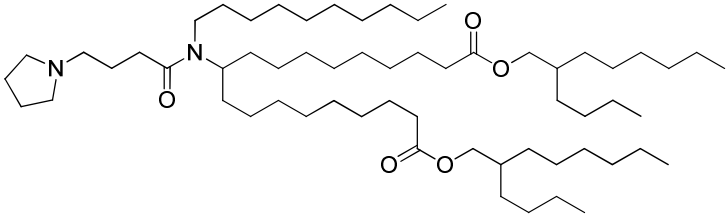

;

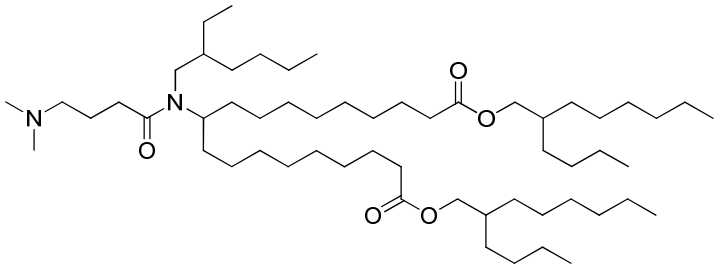
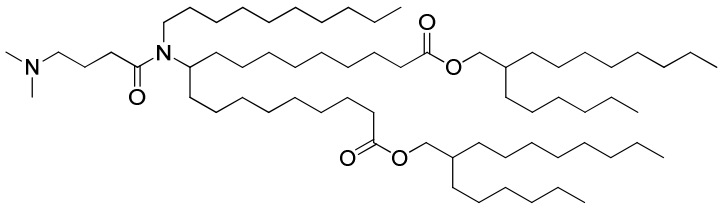
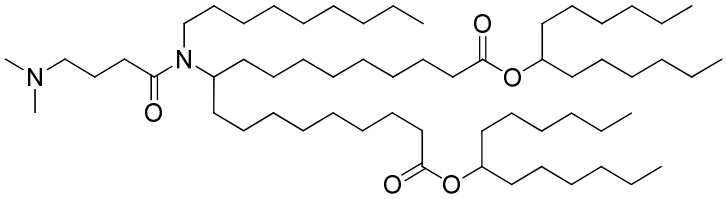
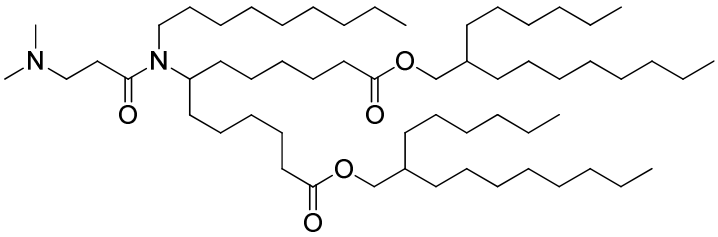
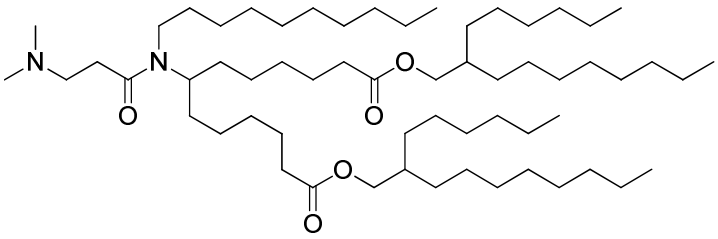
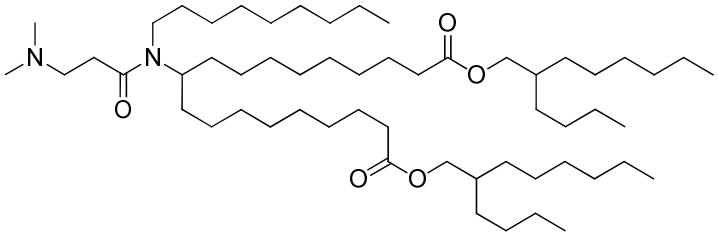
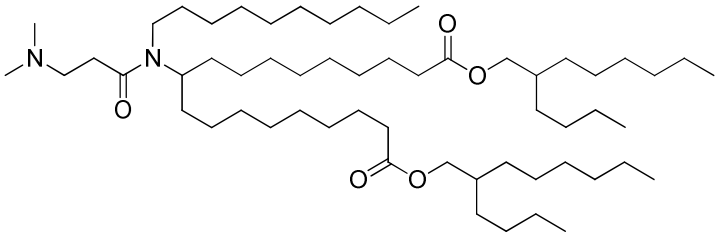

;

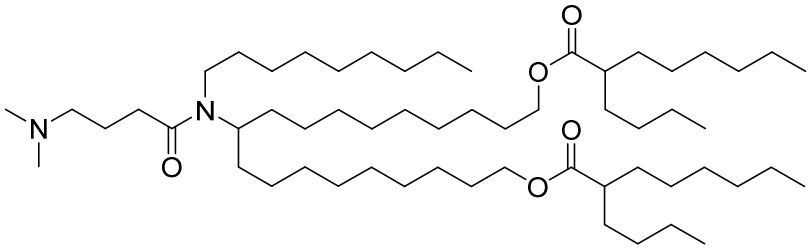
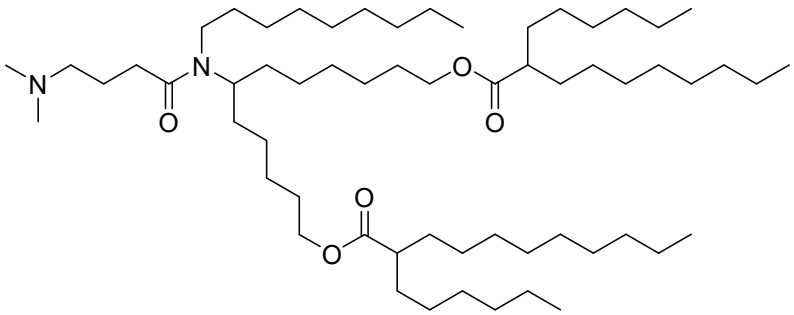
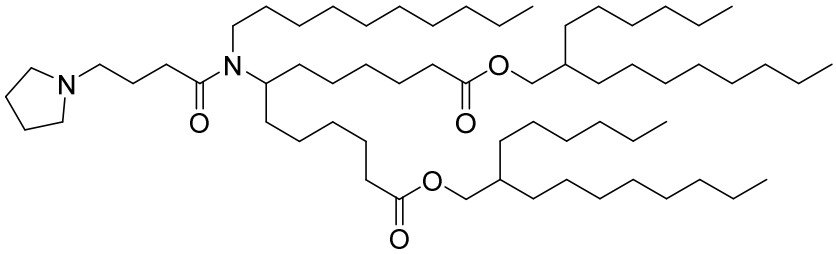
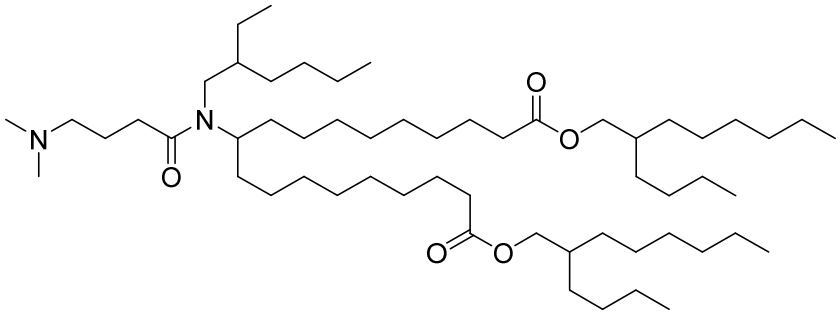
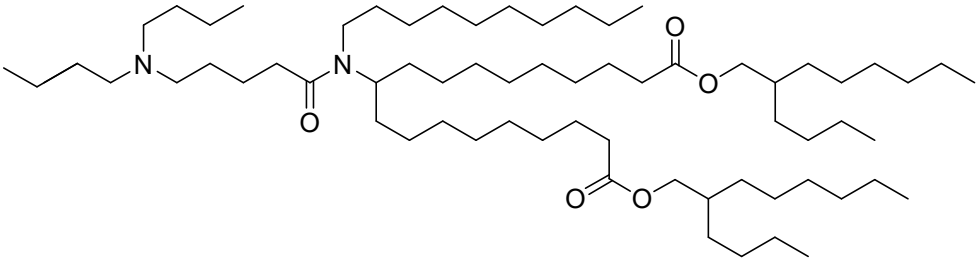
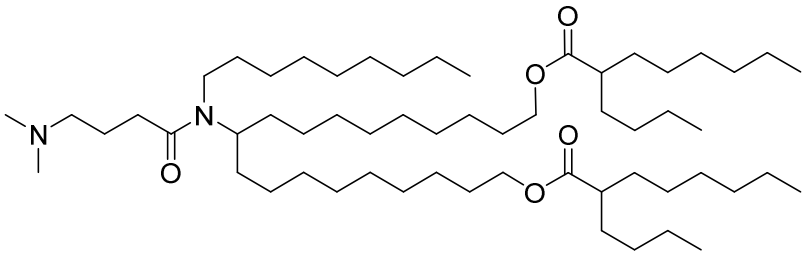

;

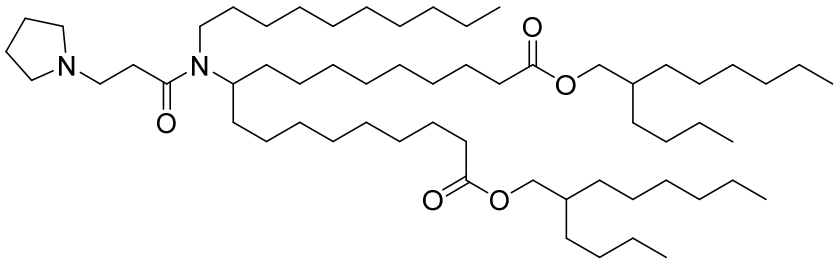
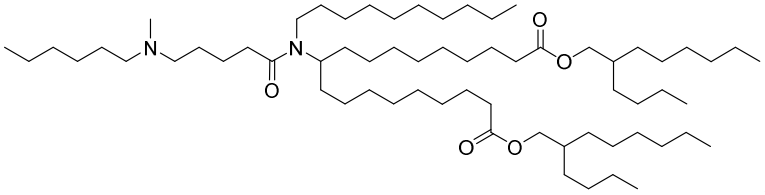
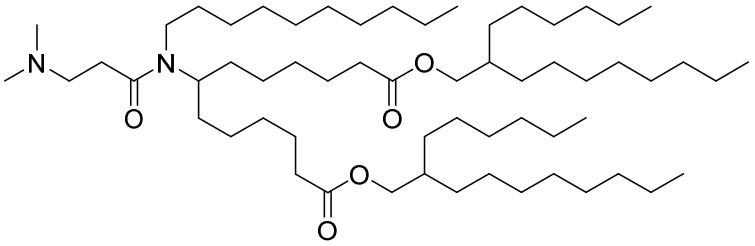
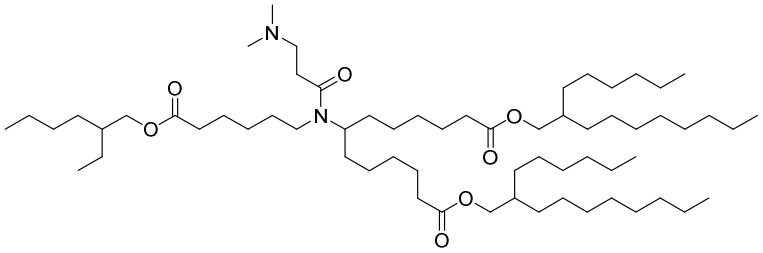
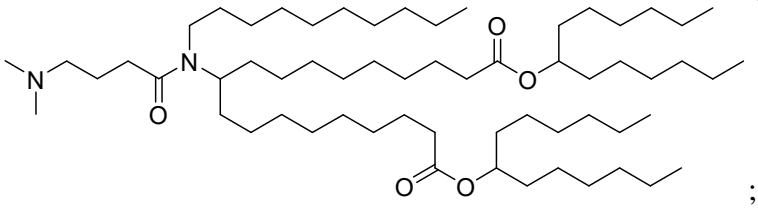
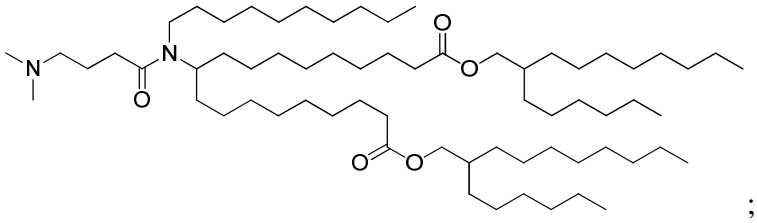

;

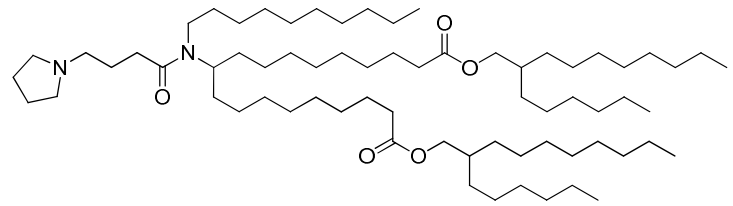

;

;

;

;

;

;

;


;

;

;

;

;

;

;

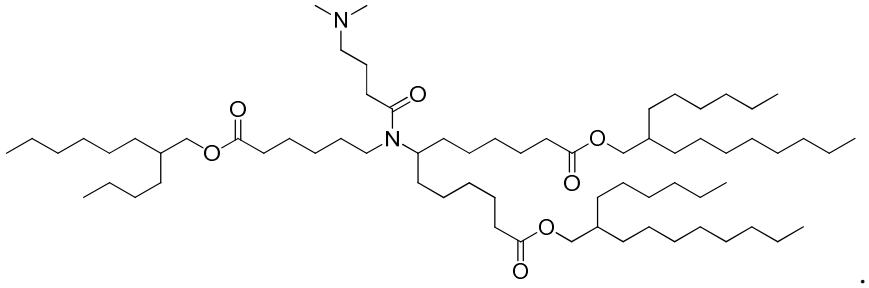

;

;

;

;

;

;

;


;

;

;

;

;

;


;

;

;

;

;

;



or



.

19. A composition comprising the compound of claim 1 and a therapeutic agent.

20. A lipid nanoparticle comprising the compound of claim 1.

21. The composition of claim 19, wherein the therapeutic agent comprises messenger RNA.

22. The lipid nanoparticle of claim 20, further comprising messenger RNA.