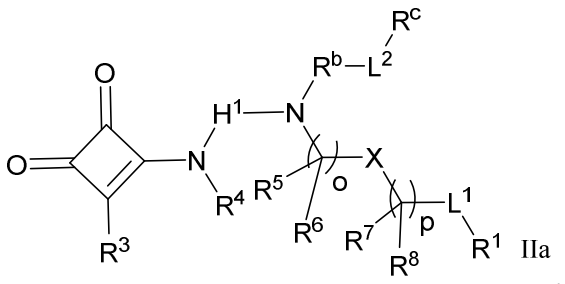
CLAIMS

1. The compound or the salt thereof according to claim 1 or 5, wherein the compound represented by formula I is a compound represented by formula IIa:



IIa,

wherein H^1 is selected from the group consisting of C_{1-12} alkylene, C_{2-12} alkenylene, C_{3-8} cycloalkylene, and C_{3-8} cycloalkenylene;

R^1 is selected from the group consisting of C_{1-24} alkyl and C_{2-24} alkenyl;

each L^1 or L^2 is independently selected from the group consisting of -C(O)O-, -OC(O)-, -C(O)-, -OC(O)O-, -O-, -S(O)q-, -S-S-, -C(O)S-, -SC(O)-, -$NR^aC(O)$-, -$C(O)NR^a$-, -$NR^aC(O)NR^a$-, -$NR^aC(O)O$-, -$OC(O)NR^a$-, -$P(O)(OR^a)$-, and a bond;

R^a is selected from the group consisting of hydrogen and C_{1-6} alkyl, and q is selected from the group consisting of 0, 1, and 2;

R^b is selected from the group consisting of C_{1-12} alkylene and C_{2-12} alkenylene;

R^c is selected from the group consisting of C_{1-24} alkyl and C_{2-24} alkenyl;

X is -$N(R^d)$- or -O-;

o is selected from the group consisting of integers between 1 and 11,

p is selected from the group consisting of integers between 1 and 5,

and o + p is not greater than 12;

R^d is selected from the group consisting of hydrogen and C_{1-6} alkyl;

R^3 is selected from the group consisting of alkylamino and cycloalkylamino;

R^4 is selected from the group consisting of hydrogen and C_{1-6} alkyl;

R^5, R^6, R^7, and R^8 are each independently selected from the group consisting of hydrogen, halogen, hydroxy, and C_{1-6} alkyl.

2. The compound or the salt thereof according to claim 1, wherein p is selected from the group consisting of 1 and 2.

3. The compound or the salt thereof according to claim 1, wherein o is selected from

the group consisting of integers between 4 and 7, such as 5 or 6.

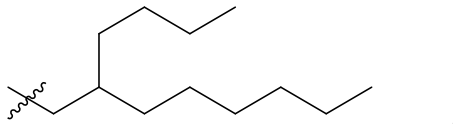
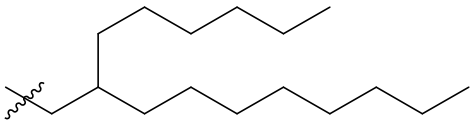
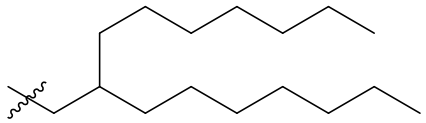
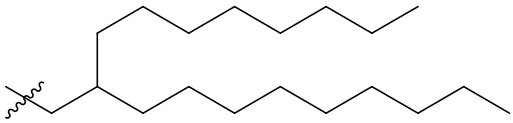
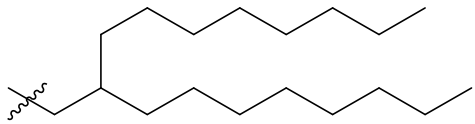
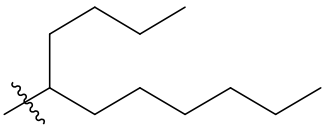
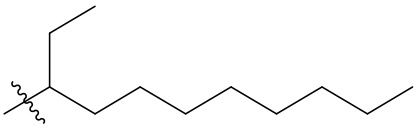
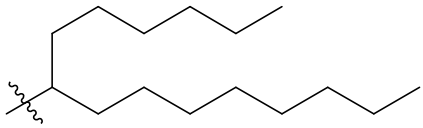
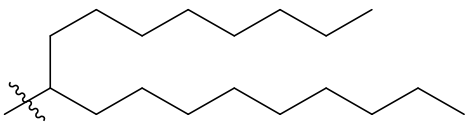
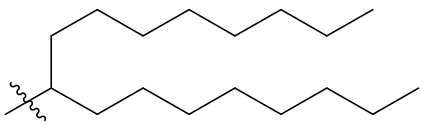
4. The compound or the salt thereof according to any one of claims 1-3, wherein H^1 is C_{1-12} alkylene, preferably C_{3-8} alkylene.

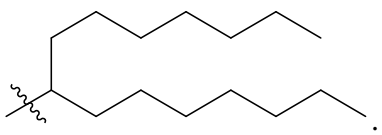
5. The compound or the salt thereof according to any one of claims 1-3, wherein each L^1 or L^2 is independently selected from the group consisting of -C(O)O-, -OC(O)-, and a bond.

6. The compound or the salt thereof according to any one of claim 1-3, wherein R^b is C_{1-12} alkylene.

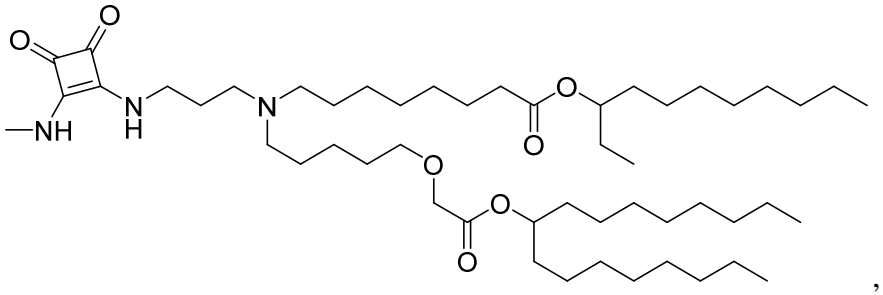
7. The compound or the salt thereof according to any one of claim 1-3, wherein R^c is C_{1-24} alkyl.

8. The compound or the salt thereof according to any one of claims 1-3, wherein R^1 or R^c is selected from the group consisting of:

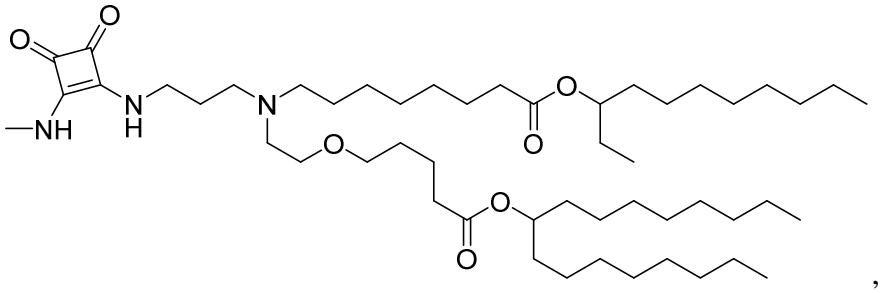

,

,

,

,

,

,

,

,

,

, and



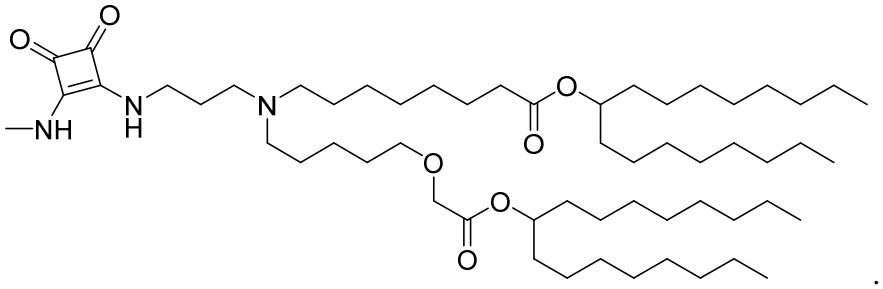
9. The compound or the salt thereof according to any one of claim 1-3, wherein the compound represented by formula IIa is selected from the group consisting of:



,



,



.

10. A lipid particle, comprising the compound or the salt thereof according to any one of claims 1-9, wherein the lipid particle further comprises an active agent, and the active agent is preferably a polynucleotide or a nucleic acid, e.g., a DNA, an siRNA, or an mRNA.

11. A pharmaceutical composition, comprising the lipid particle according to any one

of claim 1-9 and a pharmaceutically acceptable excipient.

12. Use of the compound or the salt thereof according to any one of claims 1-9, or the lipid particle according to claim 10, or the pharmaceutical composition according to claim 11 in the manufacture of a medicament for preventing and/or treating cancer, infection, autoimmune diseases, neurodegenerative diseases, and inflammation.