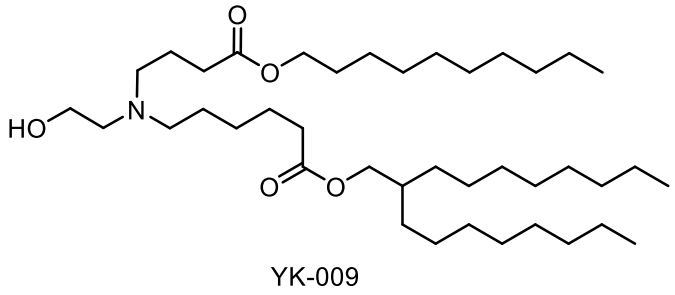
CLAIMS

1. A compound of following formula or a pharmaceutically acceptable salt thereof:



YK-009 .

2. A composition comprising a carrier, wherein the carrier comprises a cationic lipid, and the cationic lipid contains the compound or a pharmaceutically acceptable salt thereof according to claim 1;

preferably, the molar ratio of the cationic lipid to the carrier is from 30 % to 70 %;

preferably, the carrier further comprises a neutral lipid; more preferably, the molar ratio of the cationic lipid to the neutral lipid is from 1:1 to 10:1; or preferably, the neutral lipid comprises one or more of phosphatidylcholine, phosphatidylethanolamine, sphingomyelin, ceramide, sterol and a derivative thereof; or preferably, the neutral lipid is selected from one or more of

1,2-dilinoleoyl-sn-glycero-3-phosphocholine (DLPC),

1,2-dimyristoyl-sn-glycero-phosphocholine (DMPC),

1,2-dioleoyl-sn-glycero-3-phosphocholine (DOPC),

1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC),

1,2-distearoyl-sn-glycero-3-phosphocholine (DSPC),

1,2-diundecanoyl-sn-glycero-phosphocholine (DUPC),

1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC),

1,2-di-O-octadecenyl-sn-glycero-3-phosphocholine (18:0 Diether PC),

1-oleoyl-2-cholesterylhemisuccinoyl-sn-glycero-3-phosphocholine (OChemsPC),

1-hexadecyl-sn-glycero-3-phosphocholine (C16 Lyso PC),

1,2-dilinolenoyl-sn-glycero-3-phosphocholine,

1,2-diarachidonoyl-sn-glycero-3-phosphocholine,

1,2-didocosahexaenoyl-sn-glycero-3-phosphocholine,
1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE),
1,2-diphytanoyl-sn-glycero-3-phosphoethanolamine (ME 16.0 PE),
1,2-distearoyl-sn-glycero-3-phosphoethanolamine,
1,2-dilinoleoyl-sn-glycero-3-phosphoethanolamine,
1,2-dilinolenoyl-sn-glycero-3-phosphoethanolamine,
1,2-diarachidonoyl-sn-glycero-3-phosphoethanolamine,
1,2-didocosahexaenoyl-sn-glycero-3-phosphoethanolamine,
1,2-dioleoyl-sn-glycero-3-phospho-rac-(1-glycerol) sodium salt (DOPG), dipalmitoyl phosphatidylglycerol (DPPG), palmitoyl oleoyl phosphatidylethanolamine (POPE), distearoyl-phosphatidyl-ethanolamine (DSPE), dipalmitoyl phosphatidylethanolamine (DPPE), dimyristoyl phosphoethanolamine (DMPE), 1-stearyl-2-oleoyl-stearoylethanolamine (SOPE), 1-stearoyl-2-oleoyl-phosphatidylcholine (SOPC), sphingomyelin, phosphatidylcholine, phosphatidylethanolamine, phosphatidylserine, phosphatidylinositol, phosphatidic acid, palmitoyl oleoyl phosphatidylcholine, lysophosphatidylcholine, lysophosphatidylethanolamine (LPE), and mixtures thereof; or more preferably, the neutral lipid is DOPE and/or DSPC.

3. The composition according to claim 2, wherein the carrier further comprises a structured lipid; preferably, the molar ratio of the cationic lipid to the structured lipid is from 1:1 to 5:1; or preferably, the structured lipid is selected from one or more of cholesterol, nonsterol, sitosterol, ergosterol, campesterol, stigmasterol, brassicasterol, tomatine, ursolic acid, alpha-tocopherol, and corticosteroid; or more preferably, the structured lipid is cholesterol.

4. The composition according to claim 2, wherein the carrier further comprises a polymer-conjugated lipid; preferably, the molar ratio of the polymer-conjugated lipid to the carrier is from 0.5 % to 5 %; or preferably, the polymer-conjugated lipid is selected from one or more of PEG-modified phosphatidylethanolamine, PEG-modified phosphatidic acid, PEG-modified ceramide, PEG-modified dialkylamine, PEG-modified diacylglycerol, and PEG-modified dialkylglycerol; more preferably, the polymer-conjugated lipid is selected

from one or more of distearoyl phosphatidylethanolamine polyethylene glycol 2000 (DSPE-PEG2000), dimyristoylglycero-3-methoxy polyethylene glycol 2000 (DMG-PEG2000) and methoxypolyethylene glycol ditetradecylacetamide (ALC-0159).

5. The composition according to claim 2, wherein the carrier comprises a cationic lipid, a neutral lipid, a structured lipid and a polymer-conjugated lipid, and the molar ratio of the cationic lipid, the neutral lipid, the structured lipid and the polymer-conjugated lipid is (25-65):(5-25):(25-45):(0.5-5); preferably, the molar ratio of the cationic lipid, the neutral lipid, the structured lipid, and the polymer-conjugated lipid is 50:10:38.5:1.5.

6. The composition according to any one of claims 2 to 5, wherein the composition is a nanoparticle formulation which has an average particle size of 10 nm to 210 nm and a polydispersity coefficient less than or equal to 50%; preferably, the composition is a nanoparticle formulation which has an average particle size of 100 nm to 205 nm and a polydispersity coefficient less than or equal to 30 %.

7. The composition according to any one of claims 2 to 5, wherein the cationic lipid further comprises one or more other ionizable lipid compound(s).

8. The composition according to any one of claims 2 to 5, wherein the composition further comprises a therapeutic or prophylactic agent; or preferably, the mass ratio of the carrier to the therapeutic agent or prophylactic agent is from 10:1 to 30:1; or preferably, the mass ratio of the carrier to the therapeutic agent or prophylactic agent is from 15:1 to 25:1; more preferably, the mass ratio of the carrier to the therapeutic agent or prophylactic agent is 16:1; or
preferably, the therapeutic or prophylactic agent comprises one or more of a nucleic acid molecule, a small molecule compound, a polypeptide or a protein; or
preferably, the therapeutic or prophylactic agent is a vaccine or compound capable of eliciting an immune response;
preferably, the therapeutic or prophylactic agent is a nucleic acid; more preferably, the therapeutic or prophylactic agent is ribonucleic acid (RNA) or deoxyribonucleic acid (DNA);

ever more preferably, the RNA is selected from the group consisting of small interfering RNA (siRNA), asymmetric interfering RNA (aiRNA), microRNA (miRNA), Dicer-substrate RNA (dsRNA), small hairpin RNA (shRNA), messenger RNA (mRNA), and mixtures thereof; further ever more preferably, the RNA is mRNA.

9. The composition according to claim 8, wherein the composition further comprises one or more of pharmaceutically acceptable excipients; or the composition further comprises one or more of pharmaceutically acceptable diluents.

10. Use of the compound or a pharmaceutically acceptable salt thereof according to claim 1, or the composition according to any one of claims 2 to 9 in the manufacture of nucleic acid medicine, gene vaccine, small molecule medicine, polypeptide or protein medicine.

11. Use of the composition according to claim 8 or 9 in the manufacture of a medicament for treating a disease or condition in a mammal in need thereof, wherein the disease or condition is selected from the group consisting of infectious diseases, cancer and proliferative diseases, genetic diseases, autoimmune diseases, diabetes, neurodegenerative diseases, cardiovascular and renovascular diseases, and metabolic diseases; preferably, the infectious disease is selected from: diseases caused by coronavirus, influenza virus or HIV virus, infantile pneumonia, Rift Valley fever, yellow fever, rabies, and various herpes; or preferably, the mammal is a human; or preferably, the composition is administered intravenously, intramuscularly, intradermally, subcutaneously, intranasally or by inhalation; more preferably, the composition is administered subcutaneously; or preferably, the medicament is administered to the mammal at a dose of 0.001 mg/kg to 10 mg/kg.