CLAIMS

1. Immunogenic composition comprising:

   (a) a first hemagglutinin (HA) antigen or a first nucleic acid, suitably a first mRNA, encoding the first HA antigen wherein the first HA antigen is derived from a strain of Influenza B virus; and

   (b) a second HA antigen or a second nucleic acid, suitably a second mRNA, encoding the second HA antigen wherein the second HA antigen is derived from a strain of Influenza A virus,

   wherein (a) and (b) are different, and wherein the ratio of (a):(b) is comprised between 1.5:1 and 5:1, optionally wherein the ratio is a mass ratio (wt/wt ratio).

2. The immunogenic composition according to claim 1, wherein said ratio of (a):(b) is 1.5:1, 2:1, 2.2:1, 2.4:1, 2.6:1, 2.8:1, 3:1, 3.2:1, 3.4:1, 3.6:1, 3.8:1, 4:1, 4.2:1, 4.4:1, 4.6:1, 4.8:1 or 5:1.

3. The immunogenic composition according to claim 1 or 2, wherein said ratio of (a):(b) is comprised between 2:1 and 4:1, suitably between 2:1 and 3:1, suitably is 2:1 or 3:1.

4. The immunogenic composition according to any of claims 1 to 3, further comprising:

   (c) at least one further antigen or at least one further nucleic acid, suitably at least one further mRNA, encoding the at least one further antigen, wherein the at least one further antigen is derived from a strain of Influenza virus, suitably said strain of Influenza virus is selected from the group consisting of Influenza A virus and Influenza B virus.

5. The immunogenic composition according to claim 4, wherein said at least one further antigen comprises or consists of a peptide or protein selected or derived from an Influenza virus hemagglutinin (HA) or neuraminidase (NA) or an immunogenic fragment or an immunogenic variant thereof.

6. **Immunogenic composition** comprising:

   (a) a first mRNA encoding a HA of a first strain of Influenza B virus, suitably from B/Victoria lineage;

   (b) a second mRNA encoding a HA of a first strain of Influenza A virus, suitably from H1N1;

   (c^1) a third mRNA encoding a HA of a second strain of Influenza A virus, suitably from H3N2; and

(c^2) optionally, a fourth mRNA encoding a HA of a second strain of Influenza B virus, suitably from B/Yamagata lineage,

wherein the ratio of (a):(b):(c^1):(c^2) is comprised between 1.5:1:1:1.5 and 5:1:1:5, suitably between 2:1:1:2 and 4:1:1:4, suitably between 2:1:1:2 and 3:1:1:3, suitably is 2:1:1:2 or 3:1:1:3 optionally wherein the ratio is a mass ratio (wt/wt ratio).

7. The immunogenic composition of claim 6 further comprising:

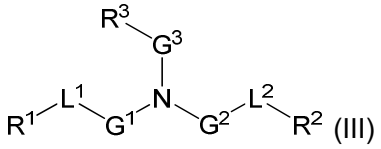
(c^3) a first mRNA encoding a NA of the first strain of Influenza A virus, suitably from H1N1;
(c^4) a second mRNA encoding a NA of the second strain of Influenza A virus, suitably from H3N2; and
(c^5) a third mRNA encoding a NA of the first strain of Influenza B virus, suitably from B/Victoria lineage,

wherein the ratio of (a):(b):(c^1):(c^2) is comprised between 1.5:1:1:1.5 and 5:1:1:5, suitably between 2:1:1:2 and 4:1:1:4, suitably between 2:1:1:2 and 3:1:1:3, suitably is 2:1:1:2 or 3:1:1:3.

8. The immunogenic composition according to claim 6 or 7, wherein the mRNAs of (a), (b), (c^1), (c^2), (c^3), (c^4), (c^5) and/or (c^6) are formulated in a lipid nanoparticle (LNP), each separately or not.

9. The immunogenic composition according to claim 8, wherein the LNP comprises a PEG-modified lipid, suitably at around 0.5 to 15 molar %, a non-cationic lipid, suitably at around 5 to 25 molar %, a sterol, suitably at around 25 to 55 molar %, and an ionizable cationic lipid, suitably at around 20 to 60 molar %.

10. The immunogenic composition according to claim 9, wherein the ionizable cationic lipid has the formula III:



(III)

or a pharmaceutically acceptable salt, tautomer or stereoisomer thereof, wherein:
L^1 or L^2 is each independently -O(C=O)- or -(C=O)O-;
G^1 and G^2 are each independently unsubstituted C_1-C_{12} alkylene or C_1-C_{12} alkenylene;

G^3 is C1-C_{24} alkylene, C_1-C_{24} alkenylene, C_3-C_8 cycloalkylene, or C_3-C_8 cycloalkenylene;

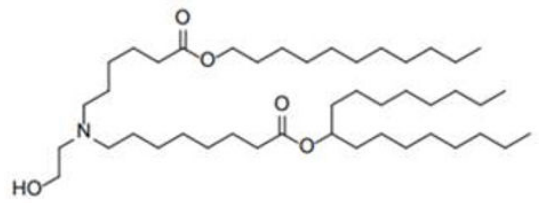
R^1 and R^2 are each independently, branched or linear, C_6-C_{24} alkyl or C_6-C_{24} alkenyl;

R^3 is H, OR^5, CN, -C(=O)OR^4, -OC(=O)R^4 or -NR^5C(=O)R^4;

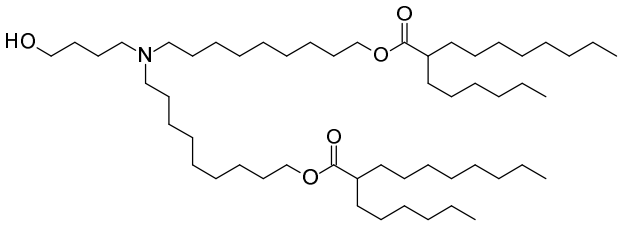
R^4 is C_1-C_{12} alkyl;

R^5 is H or C_1-C_6 alkyl.

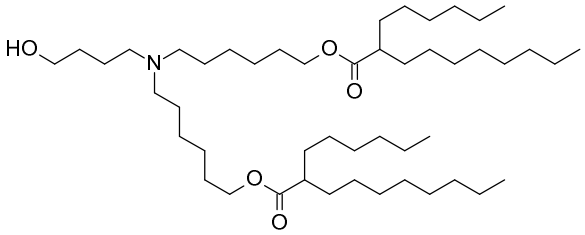
11. The immunogenic composition according to claim 9, wherein the cationic lipid has the formula:



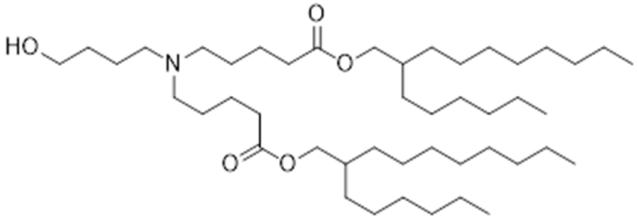
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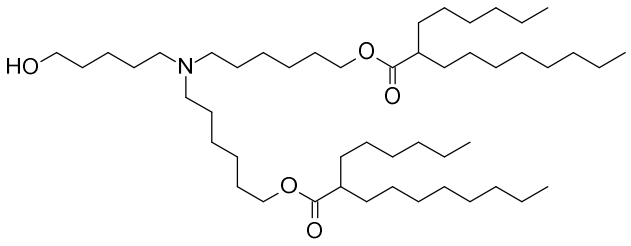
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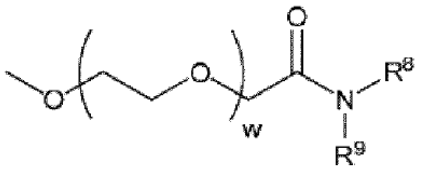


, or



12. The immunogenic composition according to any of claims 9 to 11, wherein the PEG-modified lipid comprises PEG-DMG or PEG-cDMA.

13. The immunogenic composition according to any of claims 9 to 11, wherein the PEG-modified lipid has the formula IV:



(IV)

wherein R^8 and R^9 are each independently a straight or branched, saturated or unsaturated alkyl chain containing from 10 to 30 carbon atoms, wherein the alkyl chain is optionally interrupted by one or more ester bonds;
and w has a mean value ranging from 30 to 60.

14. The immunogenic composition according to any of claims 9 to 13, wherein the non-cationic lipid is a neutral lipid, such as 1,2-distearoyl-sn-glycero-3-phosphocholine (DSPC), 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC), 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC), 1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE) or sphingomyelin (SM), preferably the neutral lipid is DSPC.

15. The immunogenic composition according to any of claims 9 to 14, wherein the sterol is cholesterol.

16. The immunogenic composition according to any of claims 6 to 15, wherein the mRNAs of (a), (b), (c^1), (c^2), (c^3), (c^4), (c^5) and/or (c^6), optionally each, are not self-replicating.

17. The immunogenic composition according to any of claims 6 to 16, wherein the mRNAs of (a), (b), (c^1), (c^2), (c^3), (c^4), (c^5) and/or (c^6) comprises a 5' untranslated region (UTR), optionally wherein the 5' UTR comprises or consists of a nucleic acid sequence derived from a 5'-UTR of a gene selected from HSD17B4, RPL32, ASAH1, ATP5A1, MP68, NDUFA4, NOSIP, RPL31, SLC7A3, TUBB4B and UBQLN2, or from a homolog, a fragment or variant of any one of these genes.

18. The immunogenic composition according to any of claims 6 to 17, wherein the mRNAs of (a), (b), (c^1), (c^2), (c^3), (c^4), (c^5) and/or (c^6) comprises a 3' UTR, optionally wherein the 3' UTR comprises or consists of a nucleic acid sequence derived from a 3'-UTR of a gene selected from PSMB3, ALB7, CASP1, COX6B1, GNAS, NDUFA1 and RPS9, or from a homolog, a fragment or a variant of any one of these genes.

19. The immunogenic composition according to any of claims 6 to 18, wherein the mRNAs of (a), (b), (c^1), (c^2), (c^3), (c^4), (c^5) and/or (c^6) comprises at least one chemical modification, optionally wherein the chemical modification is N1-methylpseudouridine and/or pseudouridine, suitably N1-methylpseudouridine.

20. **Vaccine** comprising the immunogenic composition according to any of claims 1 to 19.

21. The vaccine according to claim 20, further comprising at least one antigen or at least one nucleic acid encoding said at least one antigen, such as at least one mRNA encoding an antigen from a further pathogen, suitably the pathogen being a virus, optionally wherein said antigen from a further virus is selected from the group consisting of Coronavirus (e.g. SARS-CoV-1, SARS-CoV-2, MERS-CoV), Pneumoviridae virus (e.g. Respiratory syncytial virus, Metapneumovirus) and Paramyxovidirae virus (e.g. Parainfluenza virus, Henipavirus), suitably said antigen from a further virus is a spike protein, or an antigenic fragment thereof, from a SARS-CoV-2 virus or a mRNA encoding a spike protein, or an antigenic fragment thereof, from a SARS-CoV-2 virus.

22. **Kit or kit of parts** comprising the antigens or the nucleic acids as defined in any of claims 1 to 23 or the mRNAs as defined in any of claims 1 to 19, suitably the mRNAs of (a), (b), (c^1), (c^2), (c^3), (c^4), (c^5) and/or (c^6) as in defined in any of claims 6 to 19,

optionally comprising a liquid vehicle for solubilizing, and, optionally, technical instructions providing information on administration and dosage of the components.

23. The immunogenic composition according to any of claims 1 to 19, the vaccine according to claim 20 or 21 or the kit or kit of parts according to claim 22, **for use** as a medicament.

24. The immunogenic composition according to any of claims 1 to 19, the vaccine according to claim 20 or 21 or the kit or kit of parts according to claim 22, **for use** in the treatment or prophylaxis of an infection with an influenza virus, suitably an influenza A and/or influenza B.

25. The immunogenic composition, the vaccine, the kit for use according to claim 23 or 24, wherein an immune response is elicited, suitably an adaptative immune response, more suitably a protective adaptative immune response against an influenza virus, suitably an influenza A and/or influenza B.