Claims

1. A polymeric carrier cargo complex, comprising:
   a) as a carrier a polymeric carrier formed by disulfide-crosslinked cationic components, and
   b) as a cargo at least one nucleic acid molecule,
   for use as an immunostimulating agent or an adjuvant.

2. The polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to claim 1, wherein the at least one nucleic acid molecule is an RNA.

3. The polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 or 2, wherein the at least on nucleic acid molecule is an immunostimulatory nucleic acid..

4. The polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 to 3, wherein the at least on nucleic acid molecule is an immunostimulatory RNA (isRNA) or an mRNA.

5. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 to 4, wherein the nitrogen/phosphate (N/P) ratio of the cationic components to the at least one nucleic acid molecule is in the range of 0.1-20, or in the range of 0.1-5, or in the range of 0.1-1.

6. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 to 5, wherein the polymeric carrier comprises functional peptides or proteins additionally to the cationic components.

7. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to claim 6, wherein the functional peptides or proteins are peptide or protein antigens or antigen epitopes.

8. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 to 7, wherein the polymeric carrier additionally comprises a ligand.

9. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to claim 8, wherein the ligand is mannose.

10. The polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 to 9, wherein the cationic components are cationic peptides.

11. The polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to claim 10, wherein the cationic peptides

are selected from peptides according to formula (I)

$$(Arg)_l;(Lys)_m;(His)_n;(Orn)_o;(Xaa)_x,$$

wherein

$l + m + n + o + x$ = 3-100, and

l, m, n or o = independently of each other is any number selected from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81-90 and 91-100, provided that the overall content of Arg, Lys, His and Orn represents at least 10% of all amino acids of the cationic peptide; and Xaa is any amino acid selected from native (= naturally occurring) or non-native amino acids except of Arg, Lys, His or Orn; and

x = any number selected from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81-90, provided, that the overall content of Xaa does not exceed 90 % of all amino acids of the cationic peptide,

or are selected from peptides according to subformula (Ia)

$\{(Arg)_l;(Lys)_m;(His)_n;(Orn)_o;(Xaa')_x(Cys)_y\}$

or from peptides according to subformula (Ib)

$$Cys_1 \{(Arg)_l;(Lys)_m;(His)_n;(Orn)_o;(Xaa)_x\} Cys_2$$

wherein $(Arg)_l$; $(Lys)_m$; $(His)_n$; $(Orn)_o$; and x are as defined above; Xaa' is any amino acid selected from native (= naturally occurring) or non-native amino acids except of Arg, Lys, His, Orn; or Cys and y is any number selected from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, and 81-90, provided that the overall content of Arg (Arginine), Lys (Lysine), His (Histidine) and Orn (Ornithine) represents at least 10% of all amino acids of the oligopeptide and wherein Cys_1 and Cys_2 are Cysteines proximal to, or terminal to $(Arg)_l;(Lys)_m;(His)_n;(Orn)_o;(Xaa)_x$.

12. The polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 10 to 11, wherein the disulfide-bonds are formed by cysteine residues contained in the cationic peptides.

13. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to claim 12, wherein the cysteine residue is located proximal to, preferably at the terminal ends of the cationic peptides.

14. A polymeric carrier cargo complex for use as an immunostimulating agent or an adjuvant according to one of claims 1 to 13 comprising:

a. as a carrier a polymeric carrier formed by disulfide-crosslinked cationic polymers, and

b. as a cargo at least one nucleic acid (molecule),

in the treatment or prophylaxis of a disease selected from a tumour or a cancer disease, a cardiovascular disease, an infectious disease, an autoimmune disease or an allergy or for use as an immunostimulating agent or adjuvant in the treatment or prophylaxis of a disease selected from a tumour or a cancer disease, a cardiovascular disease, an infectious disease, an autoimmune disease or an allergy.

15. A vaccine comprising a polymeric carrier cargo complex as defined according to any of claims 1-13 and an antigen.

Claims

1. A polymeric carrier cargo complex, comprising:

   a) as a carrier a polymeric carrier formed by disulfide-crosslinked cationic components, wherein the disulfide-crosslinked cationic components are cationic peptides, wherein the cationic peptides exhibit a length of 10-100 amino acid residues, wherein the disulfide bonds are formed by cysteine residues contained in the cationic peptides, which are located proximal to the terminal ends of the cationic peptides, and

   b) as a cargo at least one single-stranded RNA molecule,

   for use in a method for unspecifically immunostimulating the immune response of a patient in need thereof or for use in a method for an adjuvant treatment of a patient in need thereof.

2. The polymeric carrier cargo complex for use according to claim 1, wherein the cysteine residues forming the disulfide bonds are positioned at the terminal ends of the cationic peptides.

3. The polymeric carrier cargo complex for use according to claim 1 or 2, wherein the at least one single-stranded RNA molecule is an immunostimulatory RNA (isRNA) or an mRNA.

4. The polymeric carrier cargo complex for use according to claim 1, 2 or 3, wherein the nitrogen/phosphate (N/P) ratio of the cationic peptides to the at least one single-stranded RNA molecule is in the range of 0.1-20, or in the range of 0.1-5, or in the range of 0.1-1.

5. The polymeric carrier cargo complex for use according to one of claims 1 to 4, wherein the disulfide-crosslinked cationic peptides comprise functional peptides or proteins additionally to the cationic peptides.

6. The polymeric carrier cargo complex for use according to claim 5, wherein the functional peptides or proteins are peptide or protein antigens or antigen epitopes.

7. The polymeric carrier cargo complex for use according to one of claims 1 to 6, wherein the disulfide-crosslinked cationic peptides additionally comprise a ligand.

8. The polymeric carrier cargo complex for use according to claim 7, wherein the ligand is mannose.

9. The polymeric carrier cargo complex for use according to any one of claims 1 to 8, wherein the cationic peptides are polycationic peptides.

10. The polymeric carrier cargo complex for use according to any of claims 1 to 9, wherein the cationic peptides are selected from peptides according to subformula (Ib)

$$Cys_1 \{(Arg)_l;(Lys)_m;(His)_n;(Orn)_o;(Xaa)_x\} Cys_2$$

wherein

l + m + n +o + x	=	8-98, and
l, m, n or o	=	independently of each other is any number selected from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80 and 81-90, provided that the overall content of Arg, Lys, His and Orn represents at least 10% of all amino acids of the cationic peptide; and Xaa is any amino acid selected from native (= naturally occurring) or non-native amino acids except of Arg, Lys, His or Orn; and
x	=	any number selected from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81-90, provided, that the overall content of Xaa does not exceed 90 % of all amino acids of the cationic peptide,

wherein Cys_1 and Cys_2 are cysteines proximal to, or terminal to $(Arg)_l;(Lys)_m;(His)_n;(Orn)_o;(Xaa)_x$.

11. The polymeric carrier cargo complex as defined according to any of claims 1 to 10 for use as a medicament.

12. A pharmaceutical composition comprising the polymeric carrier cargo complex as defined according to any one of claims 1 to 10 for use as a medicament.

13. The pharmaceutical composition for use according to claim 12, wherein the pharmaceutical composition further comprises a pharmaceutically acceptable carrier and/or vehicle.

14. A vaccine comprising a polymeric carrier cargo complex as defined according to any of claims 1-10 and an antigen.