CLAIMS:

1. A pharmaceutical composition comprising a protamine peptide and a payload molecule, dissolved in a pharmaceutically acceptable carrier, wherein the protamine peptide and the payload molecule are not conjugated to each other and do not form a complex.

2. The composition of claim 1, wherein the protamine peptide is conjugated to one or more of a lipid, a hydrophobic moiety, a polymer comprising an amino group or an additional protamine peptide, to form a protamine molecule.

3. The composition of claim 2, wherein the lipid is a fatty acid, a lipid-amine, or a lipid-carboxyl, preferably, wherein the lipid further comprises a linker or wherein the lipid is palmitic acid, stearic acid, 1,2- phosphatidylethanolamine (PE), dimyristoyl-sn-glycero-3-phosphoethanolamine (*DMPE*), dipalmitoyl-phosphatidylethanolamine (*DPPE*), 1,2-Distearoyl-sn-glycero-3-phospho-ethanolamine (*DSPE*), 1,2-Dioleoyl-sn-glycero-3-phosphoethanolamine (*DOPE*), DPPE-NHS, DSPE-NHS, or DOPE-NHS.

4. The composition of claim 2, wherein the hydrophobic moiety is allyl glycidyl ether (AGE).

5. The composition of claim 2, wherein the polymer comprising an amino group is poly(amidoamine) (*PAMAM), polyethyleneimine (PEI), or polylysine (PLL).*

6. The composition of claim 5, further comprising a crosslinker, preferably wherein the crosslinker is N-Succinimidyl S-Acetylthioacetate (SATA) or N-γ-maleimidobutyryloxysuccinimide (GMBS), or succinimidyl 4-(N-maleimido-methyl)cyclohexane-1-carboxylate (*SMCC*).

7. The composition of claim 2, wherein the protamine molecule is protamine-stearic acid, protamine-PAMAM, protamine-DMPE, protamine-GMBS-PAMAM, protamine-DMPE, protamine-AGE, protamine-SATA-PAMAM, protamine-C18, protamine-C16, protamine-PEI, or protamine-PLL.

8. The composition of claim 1, wherein the protamine peptide is conjugated to one or two additional protamine peptides resulting in a protamine dimer or a

protamine trimer.

9. The composition of any one of claims 2 to 8, wherein the protamine peptide and/or the additional protamine peptide is a protamine salt, preferably wherein the protamine salt is a protamine sulfate salt from salmon.

10. The composition of any one of claims 2 to 9, wherein the protamine peptide or the additional protamine peptide comprises the amino acid sequence of any one of SEQ ID NOs: 1-4 or a conservative substitution thereof.

11. The composition of any one of claims 1 to 10, wherein
(i) the protamine peptide comprises an alpha-helix and/or a beta sheet; and /or
(ii) the protamine peptide self-assembles into a nanostructure; and/or
(iii) the protamine peptide increases the density at the cell membrane, increases the concentration of protamine at the cell membrane, and/or increases the interaction of protamine with the cell membrane; and/or
(iv) is formulated for transmucosal, transdermal, or dermal delivery; and/or
(v) the payload molecule is about 3, 4, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, or 1000 KDa in size.

12. The composition of any one of claims 1-11, for use as a medicament.

13. Use of the composition of any one of claims 1-11, in the manufacture of a medicament for the treatment of a medical condition selected from the group consisting of CRSwNP, diabetes, an eye condition, a skin condition and rhinosinusitis, wherein the delivery of the composition to a cell, is to be non-parenteral delivery, wherein
(i) the non-parenteral delivery is to be intranasal, sublingual, oral, buccal, rectal, vaginal, intravitreal, topical, or to the skin, eye, brain, or lungs; or
(ii) the non-parenteral delivery is to be transmucosal or transcellular, preferably wherein the transcellular delivery is to be transepithelial or is to be to the lamina propria.

14. The use of claim 13, wherein the composition is to be delivered to the nucleus

of the cell and/or substantially bypasses the lysosomes of the cell once delivered;

wherein the payload molecule is selected from the group consisting of a protein, a peptide, a peptide analogue, a small molecule; an antibody, a growth hormone, insulin, and semaglutide.

15. A method of permeabilizing the membrane of a cell, comprising contacting the membrane of a cell with a protamine peptide.

16. Use of a protamine peptide molecule and a payload molecule in the manufacture of a medicament for the treatment of a medical condition selected from the group consisting of CRSwNP, diabetes, an eye condition, a skin condition and rhinosinusitis, wherein both molecules:
    a) are not conjugated to each other and do not form a complex;
    b) are to be delivered non-parenterally; and
    c) are to be administered at a different time from each other, with preferably the protamine peptide being prior to the payload molecule.

17. A method of preparing the composition of claim 1, the method comprising dissolving the protamine peptide in a first aqueous buffer and

    (i) subsequently adding and dissolving the payload molecule in the first aqueous buffer, or

    (ii) dissolving the payload molecule in a second aqueous buffer,

and mixing the first aqueous buffer with the second aqueous buffer.