Claim

1. A liquid pharmaceutical composition comprising:

a. a GLP-1 peptide or a pharmaceutically acceptable salt thereof;

b. an osmotic pressure regulator;

c. an antioxidant; and

d. a buffer;

wherein, the GLP-1 peptide is selected from the following compounds:

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(19-carboxynonadecanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[21-carboxyheneicosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(23-carboxytricosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[23-carboxytricosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(23-carboxytricosanoylamino)-4(*S*)-carboxybutanoyl-[Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(19-carboxynonadecanoylamino)-4(*S*)-carboxybutanoyl-[Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoyl-[Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(19-carboxynonadecanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[21-carboxyheneicosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(23-carboxytricosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[23-carboxytricosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(23-carboxytricosanoylamino)-4(*S*)-carboxybutanoyl-[Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(19-carboxynonadecanoylamino)-4(*S*)-carboxybutanoyl-[Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoyl-[Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(20-carboxyeicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[20-carboxyeicosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(22-carboxydocosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[22-carboxydocosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(20-carboxyeicosanoylamino)-4(*S*)-carboxybutanoyl-[Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(22-carboxydocosanoylamino)-4(*S*)-carboxybutanoyl-[Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(20-carboxyeicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[20-carboxyeicosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(22-carboxydocosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[22-carboxydocosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-(20-carboxyeicosanoylamino)-4(*S*)-carboxybutanoyl-[Arg34]GLP-1-(7-37) peptide, and

N-ε^{26}-(22-carboxydocosanoylamino)-4(*S*)-carboxybutanoyl-[Arg34]GLP-1-(7-37) peptide;

preferably, the GLP-1 peptide is selected from the following compounds:

N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(19-carboxynonadecanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

N-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide,

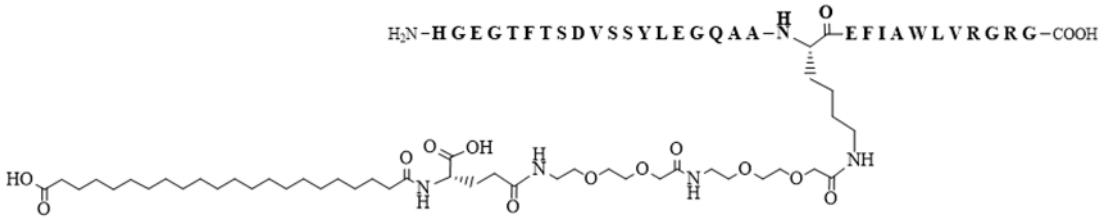
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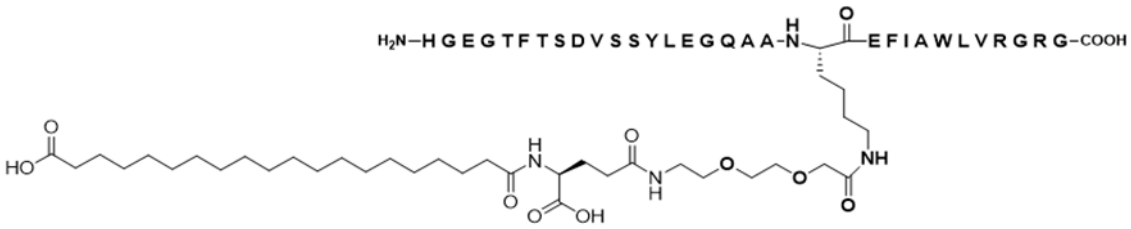
N-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide, and

N-ε^{26}-[2-(2-[2-(4-[21-carboxyheneicosanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide.

preferably, the GLP-1 peptide is the following compound:



; or



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2. The pharmaceutical composition according to claim 1, wherein the pharmaceutical composition comprises or does not comprise a preservative, preferably the pharmaceutical composition does not comprise a preservative, preferably the preservative is phenol or m-cresol, preferably the pharmaceutical composition does not comprise phenol or m-cresol; and/or

the buffer is at least one selected from the group consisting of an acetic acid-sodium acetate buffer, acetic acid-potassium acetate buffer, acetic acid-ammonium acetate buffer, and a phosphate buffer, and preferably a phosphate buffer; preferably the phosphate buffer is Na_2HPO_4; and/or

the osmotic pressure regulator is NaCl or propylene glycol; and/or

the antioxidant is at least one selected from the group consisting of ascorbic acid, methionine, citric acid and tartaric acid; preferably, the antioxidant is selected from citric acid and methionine; preferably, the citric acid is citric acid monohydrate.

3. The pharmaceutical composition according to claim 2, characterized in that the pharmaceutical composition comprises more than about 0.5 mg/ml Na_2HPO_4, preferably about 0.5-20 mg/ml Na_2HPO_4, preferably about 1-20 mg/ml Na_2HPO_4, preferably about 1-10 mg/ml Na_2HPO_4, more preferably about 1-5 mg/ml Na_2HPO_4, and further preferably about 1.40 mg/ml, about 1.41 mg/ml, about 1.42 mg/ml, about 1.5 mg/ml, about 2 mg/ml, about 2.5 mg/ml, about 3 mg/ml, about 3.5 mg/ml, about 4 mg/ml, or about 4.5 mg/ml Na_2HPO_4.

4. The pharmaceutical composition according to claim 2 or 3, wherein the concentration of NaCl is more than about 0.5 mg/ml, preferably more than about 1 mg/ml, preferably about 1-30 mg/ml, preferably about 3-25 mg/ml, preferably about 5-15 mg/ml, preferably about 5-10 mg/ml, preferably about 5 mg/ml, about 5.5 mg/ml, about 6 mg/ml, about 7 mg/ml, about 8 mg/ml, about 8.10 mg/ml, about 8.15 mg/ml, about 8.20 mg/ml, about 8.25 mg/ml, about 8.30 mg/ml, about 9 mg/ml or about 10 mg/ml; and/or

the concentration of propylene glycol is more than about 1 mg/ml, preferably more than about 2 mg/ml, preferably about 5-25 mg/ml, preferably about 10-20 mg/ml, preferably about 12-18 mg/ml, preferably about 13 mg/ml, about 13.5 mg/ml, about 14 mg/ml, about 14.5 mg/ml, about 15 mg/ml, about 16 mg/ml or about 17 mg/ml; and/or

the concentration of the antioxidant is more than about 0.5 mM, preferably more than about 1 mM, preferably about 1-25 mM, preferably about 1-20 mM, preferably about 1-15 mM, preferably about 1-10 mM, preferably about 1 mM, about 2 mM, about 3 mM, about 4 mM, about 5 mM, about 6 mM, about 7 mM, about 8 mM or about 9 mM.

5. The pharmaceutical composition according to any one of claims 2 to 4, wherein the antioxidant is selected from citric acid at a concentration of about 1-25 mM, preferably at a concentration of about 1-20 mM, preferably at a concentration of about 1-15 mM, preferably at a concentration of about 1-10 mM, preferably at a concentration of about 1 mM, about 2 mM, about 3 mM, about 4 mM, about 5 mM, about 6 mM, about 7 mM, about 8 mM or about 9 mM; preferably the citric acid is citric acid monohydrate; and/or

the concentration of the GLP-1 peptide is at least about 1 mg/ml, preferably at least about 2 mg/ml, preferably about 1-80 mg/ml, preferably about 1-70 mg/ml, preferably about 1-65 mg/ml, preferably about 1-60 mg/ml, preferably about 2-60 mg/ml, preferably about 2-50 mg/ml, more preferably about 2 mg/ml, about 3 mg/ml, about 4 mg/ml, about 5 mg/ml, about 6 mg/ml, about 7 mg/ml, about 8 mg/ml, about 9 mg/ml, about 10 mg/ml, about 11 mg/ml, about 12 mg/ml, about 13 mg/ml, about 14 mg/ml, about 15 mg/ml, about 16 mg/ml, about 17 mg/ml, about 18 mg/ml, about 19 mg/ml, about 20 mg/ml, about 21 mg/ml, about 22 mg/ml, about 23 mg/ml, about 24 mg/ml, about 25 mg/ml, about 26 mg/ml, about 27 mg/ml, about 28 mg/ml, about 29 mg/ml, about 30 mg/ml, about 31 mg/ml, about 32 mg/ml, about 33 mg/ml, about 34 mg/ml, about 35 mg/ml, about 36 mg/ml, about 37 mg/ml, about 38 mg/ml, about 39 mg/ml, about 40 mg/ml, about 41 mg/ml, about 42 mg/ml, about 43 mg/ml, about 44 mg/ml, about 45 mg/ml, about 46 mg/ml, about 47 mg/ml, about 48 mg/ml, about 49 mg/ml, or about 60 mg/ml, more preferably about 2 mg/ml, about 3 mg/ml, about 5 mg/ml, about 6 mg/ml, about 12 mg/ml, about 15 mg/ml, about 18 mg/ml, about 24 mg/ml, about 30 mg/ml, about 36 mg/ml, or about 48 mg/ml; further preferably about 3 mg/ml, about 6 mg/ml, about

12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 36 mg/ml, or about 48 mg/ml; and/or

the pH of the pharmaceutical composition is about 6.5 to about 8.5, more preferably about 7.0 to about 8.5, further preferably about 7.1 to about 8.3, further preferably about 7.2, about 7.3, about 7.4, about 7.5, about 7.6, about 7.7, about 7.8, about 7.9, about 8.0, about 8.1, or about 8.2.

6. A liquid pharmaceutical composition comprising:

about 1-60 mg/ml, preferably about 1-70 mg/ml, preferably about 1-65 mg/ml, preferably about 1-60 mg/ml, preferably about 2-60 mg/ml, preferably about 2-50 mg/ml, more preferably about 2 mg/ml, about 3 mg/ml, about 4 mg/ml, about 5 mg/ml, about 6 mg/ml, about 7 mg/ml, about 8 mg/ml, about 9 mg/ml, about 10 mg/ml, about 11 mg/ml, about 12 mg/ml, about 13 mg/ml, about 14 mg/ml, about 15 mg/ml, about 16 mg/ml, about 17 mg/ml, about 18 mg/ml, about 19 mg/ml, about 20 mg/ml, about 21 mg/ml, about 22 mg/ml, about 23 mg/ml, about 24 mg/ml, about 25 mg/ml, about 26 mg/ml, about 27 mg/ml, about 28 mg/ml, about 29 mg/ml, about 30 mg/ml, about 31 mg/ml, about 32 mg/ml, about 33 mg/ml ml, about 34 mg/ml, about 35 mg/ml, about 36 mg/ml, about 37 mg/ml, about 38 mg/ml, about 39 mg/ml, about 40 mg/ml, about 41 mg/ml, about 42 mg/ml, about 43 mg/ml, about 44 mg/ml, about 45 mg/ml, about 46 mg/ml, about 47 mg/ml, about 48 mg/ml, about 49 mg/ml, further preferably about 2 mg/ml, about 3 mg/ml, about 5 mg/ml, about 6 mg/ml, about 12 mg/ml, about 15 mg/ml, about 18 mg/ml, about 24 mg/ml, about 30 mg/ml, about 36 mg/ml, or about 48 mg/ml; further preferably about 3 mg/ml, about 6 mg/ml, about 12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 36 mg/ml, or about 48 mg/ml of *N*-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide or *N*-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide;

about 1-30 mg/ml, preferably about 3-25 mg/ml, preferably about 5-15 mg/ml, preferably about 5 mg/ml, about 6 mg/ml, about 7 mg/ml, about 8 mg/ml, about 8.10 mg/ml, about 8.15 mg/ml, about 8.20 mg/ml, about 8.25 mg/ml, about 8.30 mg/ml, about 8.50 mg/ml, about 9 mg/ml or about 10 mg/ml of NaCl;

about 1-25 mM, preferably about 1-20 mM, more preferably about 1-15 mM, further preferably about 1-10 mM, further preferably about 1 mM, about 2 mM, about 3 mM, about 4 mM, about 5 mM, about 6 mM, about 7 mM, about 8 mM or about 9 mM citric acid;

about 1-20 mg/ml, preferably about 1-10 mg/ml, more preferably about 1-5 mg/ml, and further preferably about 1.42 mg/ml, about 1.5 mg/ml, about 2 mg/ml, about 2.5 mg/ml, about 3 mg/ml, about 3.5 mg/ml, about 4 mg/ml, or about 4.5 mg/ml of Na_2HPO_4; and

the pH of the pharmaceutical composition is about 6.5 to about 8.5, more preferably about 7.0 to about 8.5, further preferably about 7.1 to about 8.3, further preferably about 7.2, about 7.3, about 7.4, about 7.5, about 7.6, about 7.7, about 7.8, about 7.9, about 8.0, about 8.1, or about 8.2.

7. A liquid pharmaceutical composition comprising:

about 1-60 mg/ml, preferably about 1-70 mg/ml, preferably about 1-65 mg/ml, preferably about 1-60 mg/ml, preferably about 2-60 mg/ml, preferably about 2-50 mg/ml, more preferably about 2 mg/ml, about 3 mg/ml, about 4 mg/ml, about 5 mg/ml, about 6 mg/ml, about 7 mg/ml, about 8 mg/ml, about 9 mg/ml, about 10 mg/ml, about 11 mg/ml, about 12 mg/ml, about 13mg/ml, about 14mg/ml, about 15mg/ml, about 16mg/ml, about 17mg/ml, about

18mg/ml, about 19mg/ml, about 20mg/ml, about 21mg/ml, about 22mg/ml, about 23mg/ml, about 24mg/ml, about 25mg/ml, about 26mg/ml, about 27mg/ml, about 28mg/ml, about 29mg/ml, about 30mg/ml, about 31mg/ml, about 32 mg/ml, about 33mg/ml, about 34mg/ml, about 35mg/ml, about 36mg/ml, about 37mg/ml, about 38mg/ml, about 39mg/ml, about 40mg/ml, about 41mg/ml, about 42mg/ml, about 43mg/ml, about 44mg/ml, about 45mg/ml, about 46mg/ml, about 47mg/ml, about 48mg/ml, or about 49mg/ml, further preferably about 2 mg/ml, about 3 mg/ml, about 5 mg/ml, about 6 mg/ml, about 12 mg/ml, about 15 mg/ml, about 18 mg/ml, about 24 mg/ml, about 30 mg/ml, about 36 mg/ml, or about 48 mg/ml; further preferably about 3 mg/ml, about 6 mg/ml, about 12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 36 mg/ml, or about 48 mg/ml of *N*-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide or *N*-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide;

about 5-25 mg/ml, preferably about 10-20 mg/ml, preferably about 12-18 mg/ml, preferably about 13 mg/ml, about 13.5 mg/ml, about 14 mg/ml, about 14.5 mg/ml, about 15 mg/ml, 16 mg/ml or about 17 mg/ml of propylene glycol;

about 1-25 mM, preferably about 1-20 mM, more preferably about 1-15 mM, further preferably about 1-10 mM, further preferably about 1 mM, about 2 mM, about 3 mM, about 4 mM, about 5 mM, about 6 mM, about 7 mM, about 8 mM or about 9 mM citric acid;

about 1-20 mg/ml, preferably about 1-10 mg/ml, more preferably about 1-5 mg/ml, and further preferably about 1.42 mg/ml, about 1.5 mg/ml, about 2 mg/ml, about 2.5 mg/ml, about 3 mg/ml, about 3.5 mg/ml, about 4 mg/ml, or about 4.5 mg/ml of Na_2HPO_4; and

the pH of the pharmaceutical composition is about 6.5 to about 8.5, more preferably about 7.0 to about 8.5, further preferably about 7.1 to about 8.3, further preferably about 7.2, about 7.3, about 7.4, about 7.5, about 7.6, about 7.7, about 7.8, about 7.9, about 8.0, about 8.1, or about 8.2.

8. A liquid pharmaceutical composition comprising:

about 3 mg/ml, about 6 mg/ml, about 12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 30 mg/ml, about 36 mg/ml, about 48 mg/ml or about 60 mg/ml of *N*-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide or *N*-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide;

about 7 mg/ml, about 8 mg/ml, about 8.10 mg/ml, about 8.15 mg/ml, about 8.20 mg/ml, about 8.25 mg/ml, about 8.30 mg/ml, about 8.50 mg/ml, about 9 mg/ml, or about 10 mg/ml of NaCl;

about 1 mM, about 2 mM, about 3 mM, about 4 mM, about 5 mM, about 6 mM, about 7 mM, about 8 mM, 9 mM or about 10 mM citric acid;

about 1.42 mg/ml of Na_2HPO_4; and

the pH of the pharmaceutical composition is about 7.3.

9. A liquid pharmaceutical composition comprising:

about 3 mg/ml, about 6 mg/ml, about 12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 30 mg/ml, about 36

mg/ml, or about 48 mg/ml of *N*-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide or *N*-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide;

about 14 mg/ml of propylene glycol;

about 1 mM, 2 mM, about 3 mM, about 4 mM, about 5 mM, about 6 mM, about 7 mM, about 8 mM, 9 mM or about 10 mM citric acid;

about 1.42 mg/ml of Na_2HPO_4; and

the pH of the pharmaceutical composition is about 7.3.

10. A pharmaceutical product comprising a container and the liquid pharmaceutical composition according to any one of claims 1 to 9 placed in the container; preferably, the container is selected from a pen injection device, an automatic injection device, a syringe, and a vial.

11. A pharmaceutical product comprising a container and a liquid pharmaceutical composition placed in the container, characterized in that the container is deoxygenated and filled with nitrogen before the liquid pharmaceutical composition is placed in the container and/or during the process of the liquid pharmaceutical composition being placed in the container and/or after the liquid pharmaceutical composition is placed in the container; the liquid pharmaceutical composition comprises:

about 3 mg/ml, about 6 mg/ml, about 12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 36 mg/ml, about 48 mg/ml, or about 60 mg/ml of *N*-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide or *N*-ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide;

about 3 mg/ml, about 4 mg/ml, about 5 mg/ml, about 6 mg/ml, about 7 mg/ml, about 8 mg/ml, about 8.10 mg/ml, about 8.15 mg/ml, about 8.20 mg/ml, about 8.25 mg/ml, about 8.30 mg/ml, about 8.50 mg/ml, about 9 mg/ml, or about 10 mg/ml of NaCl;

about 1.42 mg/ml, about 1.5 mg/ml, about 2 mg/ml, about 2.5 mg/ml, about 3 mg/ml, about 3.5 mg/ml, about 4 mg/ml, or about 4.5 mg/ml of Na_2HPO_4; and

the pH of the pharmaceutical composition is about 7.0, about 7.1, about 7.2, about 7.3, about 7.4, about 7.6, or about 7.7.

12. A pharmaceutical product comprising a container and a liquid pharmaceutical composition placed in the container, characterized in that the container is deoxygenated and filled with nitrogen before the liquid pharmaceutical composition is placed in the container and/or during the process of the liquid pharmaceutical composition being placed in the container and/or after the liquid pharmaceutical composition is placed in the container; the liquid pharmaceutical composition comprises:

about 2-60 mg/ml, preferably about 3 mg/ml, about 6 mg/ml, about 12 mg/ml, about 18 mg/ml, about 24 mg/ml, about 36 mg/ml, or about 48 mg/ml of *N*-ε^{26}-[2-(2-[2-(2-[2-(2-[4-(21-carboxyheneicosanoylamino)-4(*S*)-carboxybutanoylamino]ethoxy)ethoxy]acetylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide or *N*-

ε^{26}-[2-(2-[2-(4-[19-carboxynonadecanoylamino]-4(*S*)-carboxybutanoylamino)ethoxy]ethoxy)acetyl][Gly8, Arg34]GLP-1-(7-37) peptide;

about 13 mg/ml, about 14 mg/ml, about 15 mg/ml, 16 mg/ml, or about 17 mg/ml of propylene glycol;

about 1.42 mg/ml, about 1.5 mg/ml, about 2 mg/ml, about 2.5 mg/ml, about 3 mg/ml, about 3.5 mg/ml, about 4 mg/ml, or about 4.5 mg/ml of Na_2HPO_4; and

the pH of the pharmaceutical composition is about 7.0, about 7.1, about 7.2, about 7.3, about 7.4, about 7.6, or about 7.7.

13. The pharmaceutical product according to claim 11 or 12, wherein the liquid pharmaceutical composition further comprises about 0.005 mM-25 mM, preferably about 0.01 mM-10 mM, further preferably about 0.1 mM-2.0 mM citric acid or methionine; and/or

deoxygenation of the container is achieved by filling the container with an inert gas; preferably, the inert gas is nitrogen; and/or

the container is a pen injection device, an automatic injection device, a syringe, or a vial;

preferably, wherein the pharmaceutical composition is for parenteral administration; preferably, the parenteral administration is subcutaneous administration.

14. Use of the pharmaceutical composition according to any one of claims 1 to 9, or the pharmaceutical product according to any one of claims 10 to 13, in the preparation of a medicament for treating diabetes, obesity, non-alcoholic fatty liver disease, Alzheimer's disease, or Parkinson's disease; preferably administering the pharmaceutical composition according to any one of claims 1 to 9 to a subject in need thereof once a week, once every two weeks, or less frequently.

15. The pharmaceutical composition according to any one of claims 1 to 9, or the pharmaceutical product according to any one of claims 10 to 13, for use in the treatment of diabetes, obesity, non-alcoholic fatty liver disease, Alzheimer's disease, or Parkinson's disease; preferably, the pharmaceutical composition according to any one of claims 1 to 9 is administered to a subject in need thereof once a week, once every two weeks, or less frequently.