[Technical Solution]

In one aspect, the present invention refers to a use of a pharmaceutical composition in the manufacture of a medicament for preventing or treating congenital hyperinsulinism, wherein the pharmaceutical composition comprises a peptide comprising the amino acid sequence of the following General Formula 1:

X1-X2-QGTF-X7-SD-X10-S-X12-X13-X14-X15-X16-X17-X18-X19-X20-X21-F-X23-X24-W-L-X27-X28-X29-X30 (General Formula 1, SEQ ID NO: 45)

wherein, in General Formula 1,

X1 is tyrosine (Y);

X2 is serine (S) or α-methyl-glutamic acid, aminoisobutyric acid (Aib);

X7 is threonine (T), valine (V), or cysteine (C);

X10 is tyrosine (Y) or cysteine (C);

X12 is lysine (K) or cysteine (C);

X13 is tyrosine (Y) or cysteine (C);

X14 is leucine (L) or cysteine (C);

X15 is aspartic acid (D) or cysteine (C);

X16 is glutamic acid (E), serine (S), or cysteine (C);

X17 is aspartic acid (D), glutamic acid (E), lysine (K), arginine (R), serine (S), cysteine (C), or valine (V);

X18 is aspartic acid (D), glutamic acid (E), arginine (R), or cysteine (C);

X19 is alanine (A) or cysteine (C);

X20 is glutamine (Q), aspartic acid (D), lysine (K), or cysteine (C);

X21 is aspartic acid (D), glutamic acid (E), leucine (L), valine (V), or cysteine (C);

X23 is isoleucine (I), valine (V), or arginine (R);

X24 is valine (V), arginine (R), alanine (A), glutamic acid (E), lysine (K), glutamine (Q), or leucine (L);

X27 is isoleucine (I), valine (V), alanine (A), methionine (M), glutamine (Q), or arginine (R);

X28 is glutamine (Q), lysine (K), asparagine (N), or arginine (R);

X29 is threonine (T); and

X30 is cysteine (C), or is absent;

with the proviso that when the amino acid sequence of General Formula 1 is identical to

SEQ ID NO: 1 or SEQ ID NO: 12, it is excluded.

In another aspect, the present disclosure refers to a use of a pharmaceutical composition in the manufacture of a medicament for preventing or treating congenital hyperinsulinism, wherein the pharmaceutical composition comprises an isolated conjugate comprising a peptide moiety and a biocompatible material moiety which is linked to the peptide moiety, wherein the peptide moiety comprises an amino acid sequence selected from the group consisting of SEQ ID NOS: 2 to 11 and 13 to 44.

[Claims]

[Claim 1] Use of a pharmaceutical composition in the manufacture of a medicament for preventing or treating congenital hyperinsulinism, wherein the pharmaceutical composition comprises a peptide comprising the amino acid sequence of the following General Formula 1:

X1-X2-QGTF-X7-SD-X10-S-X12-X13-X14-X15-X16-X17-X18-X19-X20-X21-F-X23-X24-W-L-X27-X28-X29-X30 (General Formula 1, SEQ ID NO: 45)

wherein, in General Formula 1,
X1 is tyrosine (Y);
X2 is serine (S) or aminoisobutyric acid (Aib);
X7 is threonine (T), valine (V), or cysteine (C);
X10 is tyrosine (Y) or cysteine (C);
X12 is lysine (K) or cysteine (C);
X13 is tyrosine (Y) or cysteine (C);
X14 is leucine (L) or cysteine (C);
X15 is aspartic acid (D) or cysteine (C);
X16 is glutamic acid (E), serine (S), or cysteine (C);
X17 is aspartic acid (D), glutamic acid (E), lysine (K), arginine (R), serine (S), cysteine (C), or valine (V);
X18 is aspartic acid (D), glutamic acid (E), arginine (R), or cysteine (C);
X19 is alanine (A) or cysteine (C);
X20 is glutamine (Q), aspartic acid (D), lysine (K), or cysteine (C);
X21 is aspartic acid (D), glutamic acid (E), leucine (L), valine (V), or cysteine (C);
X23 is isoleucine (I), valine (V), or arginine (R);
X24 is valine (V), arginine (R), alanine (A), glutamic acid (E), lysine (K), glutamine (Q), or leucine (L);
X27 is isoleucine (I), valine (V), alanine (A), methionine (M), glutamine (Q), or arginine (R);
X28 is glutamine (Q), lysine (K), asparagine (N), or arginine (R);
X29 is threonine (T); and
X30 is cysteine (C) or is absent;
with the proviso that when the amino acid sequence of General Formula 1 is identical to SEQ ID NO: 1 or SEQ ID NO: 12, it is excluded.

[Claim 2]
Use of a pharmaceutical composition in the manufacture of a medicament for preventing or treating congenital hyperinsulinism, wherein the pharmaceutical composition comprises an isolated conjugate comprising a peptide moiety and a biocompatible material moiety which is linked to the peptide moiety, wherein the peptide moiety comprises an amino acid sequence selected from the group

consisting of SEQ ID NOS: 2 to 11 and 13 to 44.

[Claim 3]

The use of claim 1,
wherein, in General Formula 1,
X1 is tyrosine (Y);
X2 is serine (S) or aminoisobutyric acid (Aib);
X7 is cysteine (C), threonine (T), or valine (V);
X10 is tyrosine (Y) or cysteine (C);
X12 is lysine (K) or cysteine (C);
X13 is tyrosine (Y) or cysteine (C);
X14 is leucine (L) or cysteine (C);
X15 is aspartic acid (D) or cysteine (C);
X16 is glutamic acid (E), serine (S), or cysteine (C);
X17 is glutamic acid (E), lysine (K), arginine (R), cysteine (C), or valine (V);
X18 is arginine (R) or cysteine (C);
X19 is alanine (A) or cysteine (C);
X20 is glutamine (Q) or lysine (K);
X21 is aspartic acid (D), glutamic acid (E), valine (V), or cysteine (C);
X23 is valine (V);
X24 is valine (V) or glutamine (Q);
X27 is methionine (M);
X28 is asparagine (N) or arginine (R);
X29 is threonine (T); and
X30 is cysteine (C) or is absent.

[Claim 4]

The use of claim 1,
wherein, in General Formula 1,
X1 is tyrosine (Y);
X2 is aminoisobutyric acid (Aib);
X7 is cysteine (C), threonine (T), or valine (V);
X10 is tyrosine (Y) or cysteine (C);
X12 is lysine (K);
X13 is tyrosine (Y) or cysteine (C);
X14 is leucine (L) or cysteine (C);
X15 is aspartic acid (D) or cysteine (C);
X16 is glutamic acid (E), serine (S), or cysteine (C);
X17 is lysine (K), arginine (R), cysteine (C), or valine (V);
X18 is arginine (R) or cysteine (C);
X19 is alanine (A) or cysteine (C);

X20 is glutamine (Q) or lysine (K);
X21 is aspartic acid (D), glutamic acid (E), or cysteine (C);
X23 is valine (V);
X24 is glutamine (Q);
X27 is methionine (M);
X28 is asparagine (N) or arginine (R);
X29 is threonine (T); and
X30 is cysteine (C) or is absent.

[Claim 5]

The use of claim 1,
wherein, in General Formula 1,
X1 is tyrosine (Y);
X2 is serine (S) or aminoisobutyric acid (Aib);
X7 is threonine (T), valine (V), or cysteine (C);
X10 is tyrosine (Y) or cysteine (C);
X12 is lysine (K) or cysteine (C);
X13 is tyrosine (Y) or cysteine (C);
X14 is leucine (L) or cysteine (C);
X15 is aspartic acid (D) or cysteine (C);
X16 is glutamic acid (E), serine (S), or cysteine (C);
X17 is aspartic acid (D), glutamic acid (E), lysine (K), arginine (R), serine (S), cysteine (C), or valine (V);
X18 is aspartic acid (D), glutamic acid (E), arginine (R), or cysteine (C);
X19 is alanine (A) or cysteine (C);
X20 is glutamine (Q), aspartic acid (D), or lysine (K);
X21 is aspartic acid (D) or glutamic acid (E);
X23 is valine (V);
X24 is valine (V) or glutamine (Q);
X27 is isoleucine (I) or methionine (M);
X28 is asparagine (N) or arginine (R);
X29 is threonine (T); and
X30 is cysteine (C) or is absent.

[Claim 6]

The use of claim 1,
wherein, in General Formula 1,
X1 is tyrosine (Y);
X2 is aminoisobutyric acid (Aib);
X7 is threonine (T);
X10 is tyrosine (Y);
X12 is lysine (K);

X13 is tyrosine (Y);
X14 is leucine (L);
X15 is aspartic acid (D) or cysteine (C);
X16 is glutamic acid (E), serine (S), or cysteine (C);
X17 is lysine (K) or arginine (R);
X18 is arginine (R);
X19 is alanine (A);
X20 is glutamine (Q), cysteine (C), or lysine (K);
X21 is aspartic acid (D), cysteine (C), valine (V), or glutamic acid (E);
X23 is valine (V) or arginine (R);
X24 is glutamine (Q) or leucine (L);
X27 is methionine (M);
X28 is asparagine (N) or arginine (R);
X29 is threonine (T); and
X30 is absent.

[Claim 7]

The use of claim 1, wherein the peptide comprises the amino acid sequence of the following General Formula 2:

Y-Aib-QGTF-X7-SD-X10-S-X12-Y-L-X15-X16-X17-R-A-X20-X21-F-V-X24-W-L-M-N-T-X30 (General Formula 2, SEQ ID NO: 46)

wherein, in General Formula 2,
X7 is threonine (T), valine (V), or cysteine (C);
X10 is tyrosine (Y) or cysteine (C);
X12 is lysine (K) or cysteine (C);
X15 is aspartic acid (D) or cysteine (C);
X16 is glutamic acid (E) or serine (S);
X17 is lysine (K) or arginine (R);
X20 is glutamine (Q) or lysine (K);
X21 is aspartic acid (D) or glutamic acid (E);
X24 is valine (V) or glutamine (Q); and
X30 is cysteine (C) or is absent.

[Claim 8]

The use of claim 1, wherein the peptide has an isoelectric point (pI) value different from that of native glucagon (6.8).

[Claim 9]

The use of claim 1, wherein each amino acid in at least one amino acid pair among the amino acid pairs of X10 and X14, X12 and X16, X16 and X20, X17 and

X21, X20 and X24, and X24 and X28 in General Formula 1 is substituted with glutamic acid or lysine, which is capable of forming a ring, respectively.

[Claim 10]

The use of claim 9, wherein each amino acid in the amino acid pair of X12 and X16 or each amino acid in the amino acid pair of X16 and X20 or each amino acid in the amino acid pair of X17 and X21 is respectively substituted with glutamic acid or lysine, which is capable of forming a ring.

[Claim 11]

The use of claim 1, wherein, in General Formula 1, a ring is formed between each amino acid in at least one amino acid pair among the amino acid pairs of X10 and X14, X12 and X16, X16 and X20, X17 and X21, X20 and X24, and X24 and X28.

[Claim 12]

The use of claim 1, wherein the C-terminus of the peptide is amidated.

[Claim 13]

The use of claim 1, wherein the C-terminus of the peptide is unmodified.

[Claim 14]

The use of claim 1, wherein the peptide is a native glucagon derivative capable of activating a glucagon receptor.

[Claim 15]

The use of claim 1, wherein the peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOS: 7 to 11, 13 to 27, 29, 31, and 35 to 44.

[Claim 16]

The use of claim 7, wherein the peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOS: 13, 15, and 36 to 44.

[Claim 17]

The use of claim 1, wherein the peptide comprises the amino acid sequence of SEQ ID NO: 37.

[Claim 18]

The use according to any one of claims 1 to 17, wherein the peptide is in the form of a long-acting conjugate, in which a biocompatible material moiety is linked to a peptide moiety comprising the amino acid sequence of General Formula 1.

[Claim 19]

The use of claim 18, wherein the biocompatible material moiety is selected from the group consisting of a polymer, fatty acid, cholesterol, albumin and a fragment thereof, an albumin-binding material, a polymer of repeating units of a particular amino acid sequence, an antibody, an antibody fragment, an FcRn-binding material, *in vivo* connective tissue or a derivative thereof, a nucleotide, fibronectin, transferrin, a saccharide, heparin, and elastin.

[Claim 20]

The use of claim 19, wherein the polymer is selected from the group consisting of a polyethylene glycol, a polypropylene glycol, an ethylene glycol-propylene glycol copolymer, polyoxyethylated polyol, polyvinyl alcohol, a polysaccharide, dextran, polyvinyl ethyl ether, a biodegradable polymer, a lipid polymer, chitin, hyaluronic acid, an oligonucleotide, and a combination thereof.

[Claim 21]

The use of claim 19, wherein the FcRn-binding material is a polypeptide comprising an immunoglobulin Fc region.

[Claim 22]

The use of claim 18, wherein the peptide moiety and the biocompatible material moiety are linked with each other through a linker.

[Claim 23]

The use of claim 22, wherein the linker is selected from the group consisting of a peptide, fatty acid, a saccharide, a polymer, a low molecular weight compound, a nucleotide, and a combination thereof.

[Claim 24]

The use of claim 23, wherein the polymer is selected from the group consisting of a polyethylene glycol, a polypropylene glycol, an ethylene glycol-propylene glycol copolymer, polyoxyethylated polyol, polyvinyl alcohol, a polysaccharide, dextran, polyvinyl ethyl ether, a biodegradable polymer, a lipid polymer, chitin, hyaluronic acid, an oligonucleotide, and a combination thereof.

[Claim 25]

The use of claim 22, wherein the linker is a polyethylene glycol.

[Claim 26]

The use of claim 21, wherein the immunoglobulin Fc region is aglycosylated.

[Claim 27]

The use of claim 21, wherein the immunoglobulin Fc region is selected from the group consisting of:

(a) a CH1 domain, a CH2 domain, a CH3 domain, and a CH4 domain;

(b) a CH1 domain and a CH2 domain;

(c) a CH1 domain and a CH3 domain;

(d) a CH2 domain and a CH3 domain;

(e) a combination between one or at least two domains among a CH1 domain, a CH2 domain, a CH3 domain, and a CH4 domain, and an immunoglobulin hinge region or a part of the hinge region; and

(f) a dimer between each domain of the heavy chain constant region and the light chain constant region.

[Claim 28]

The use of claim 21, wherein the polypeptide comprising an immunoglobulin Fc region is in the form of a dimer.

[Claim 29]

The use of claim 21, wherein the immunoglobulin Fc region is a native Fc derivative in which the region capable of forming a disulfide bond is deleted, a native Fc derivative in which a part of the amino acid(s) in the N-terminus is removed, a native Fc derivative in which a methionine residue is added to the N-terminus, a native Fc derivative in which a complement-binding site is deleted, or a native Fc derivative in which an antibody dependent cell mediated cytotoxicity (ADCC) site is deleted.

[Claim 30]

The use of claim 21, wherein the immunoglobulin Fc region is derived from an immunoglobulin selected from the group consisting of IgG, IgA, IgD, IgE, and IgM.

[Claim 31]

The use of claim 30, wherein the immunoglobulin Fc region is an IgG4 Fc region.

[Claim 32]

The use of claim 21, wherein the immunoglobulin Fc region is an aglycosylated Fc region derived from human IgG4.

[Claim 33]

The use of claim 22, wherein the linker is linked to a cysteine residue of a peptide comprising the amino acid sequence of General Formula 1.

[Claim 34]

The use of claim 22, wherein the linker is respectively linked to the peptide moiety and the biocompatible material moiety through covalent bonds, which are respectively formed by reacting one end of the linker with an amine group or thiol group of the biocompatible material moiety and reacting the other end of the linker with an amine group or thiol group of the peptide moiety including the amino acid sequence of General Formula 1.

[Claim 35]

The use according to any one of claims 1 to 34, wherein the pharmaceutical composition is to be administered to a subject in need thereof for preventing or treating congenital hyperinsulinism.