the cells. In the small intestine, a glucagon precursor is decomposed into three peptides, i.e., glucagon, GLP-1, and GLP-2. Here, the GLP-1 refers to GLP-1 (1-37), which is in the form without an insulinotropic function, and is processed to become an active form of GLP-1 (7-37). The GLP-1 (7-37) has an amino acid sequence represented by SEQ ID NO: 2.

Preferably, a GLP-1 analogue may be selected from the group consisting of Arg^{34}-GLP-1(7-37), Gly^{8}-GLP-1(7-36)-amide, Gly^{8}-GLP-1(7-37), Val^{8}-GLP-1(7-36)-amide, Val^{8}-GLP-1(7-37), $Val^{8}Asp^{22}$-GLP-1(7-36)-amide, $Val^{8}Asp^{22}$-GLP-1(7-37), $Val^{8}Glu^{22}$-GLP-1(7-36)-amide, $Val^{8}Glu^{22}$-GLP-1(7-37), $Val^{8}Lys^{22}$-GLP-1(7-36)-amide, $Val^{8}Lys^{22}$-GLP-1(7-37), $Val^{8}Arg^{22}$-GLP-1(7-36)-amide, $Val^{8}Arg^{22}$-GLP-1(7-37), $Val^{8}His^{22}$-GLP-1(7-36)-amide, $Val^{8}His^{22}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Glu^{22}Val^{25}$-GLP-1(7-37), $Val^{8}Tyr^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Leu^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Tyr^{18}Glu^{22}$-GLP-1(7-37), $Val^{8}Glu^{22}His^{37}$-GLP-1(7-37), $Val^{8}Glu^{22}Ile^{33}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}Val^{25}Ile^{33}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}Ile^{33}$-GLP-1(7-37), $Val^{8}Glu^{22}Val^{25}Ile^{33}$-GLP-1(7-37), and $Val^{8}Trp^{16}Glu^{22}Val^{25}$-GLP-1(7-37), but is not limited thereto.

As another type of insulinotropic peptide, exendin-4 is a polypeptide consisting of 39 amino acids that shows 53% amino acid sequence similarity with GLP-1 and has an amino acid sequence represented by SEQ ID NO: 2. Exendin-3 has an

Gly^{8}-GLP-1(7-37), Val^{8}-GLP-1(7-36)-amide, Val^{8}-GLP-1(7-37), $Val^{8}Asp^{22}$-GLP-1(7-36)-amide, $Val^{8}Asp^{22}$-GLP-1(7-37), $Val^{8}Glu^{22}$-GLP-1(7-36)-amide, $Val^{8}Glu^{22}$-GLP-1(7-37), $Val^{8}Lys^{22}$-GLP-1(7-36)-amide, $Val^{8}Lys^{22}$-GLP-1(7-37), $Val^{8}Arg^{22}$-GLP-1(7-36)-amide, $Val^{8}Arg^{22}$-GLP-1(7-37), $Val^{8}His^{22}$-GLP-1(7-36)-amide, $Val^{8}His^{22}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Glu^{22}Val^{25}$-GLP-1(7-37), $Val^{8}Tyr^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Leu^{16}Glu^{22}$-GLP-1(7-37), $Val^{8}Tyr^{18}Glu^{22}$-GLP-1(7-37), $Val^{8}Glu^{22}His^{37}$-GLP-1(7-37), $Val^{8}Glu^{22}Ile^{33}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}Val^{25}Ile^{33}$-GLP-1(7-37), $Val^{8}Trp^{16}Glu^{22}Ile^{33}$-GLP-1(7-37), $Val^{8}Glu^{22}Val^{25}Ile^{33}$-GLP-1(7-37), and $Val^{8}Trp^{16}Glu^{22}Val^{25}$-GLP-1(7-37).

[Claim 10]

The insulinotropic peptide derivative of claim 8, wherein the native insulinotropic peptide derivative or its analogue is a ZP-10 ($Ser^{38}Lys^{39}$-exendin-4(1-39)-LysLysLysLysLys-amide), which is an exendin-4 analogue represented by SEQ ID NO: 4.

[Claim 11]

The insulinotropic peptide derivative of claim 1, wherein the insulinotropic peptide derivative has a higher dissociation constant (Kd) for the GLP-1 receptor compared to the native insulinotropic peptide.

[Claim 12]

The insulinotropic peptide derivative of claim 5,