Claims

1. A peptidic compound having the formula (I):

$$R^1 - Z - R^2 \qquad (I)$$

wherein Z is a peptide moiety having the formula (II)

Tyr-Aib-X3-Gly-Thr-Phe-Thr-Ser-Asp-Leu-Ser-X12-Gln-X14-X15-X16-X17-X18-X19-X20-X21-Phe-Ile-Glu-Trp-Leu-Lys-X28-X29-Gly-Pro-Ser-Ser-Gly-Ala-Pro-Pro-Pro-Ser-X40 (II)

X3 represents an amino acid residue selected from Gln, Glu and His,
X12 represents an amino acid residue selected from Ile and Lys,
X14 represents an amino acid residue having a side chain with an $-NH_2$ group, wherein the $-NH_2$ side chain group is functionalized by - $C(O)-R^5$, wherein R^5 may be a moiety comprising up to 50 or up to 100 carbon atoms and optionally heteroatoms selected from halogen, N, O, S and/or P,
X15 represents an amino acid residue selected from Asp and Glu,
X16 represents an amino acid residue selected from Ser, Lys, Glu and Gln,
X17 represents an amino acid residue selected from Arg, Lys, Glu, Gln, Leu, Aib, Tyr and Ala,
X18 represents an amino acid residue selected from Ala, Arg, Aib, Leu and Tyr,
X19 represents an amino acid residue selected from Ala, Val and Aib,
X20 represents an amino acid residue selected from Pip, (S)MeLys, (R)MeLys and (S)MeOrn,
X21 represents an amino acid residue selected from Asp, Glu and Leu,
X28 represents an amino acid residue selected from Asn, Ala, Aib and Ser,
X29 represents an amino acid residue selected from Gly, Thr, Aib, D-Ala and Ala,
X40 is either absent or represents Lys,

R^1 represents NH_2,
R^2 represents the C-terminal group of the peptidic compound and is selected from OH and NH_2,

or a salt or solvate thereof, wherein the compound is a GLP-1 and GIP receptor agonist.

2. A compound of claim 1, wherein X14 represents an amino acid residue with a functionalized $-NH_2$ side chain group, such as functionalized Lys, Orn, Dab or Dap, wherein at least one H atom of the $-NH_2$ side chain group is replaced by $-C(O)-R^5$, which is selected from

(S)-4-Carboxy-4-hexadecanoylamino-butyryl-, (S)-4-Carboxy-4-octadecanoylamino-butyryl-, 4-Hexadecanoylamino-butyryl-, 4-{3-[(R)-2,5,7,8-tetramethyl-2-((4R,8R)-4,8,12-trimethyl-tridecyl)-chroman-6-yloxycarbonyl]-propionylamino}-butyryl-, 4-octadecanoylamino-butyryl-, 4-((Z)-octadec-9-enoylamino)-butyryl-, 6-[(4,4-Diphenyl-cyclohexyloxy)-hydroxy-phosphoryloxy]-hexanoyl-, Hexadecanoyl-, (S)-4-Carboxy-4-(15-carboxy-pentadecanoylamino)-butyryl-, (S)-4-Carboxy-4-{3-[3-((2S,3R,4S,5R)-5-carboxy-2,3,4,5-tetrahydroxy-pentanoylamino)-propionylamino]-propionylamino}-butyryl, (S)-4-Carboxy-4-{3-[(R)-2,5,7,8-tetramethyl-2-((4R,8R)-4,8,12-trimethyl-tridecyl)-chroman-6-yloxycarbonyl]-propionylamino}-butyryl-, (S)-4-Carboxy-4-((9Z,12Z)-octadeca-9,12-dienoylamino)-butyryl-, (S)-4-Carboxy-4-[6-((2S,3R,4S,5R)-5-carboxy-2,3,4,5-tetrahydroxy-pentanoylamino)-hexanoylamino]-butyryl-, (S)-4-Carboxy-4-((2S,3R,4S,5R)-5-carboxy-2,3,4,5-tetrahydroxy-pentanoylamino)-butyryl-, (S)-4-Carboxy-4-tetradecanoylamino-butyryl-, (S)-4-(1 1 -Benzyloxycarbonyl-undecanoylamino)-4-carboxy-butyryl-, (S)-4-Carboxy-4-[1 1 -((2S,3R,4R,5R)-2,3,4,5,6-pentahydroxy-hexylcarbamoyl)-undecanoylamino]-butyryl-, (S)-4-Carboxy-4-((Z)-octadec-9-enoylamino)-butyryl-, (S)-4-Carboxy-4-(4-dodecyloxy-benzoylamino)-butyryl-, (S)-4-Carboxy-4-henicosanoylamino-butyryl-, (S)-4-Carboxy-4-docosanoylamino-butyryl-, (S)-4-Carboxy-4-((Z)-nonadec-10-enoylamino)-butyryl-, (S)-4- Carboxy-4-(4-decyloxy-benzoylamino)-butyryl-, (S)-4-Carboxy-4-[(4'-octyloxy-biphenyl-4-carbonyl)-amino]-butyryl-, (S)-4-Carboxy-4-(12-phenyl-dodecanoylamino)-butyryl-, (S)-4-Carboxy-4-icosanoylamino-butyryl-, (S)-4-Carboxy-4-((S)-4-carboxy-4-hexadecanoylamino-butyrylannino)-butyryl-, (S)-4-Carboxy-4-((S)-4-carboxy-4-octadecanoylamino-butyrylannino)-butyryl-, 3-(3-Octadecanoylamino-propionylannino)-propionyl-, 3-(3-Hexadecanoylamino-propionylannino)-propionyl-, 3-Hexadecanoylamino-propionyl-, (S)-4-Carboxy-4-[(R)-4-((3R,5S,7R,8R,9R,10S,12S,13R,14R,17R)-3,7,12-trihydroxy-8,10,13-trinnethyl-hexadecahydro-cyclopenta[a]phenanthren-17-yl)-pentanoylamino]-butyryl-, (S)-4-Carboxy-4-[(R)-4-((3R,5R,8R,9S,10S,13R,14S,17R)-3-hydroxy-10,13-dimethyl-hexadecahydro-cyclopenta[a]phenanthren-17-yl)-pentanoylamino]-butyryl-, (S)-4-Carboxy-4-((9S,10R)-9,10,16-trihydroxy-hexadecanoylamino)-butyryl-, tetradecanoyl-, 1 1 -Carboxy-undecanoyl-, 1 1 -Benzyloxycarbonyl-undecanoyl-, (S)-4-Carboxy-4-((S)-4-carboxy-4-tetradecanoylamino-butyrylannino)-butyryl-, 6-[Hydroxy-(naphthalen-2-yloxy)-phosphoryloxy]-hexanoyl-, 6-[Hydroxy-(5-phenyl-pentyloxy)-phosphoryloxy]-hexanoyl-, 4-(Naphthalene-2-sulfonylamino)-4-oxo-butyryl-, 4-(Biphenyl-4-sulfonylamino)-4-oxo-butyryl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyrylamino}-butyryl-, (S)-4-Carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyryl-, (S)-4-Carboxy-2-{(S)-4-carboxy-2-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyrylamino}-butyryl-, (S)-4-Carboxy-2-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyryl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[(S)-4-carboxy-4-(17-

carboxy-heptadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-butyrylannino}-butyryl-, (S)-4-Carboxy-4-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)- acetylamino]-butyryl-,(S)-4-Carboxy-2-{(S)-4-carboxy-2-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-butyrylannino}-butyryl-, (S)-4-Carboxy-2-[2-(2-{2-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-butyryl-, 2-(2-{2-[2-(2-{2-[(S)-4-Carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetyl-, 2-(2-{2-[(S)-4-Carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetyl-, (S)-4-Carboxy-4-((S)-4-carboxy-4-{(S)-4-carboxy-4-[(S)-4-carboxy-4-(19-carboxy-nonadecanoylamino)-butyrylamino]-butyrylamino}-butyrylamino)-butyryl-, 2-(2-{2-[2-(2-{2-[(S)-4-Carboxy-4-(16-1 H-tetrazol-5-yl-hexadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetyl-, 2-(2-{2-[2-(2-{2-[(S)-4-Carboxy-4-(16-carboxy-hexadecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetyl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[(S)-4-carboxy-4-(17-carboxy-heptadecanoylamino)-butyrylannino]-butyrylannino}-butyryl-, (S)-4-Carboxy-4-((S)-4-carboxy-4-{2-[2-(2-{2-[2-(2-{(S)-4-carboxy-4-[10-(4-carboxy-phenoxy)-decanoylamino]-butyrylannino}-ethoxy)-ethoxy]-acetylamino}-ethoxy)-ethoxy]-acetylannino}-butyryl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(7-carboxy-heptanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyrylaminoj-butyryl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(1 1 -carboxy-undecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylannino]-butyrylannino}-butyryl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(13-carboxy-tridecanoylamino)-butyrylannino]-ethoxy}-ethoxy)-acetylannino]-ethoxy}-ethoxy)-acetylamino]-butyrylannino}-butyryl-, (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(15-carboxy-pentadecanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyrylannino}-butyryl-, and (S)-4-Carboxy-4-{(S)-4-carboxy-4-[2-(2-{2-[2-(2-{2-[(S)-4-carboxy-4-(19-carboxy-nonadecanoylamino)-butyrylamino]-ethoxy}-ethoxy)-acetylamino]-ethoxy}-ethoxy)-acetylamino]-butyrylannino}-butyryl-,
X40 is absent or represents Lys.

3. A compound of any one of claims 1 - 2, wherein X14 represents Lys, wherein the -NH_2 side chain group is functionalized by one of the groups selected from (S)-4-Carboxy-4-hexadecanoylamino-butyryl-, (S)-4-Carboxy-4-octadecanoylamino-butyryl-, 4-octadecanoylamino-butyryl-, Hexadecanoyl-, (S)-4-Carboxy-4-henicosanoylamino-butyryl-, (S)-4-Carboxy-4-((S)-4-carboxy-4-octadecanoylamino-butyrylamino)-butyryl-, 3-(3-Octadecanoylamino-propionylamino)-propionyl-.

4. A compound according to any one of claims 1 -3, wherein X14 is Lys functionalized with C(O)-R^5, wherein R^5 is selected from the group consisting of (S)-4-carboxy-4-

hexadecanoylamino-butyryl (γE-x53) and (S)-4-carboxy-4-octadecanoylamino-butyryl (γE-x70).

5. A compound of any one of claims 1 - 4, wherein R^2 is NH_2.

6. A compound according to any one of claims 1 -5, wherein the peptidic compound has a relative activity of at least 0.04%, preferably at least 0.08%, more preferably at least 0.2% compared to that of natural GIP at the GIP receptor.

7. A compound according to any one of claims 1 -6, wherein the peptidic compound exhibits a relative activity of at least 0.07%, preferably at least 0.1 %, more preferably at least 0.14%, more preferably at least 0.35% and even more preferably at least 0.4% compared to that of GLP-1 (7-36) at the GLP-1 receptor.

8. A compound according to any one of claims 6 or 7, wherein the peptidic compound further exhibits a relative activity of at least 0.1 %, preferably at least 0.2%, more preferably at least 0.3%, more preferably at least 0.4% and even more preferably at least 0.5% compared to that of natural glucagon at the glucagon receptor.

9. A compound of any one of claims 1 - 8, wherein
X14 represents Lys, wherein the -NH_2 side chain group is functionalized by one of the groups selected from (S)-4-Carboxy-4-hexadecanoylamino-butyryl-, (S)-4-Carboxy-4-octadecanoylamino-butyryl-.

10. A compound of any one of claims 1 - 9, wherein
X3 represents an amino acid residue selected from Gln, His and Glu,
X12 represents an amino acid residue selected from Ile and Lys,
X14 represents Lys, wherein the -NH_2 side chain group is functionalized by one of the groups selected from (S)-4-Carboxy-4-hexadecanoylamino-butyryl- and (S)-4-Carboxy-4-octadecanoylamino-butyryl-,
X15 represents an amino acid residue selected from Glu and Asp,
X16 represents Glu,
X17 represents an amino acid residue selected from Arg and Gln,
X18 represents an amino acid residue selected from Ala and Arg,
X19 represents Ala,
X21 represents Glu,
X28 represents an amino acid residue selected from Asn, Ser and Ala,
X29 represents an amino acid residue selected from Gly and Thr,
X40 is absent.

11. A compound of any one of claims 1 - 10, wherein X19 represents Ala.

12. A compound of any one of claims 1 - 11, wherein
X16 represents Glu,

13. A compound of any one of claims 1 - 12, wherein
X28 represents Ala,
X29 represents Gly.

14. A compound of any one of claims 1 - 12, wherein
X28 represents Asn,
X29 represents Thr.

15. A compound of any one of claims 1 - 14, wherein
X3 represents an amino acid residue selected from Gln and Glu,
X12 represents an amino acid residue selected from Ile and Lys,
X14 represents Lys, wherein the -NH_2 side chain group is functionalized by -C(O)-R^5, wherein R^5 is selected from (S)-4-Carboxy-4-hexadecanoylamino-butyryl- (γE-x53) and (S)-4-Carboxy-4-octadecanoylamino-butyryl- (γE-x70),
X15 represents an amino acid residue selected from Asp and Glu,
X16 represents Glu,
X17 represents an amino acid residue selected from Arg and Gln,
X18 represents an amino acid residue selected from Ala and Arg,
X19 represents Ala,
X21 represents Glu,
X28 represents an amino acid residue selected from Asn, Ala and Ser,
X29 represents an amino acid residue selected from Gly and Thr,
X40 is absent.

16. The compound of any one of claims 1 -15, selected from the compounds of SEQ ID NO: 8-16 or a salt or solvate thereof.

17. The compound of any one of claims 1 -15, selected from the compounds of SEQ ID NO: 8-13 and 15 or a salt or solvate thereof.

18. The compound of any one of claims 1 -17 for use in medicine, particularly in human medicine.

19. The compound of claim 18 for use according to claim 18 which is present as an active agent in a pharmaceutical composition together with at least one pharmaceutically acceptable carrier.

20. The compound of claim 18 for use according to claim 18 or 19 together with at least one additional therapeutically active agent, wherein the additional therapeutically active agent is selected from the series of Insulin and Insulin derivatives, GLP-1, GLP-1 analogues and GLP-1 receptor agonists, polymer bound GLP-1 and GLP-1 analogues, dual GLP1/glucagon agonists, PYY3-36 or analogues thereof, pancreatic polypeptide or analogues thereof, Glucagon receptor agonists, GIP receptor agonists or antagonists, ghrelin antagonists or inverse agonists, Xenin and analogues thereof,

DDP-IV inhibitors, SGLT2 inhibitors, dual SGLT2 / SGLT1 inhibitors, Biguanides Thiazolidinediones, dual PPAR agonists, Sulfonylureas, Meglitinides, alpha-glucosidase inhibitors, Amylin and Amylin analogues, GPR1 19 agonists, GPR40 agonists, GPR120 agonists, GPR142 agonists, systemic or low-absorbable TGR5 agonists, Cycloset, inhibitors of 11-beta-HSD, activators of glucokinase, inhibitors of DGAT, inhibitors of protein tyrosinephosphatase 1, inhibitors of glucose-6-phosphatase, inhibitors of fructose-1,6-bisphosphatase, inhibitors of glycogen phosphorylase, inhibitors of phosphoenol pyruvate carboxykinase, inhibitors of glycogen synthase kinase, inhibitors of pyruvate dehydrogenase kinase, alpha2-antagonists, CCR-2 antagonists, modulators of glucose transporter-4, Somatostatin receptor 3 agonists, HMG-CoA-reductase inhibitors, fibrates, nicotinic acid and the derivatives thereof, nicotinic acid receptor 1 agonists, PPAR-alpha, gamma or alpha/gamma) agonists or modulators, PPAR-delta agonists, ACAT inhibitors, cholesterol absorption inhibitors, bile acid-binding substances, IBAT inhibitors, MTP inhibitors, modulators of PCSK9, LDL receptor up-regulators by liver selective thyroid hormone receptor β agonists, HDL-raising compounds, lipid metabolism modulators, PLA2 inhibitors , ApoA-I enhancers, thyroid hormone receptor agonists, cholesterol synthesis inhibitors, omega-3 fatty acids and derivatives thereof, active substances for the treatment of obesity, such as Sibutramine, Tesofensine, Orlistat, CB-1 receptor antagonists, MCH-1 antagonists, MC4 receptor agonists and partial agonists, NPY5 or NPY2 antagonists, NPY4 agonists, beta-3-agonists, leptin or leptin mimetics, agonists of the 5HT2c receptor, or the combinations of bupropione/naltrexone (CONTRAVE), bupropione/zonisamide (EMPATIC), bupropione/phentermine or pramlintide/metreleptin, QNEXA (Phentermine+ topiramate), lipase inhibitors, angiogenesis inhibitors, H3 antagonists, AgRP inhibitors, triple monoamine uptake inhibitors (norepinephrine and acetylcholine), MetAP2 inhibitors, nasal formulation of the calcium channel blocker diltiazem, antisense against production of fibroblast growth factor receptor 4, prohibitin targeting peptide-1, drugs for influencing high blood pressure, chronic heart failure or atherosclerosis, such as angiotensin II receptor antagonists, ACE inhibitors, ECE inhibitors, diuretics, beta-blockers, calcium antagonists, centrally acting hypertensives, antagonists of the alpha-2-adrenergic receptor, inhibitors of neutral endopeptidase, thrombocyte aggregation inhibitors.

21. The compound of claim 18 for use according to claim 18 or 19 together with at least one additional therapeutically active agent, wherein the additional therapeutically active agent particularly is a GLP-1 agonist and/or insulin or an insulin analogue and/or a gastrointestinal peptide.

22. The compound of claim 18 for use according to any one of claims 18-21, for use in the treatment or prevention of hyperglycemia, type 2 diabetes, impaired glucose tolerance, type 1 diabetes, obesity, metabolic syndrome and neurodegenerative disorders, particularly for delaying or preventing disease progression in type 2 diabetes, treating metabolic syndrome, treating obesity or preventing overweight, for

decreasing food intake, increase energy expenditure, reducing body weight, delaying the progression from impaired glucose tolerance (IGT) to type 2 diabetes; delaying the progression from type 2 diabetes to insulin-requiring diabetes; regulating appetite; inducing satiety; preventing weight regain after successful weight loss; treating a disease or state related to overweight or obesity; treating bulimia; treating binge eating; treating atherosclerosis, hypertension, IGT, dyslipidemia, coronary heart disease, hepatic steatosis, treatment of beta-blocker poisoning, use for inhibition of the motility of the gastro-intestinal tract, useful in connection with investigations of the gastro-intestinal tract using techniques such as X-ray, CT- and NMR-scanning.

23. The compound of claim 18 for use according to any one of claims 18-22, for use in the treatment or prevention of hyperglycemia, type 2 diabetes, obesity and metabolic syndrome or reducing body weight.