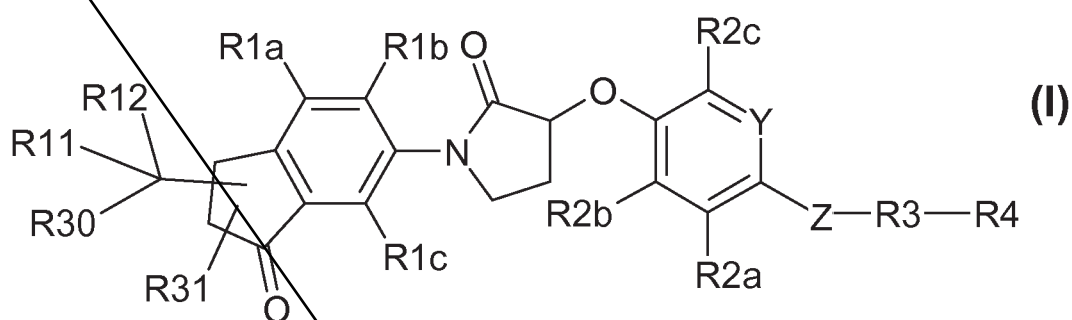


DE2014/026WOPCT

Claims:

5 1. A compound of the formula I



in which

10 R30 is $(\text{CR}_{11}'\text{R}_{12}')_n\text{-R}_{32}$, $\text{NR}_{17}\text{R}_{18}$ or OR_{17} ;

R31 is H or $(\text{CR}_{11}'\text{R}_{12}')_m\text{-R}_{32}$;

n is 0, 1 or 2;

15

m is 0, 1, 2 or 3;

R11, R12 are independently of each other H or $(\text{C}_1\text{-C}_6)\text{-alkyl}$;
or R11 and R12 form together the group $=\text{O}$;

20

R11', R12' are independently of each other H or $(\text{C}_1\text{-C}_6)\text{-alkyl}$;

R32 is $(\text{C}_1\text{-C}_6)\text{-alkyl}$, COOR_{13} , $\text{CONR}_{14}\text{R}_{15}$, SO_2R_{16} or OH;

25

R13 is H or $(\text{C}_1\text{-C}_6)\text{-alkyl}$;

R14, R15 are independently of each other H, $(\text{C}_1\text{-C}_6)\text{-alkyl}$, $(\text{C}_1\text{-C}_6)\text{-alkyl}$ substituted with OR_{17} , or $(\text{C}_3\text{-C}_6)\text{-cycloalkyl}$;

or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR18;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR19;

R16 is (C₁-C₆)-alkyl;

R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

R19 is H or (C₁-C₆)-alkyl;

R1a, R1b, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a, R2b, R2c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

Y is N or CH;

Z is a bond, O, CR₅R₅', NR₆, C=O, S, SO or SO₂,

R5, R5', R6 are independently of each other H or (C₁-C₄)-alkyl;

R3 is a bond or (CR₇R₇')_p;

p is 0, 1, 2, 3 or 4;

R7, R7' are independently of each other H or (C₁-C₆)-alkyl;

R4 is (C₁-C₆)-alkyl, OR8, (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl or 5- or 6-membered heteroaryl ring;

wherein the groups (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl, 5- or 6-membered heteroaryl ring may be optionally substituted with 1 to 3 groups selected from (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, hydroxy, hydroxy-(C₁-C₄)-alkyl, (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl, oxo, F or Cl;

R₈ is H, (C₁-C₆)-alkyl, hydroxy-(C₁-C₄)-alkyl or (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl;

wherein at each occurrence the hydrogen atoms of alkyl groups may be partially or fully replaced by fluorine atoms;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

2. A compound of the formula I as claimed in claim 1, wherein the 3-position of the pyrrolidinone ring has (*R*)-configuration.

3. A compound of the formula I as claimed in claim 1 or 2, wherein

Y is N.

4. A compound of the formula I as claimed in any of claims 1 to 3, wherein

Z is O.

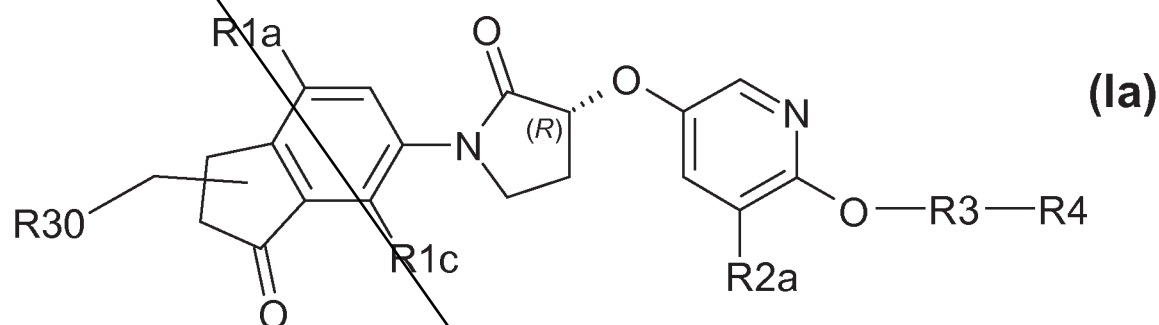
5. A compound of the formula I as claimed in any of claims 1 to 4, wherein

R₃ is CH₂.

6. A compound of the formula I as claimed in any of claims 1 to 5, wherein

R4 is (C₃-C₈)-cycloalkyl.

7. A compound of the formula I as claimed in any of claims 1 to 4, which is a compound of the formula Ia



in which

R30 is (CR_{11'}R_{12'})_n-R32 or OR17;

n is 0, 1 or 2;

R_{11'}, R_{12'} are independently of each other H or (C₁-C₆)-alkyl;

R32 is COOR₁₃, CONR₁₄R₁₅, SO₂R₁₆ or OH;

R₁₃ is H or (C₁-C₆)-alkyl;

R₁₄, R₁₅ are independently of each other H, (C₁-C₆)-alkyl, (C₁-C₆)-alkyl substituted with OR17, or (C₃-C₆)-cycloalkyl;
or R₁₄ and R₁₅ form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR₁₈;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR19;

R16 is (C₁-C₆)-alkyl;

R17 is H or (C₁-C₆)-alkyl;

5 R18 is H or (C₁-C₆)-alkyl;

R19 is H or (C₁-C₆)-alkyl;

10 R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R3 is a bond or (CR₇R_{7'})_p,

15 p is 0, 1, 2, 3 or 4;

R7, R7' are independently of each other H or (C₁-C₆)-alkyl;

20 R4 is (C₁-C₆)-alkyl, OR8, (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl or 5- or 6-membered heteroaryl ring;

wherein the groups (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl, 5- or 6-membered heteroaryl ring may be optionally substituted with 1 to 3 groups selected from (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, hydroxy, hydroxy-(C₁-C₄)-alkyl, (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl, 25 oxo, F or Cl;

R8 is H, (C₁-C₆)-alkyl, hydroxy-(C₁-C₄)-alkyl or (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl;

30 wherein at each occurrence the hydrogen atoms of alkyl groups may be partially or fully replaced by fluorine atoms;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

8. A compound of the formula I as claimed in claim 7, wherein

R30 is (CR11'R12')_n-R32 or OR17;

n is 0, 1 or 2;

R11', R12' are independently of each other H or (C₁-C₆)-alkyl

R32 is (C₁-C₆)-alkyl, COOR13, CONR14R15, SO₂R16 or OH;

R13 is H or (C₁-C₆)-alkyl;

R14, R15 are independently of each other H, (C₁-C₆)-alkyl, (C₁-C₆)-alkyl substituted with OR17, or (C₃-C₆)-cycloalkyl;
or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR18;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR19;

R16 is (C₁-C₆)-alkyl;

R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

R19 is H or (C₁-C₆)-alkyl;

R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R3 is bond, CH₂ or CH₂-CH₂;

R4 is (C₁-C₆)-alkyl, OR8, (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl or 5- or 6-membered heteroaryl ring;
wherein the groups (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl, 5- or 6-membered heteroaryl ring may be optionally substituted with 1 to 3 groups selected from (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, hydroxy, hydroxy-(C₁-C₄)-alkyl, (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl, oxo, F or Cl;

R8 is H, (C₁-C₆)-alkyl, hydroxy-(C₁-C₄)-alkyl or (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl;

wherein at each occurrence the hydrogen atoms of alkyl groups may be partially or fully replaced by fluorine atoms;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

9. A compound of the formula Ia as claimed in claim 7 or 8, wherein

R30 is (CR_{11'}R_{12'})_n-R32 or OR17;

n is 0, 1 or 2;

R_{11'}, R_{12'} are independently of each other H or (C₁-C₆)-alkyl;

R32 is COOR13, CONR14R15, SO₂R16 or OH;

R13 is H or (C₁-C₆)-alkyl;

R14, R15 are independently of each other H, (C₁-C₆)-alkyl, (C₁-C₆)-alkyl substituted with OR17, or (C₃-C₆)-cycloalkyl;
or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR18;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR19;

5 R16 is (C₁-C₆)-alkyl;

R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

10

R19 is H or (C₁-C₆)-alkyl;

R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

15 R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R3 is bond, CH₂ or CH₂-CH₂;

R4 (C₃-C₈)-cycloalkyl;

20

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

25 10. A compound of the formula Ia as claimed in claim 7 to 9, wherein

R30 is R32;

R32 is CONR₁₄R₁₅, COOR₁₃;

30

R13 is H or (C₁-C₆)-alkyl;

R14, R15 are independently of each other H, (C₁-C₆)-alkyl or (C₁-C₆)-alkyl substituted with OR17;

or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the series O, S and NR18;

5 R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

10 R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R3 is CH₂;

15 R4 (C₃-C₆)-cycloalkyl;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

20 11. A compound of the formula Ia as claimed in claim 7 to 10, wherein

R30 is R32;

25 R32 is CONR14R15, COOR13;

R14, R15 are independently of each other H, (C₁-C₆)-alkyl or (C₁-C₆)-alkyl substituted with OR17;

30 R17 is H or (C₁-C₆)-alkyl;

R1a is H or F;

R1c is H;

R2a is H;

R3 is CH₂;

R4 (C₃-C₆)-cycloalkyl;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

12. A compound selected from the list

5-[(3R)-3-[[6-(Cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-N,N-dimethyl-3-oxo-indane-1-carboxamide,

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide,

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-3-oxo-indan-1-yl]-N-methyl-acetamide,

2-[6-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-4-fluoro-1-oxo-indan-2-yl]-N,N-dimethyl-acetamide,

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-3-oxo-indan-1-yl]acetamide and

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide

or a pharmaceutically acceptable salt thereof.

13. The compound

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide

or a pharmaceutically acceptable salt thereof.

14. The compound

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide

or a pharmaceutically acceptable salt thereof.

15. A pharmaceutical composition comprising at least one compound as claimed in any of claims 1 to 14 or a physiologically acceptable salt of any of them, for use as a pharmaceutical.

16. A pharmaceutical composition as claimed in claim 15, comprising additionally one or more active ingredients selected from the list:

Insulin and insulin derivatives, GLP-1, GLP-1 analogues and GLP-1 receptor agonists, polymer bound GLP-1 and GLP-1 analogues, dual GLP-1/GIP agonists, dual GLP-1/glucagon receptor agonists, PYY3-36 or analogues thereof, pancreatic polypeptide or analogues thereof, glucagon receptor agonists or antagonists, GIP receptor agonists or antagonists, ghrelin antagonists or inverse agonists, xenin and analogues thereof, DDP-IV inhibitors, SGLT-2 inhibitors, dual SGLT-2/SGLT-1 inhibitors, biguanides, thiazolidinediones, PPAR agonists, PPAR modulators, sulfonylureas, meglitinides, alpha-glucosidase inhibitors, amylin and amylin analogues, GPR119 agonists, GPR40 agonists, GPR120 agonists, GPR142 agonists, TGR5 agonists, AMPK stimulants, AMPK activators, inhibitors of 11-beta-HSD, activators of glucokinase, inhibitors of DGAT, inhibitors of protein tyrosine phosphatase 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, CCR-2 antagonists, modulators of glucose transporter-4, somatostatin receptor 3 agonists, HMG-CoA-reductase inhibitors, fibrates, nicotinic acid and derivatives thereof, nicotinic acid receptor 1 agonists, , ACAT

inhibitors, cholesterol absorption inhibitors, bile acid-binding substances, IBAT inhibitors, MTP inhibitors, modulators of PCSK9, LDL receptor up-regulators (liver selective thyroid hormone receptor beta agonists), HDL-raising compounds, lipid metabolism modulators, PLA2 inhibitors, ApoA-I enhancers, cholesterol synthesis inhibitors, omega-3 fatty acids and derivatives thereof, active substances for the treatment of obesity, CB1 receptor antagonists, MCH-1 antagonists, MC4 receptor agonists and partial agonists, NPY5 or NPY2 antagonists, NPY4 agonists, beta-3 adrenergic receptor agonists, leptin or leptin mimetics, 5HT2c receptor agonists, lipase inhibitors, angiogenesis inhibitors, H3 antagonists, AgRP inhibitors, triple monoamine uptake inhibitors, MetAP2 inhibitors, antisense oligonucleotides against production of fibroblast growth factor receptor 4 or prohibitin targeting peptide-1, drugs for influencing high blood pressure, chronic heart failure or atherosclerosis, angiotensin II receptor antagonists, dual angiotensin receptor blockers (ARB), angiotensin converting enzyme (ACE) inhibitors, angiotensin converting enzyme 2 (ACE-2) activators, , renin inhibitors, prorenin inhibitors, endothelin converting enzyme (ECE) inhibitors, endothelin receptor blockers, endothelin antagonists, diuretics, aldosterone antagonists, aldosterone synthase inhibitors, alpha-blockers, antagonists of the alpha-2 adrenergic receptor, beta-blockers, mixed alpha-/beta-blockers, calcium antagonists/calcium channel blockers (CBBs), dual mineralocorticoid/CCBs, centrally acting antihypertensives, inhibitors of neutral endopeptidase, aminopeptidase-A inhibitors, vaso peptide inhibitors, dual vaso peptide inhibitors, neprilysin-ACE inhibitors, neprilysin-ECE inhibitors, dual-acting Angiotensin (AT) receptor-neprilysin inhibitors, dual AT1/ endothelin-1 (ETA) antagonists, advanced glycation end-product breakers, recombinant renalase, blood pressure vaccines, anti-RAAS vaccines, AT1- or AT2-vaccines, modulators of genetic polymorphisms with antihypertensive response and thrombocyte aggregation inhibitors.

17. A pharmaceutical composition as claimed in claim 15, comprising additionally metformin.

18. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one DPP-IV inhibitor.

19. A pharmaceutical composition as claimed in claim 18, wherein the DPP-IV inhibitor is selected from the list alogliptin, linagliptin, saxagliptin, sitagliptin, anagliptin, teneligliptin, trelagliptin, vildagliptin, gemigliptin, omarigliptin, evogliptin and dutogliptin.

5

20. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one SGLT-2 inhibitor.

10

21. A pharmaceutical composition as claimed in claim 20, wherein the SGLT-2 inhibitor is selected from the list canagliflozin, dapagliflozin, remogliflozin, remogliflozin etabonate, sergliflozin, empagliflozin, ipragliflozin, tofogliflozin, luseogliflozin and ertugliflozin.

15

22. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one GPR40 agonist.

20

23. A pharmaceutical composition as claimed in claim 22, wherein the GPR40 agonist is selected from the list TUG-424, P-1736, P-11187, JTT-851, GW9508, CNX-011-67, AM-1638 and AM-5262.

25

24. A pharmaceutical composition as claimed in claim 15, comprising additionally ezetimibe.

30

25. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one HMG-CoA reductase inhibitor.

26. A pharmaceutical composition as claimed in claim 25, wherein the HMG-CoA reductase inhibitor is selected from the list simvastatin, atorvastatin, rosuvastatin, pravastatin, fluvastatin, pitavastatin, lovastatin, mevastatin, rivastatin and cerivastatin.

5

27. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one PPAR agonist or PPAR modulator.

10

28. A pharmaceutical composition as claimed in claim 27, wherein the PPAR agonist or PPAR modulator is saroglitazar.

15

29. A pharmaceutical composition as claimed in claim 27, wherein the PPAR agonist or PPAR modulator is selected from the list pioglitazone, rosiglitazone and lobeglitazone.

20

30. A pharmaceutical composition as claimed in claim 15, comprising additionally acarbose.

25

31. A compound of the formula I as claimed in any of claims 1 to 14 for use as a pharmaceutical.

30

32. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of diabetes, obesity, dyslipidemia and related disorders.

33. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of diabetes.

34. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of obesity.

5 35. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of dyslipidemia.

10 36. A compound of the formula I as claimed in any of claims 1 to 14 for prevention and/or treatment of a disease associated with the GPR119.

15 37. A method for treating diabetes, obesity or dyslipidemia in a patient, the method comprising administering to the patient an effective amount of at least one compound of formula I as claimed in any of claims 1 to 14.

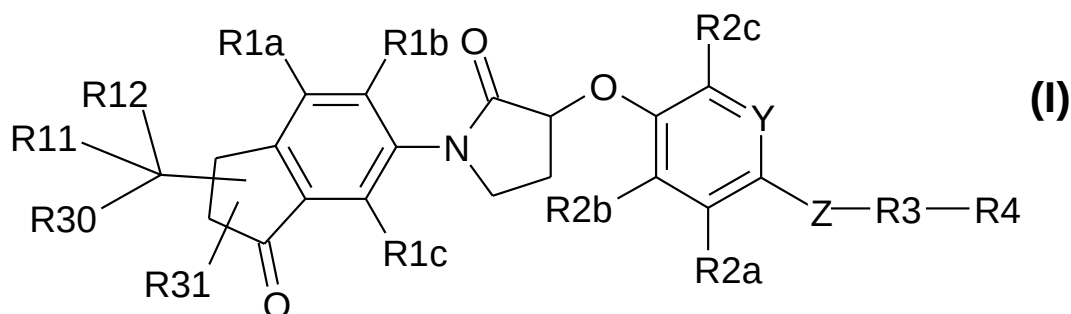
20 38. A method for treating diabetes, obesity, dyslipidemia or high blood pressure in a patient, the method comprising administering to the patient an effective amount of at least one compound of formula I as claimed in any of claims 1 to 14 and an effective amount of at least one other compound useful for treating diabetes, obesity, dyslipidemia or high blood pressure.

25 39. The method as claimed in claim 38 wherein the effective amount of at least one compound of formula I as claimed in any of claims 1 to 14 and the additional active ingredient are administered to the patient simultaneously.

30 40. The method as claimed in claim 38 wherein the effective amount of at least one compound of formula I as claimed in any of claims 1 to 14 and the additional active ingredient are administered to the patient sequentially.

Claims:

1. A compound of the formula I



in which

R30 is $(\text{CR}_{11}'\text{R}_{12}')_n\text{-R}_{32}$, $\text{NR}_{17}\text{R}_{18}$ or OR_{17} ;

R31 is H or $(\text{CR}_{11}'\text{R}_{12}')_m\text{-R}_{32}$;

n is 0, 1 or 2;

m is 0, 1, 2 or 3;

R11, R12 are independently of each other H or $(\text{C}_1\text{-C}_6)\text{-alkyl}$;
or R11 and R12 form together the group =O;

R11', R12' are independently of each other H or $(\text{C}_1\text{-C}_6)\text{-alkyl}$;

R32 is $(\text{C}_1\text{-C}_6)\text{-alkyl}$, COOR_{13} , $\text{CONR}_{14}\text{R}_{15}$, SO_2R_{16} or OH;

R13 is H or $(\text{C}_1\text{-C}_6)\text{-alkyl}$;

R14, R15 are independently of each other H, $(\text{C}_1\text{-C}_6)\text{-alkyl}$, $(\text{C}_1\text{-C}_6)\text{-alkyl}$ substituted with OR_{17} , or $(\text{C}_3\text{-C}_6)\text{-cycloalkyl}$;
or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR_{18} ;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR19;

- 5 R16 is (C₁-C₆)-alkyl;
- R17 is H or (C₁-C₆)-alkyl;
- R18 is H or (C₁-C₆)-alkyl;
- 10 R19 is H or (C₁-C₆)-alkyl;
- R1a, R1b, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;
- 15 R2a, R2b, R2c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;
- Y is N or CH;
- Z is a bond, O, CR₅R₅', NR₆, C=O, S, SO or SO₂;
- 20 R5, R5', R6 are independently of each other H or (C₁-C₄)-alkyl;
- R3 is a bond or (CR₇R_{7'})_p;
- 25 p is 0, 1, 2, 3 or 4;
- R7, R7' are independently of each other H or (C₁-C₆)-alkyl;
- 30 R4 is (C₁-C₆)-alkyl, OR8, (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl or 5- or 6-membered heteroaryl ring;
 wherein the groups (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl, 5- or 6-membered heteroaryl ring may be optionally substituted with 1 to 3 groups selected from (C₁-C₄)-alkyl, (C₁-

C₄)-alkanoyl, hydroxy, hydroxy-(C₁-C₄)-alkyl, (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl, oxo, F or Cl;

R₈ is H, (C₁-C₆)-alkyl, hydroxy-(C₁-C₄)-alkyl or (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl;

5

wherein at each occurrence the hydrogen atoms of alkyl groups may be partially or fully replaced by fluorine atoms;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

10

2. A compound of the formula I as claimed in claim 1, wherein the 3-position of the pyrrolidinone ring has (*R*)-configuration.

15

3. A compound of the formula I as claimed in claim 1 or 2, wherein

Y is N.

20

4. A compound of the formula I as claimed in any of claims 1 to 3, wherein

Z is O.

25

5. A compound of the formula I as claimed in any of claims 1 to 4, wherein

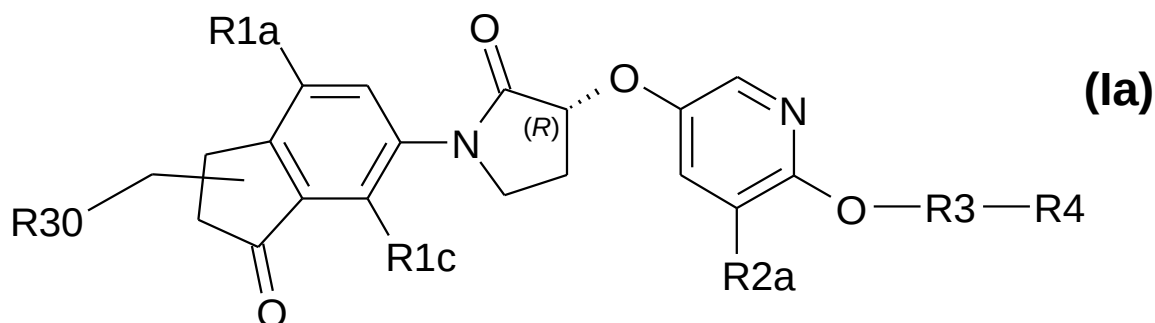
R₃ is CH₂.

30

6. A compound of the formula I as claimed in any of claims 1 to 5, wherein

R₄ is (C₃-C₈)-cycloalkyl.

7. A compound of the formula I as claimed in any of claims 1 to 4, which is a compound of the formula Ia



in which

R30 is $(\text{CR}_{11}'\text{R}_{12}')_n\text{-R}_{32}$ or OR_{17} ;

n is 0, 1 or 2;

R₁₁', R₁₂' are independently of each other H or (C₁-C₆)-alkyl;

R₃₂ is COOR₁₃, CONR₁₄R₁₅, SO₂R₁₆ or OH;

R₁₃ is H or (C₁-C₆)-alkyl;

R₁₄, R₁₅ are independently of each other H, (C₁-C₆)-alkyl, (C₁-C₆)-alkyl substituted with OR₁₇, or (C₃-C₆)-cycloalkyl;
or R₁₄ and R₁₅ form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR₁₈;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR₁₉;

R₁₆ is (C₁-C₆)-alkyl;

R₁₇ is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

R19 is H or (C₁-C₆)-alkyl;

5

R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

10 R3 is a bond or (CR₇R_{7'})_p;

p is 0, 1, 2, 3 or 4;

R7, R7' are independently of each other H or (C₁-C₆)-alkyl;

15

R4 is (C₁-C₆)-alkyl, OR8, (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl or 5- or 6-membered heteroaryl ring;

wherein the groups (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl, 5- or 6-membered heteroaryl ring may be optionally substituted with 1 to 3 groups selected from (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, hydroxy, hydroxy-(C₁-C₄)-alkyl, (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl, oxo, F or Cl;

20

R8 is H, (C₁-C₆)-alkyl, hydroxy-(C₁-C₄)-alkyl or (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl;

25

wherein at each occurrence the hydrogen atoms of alkyl groups may be partially or fully replaced by fluorine atoms;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

30

8. A compound of the formula I as claimed in claim 7, wherein

R30 is (CR₁₁'R₁₂')_n-R32 or OR17;

n is 0, 1 or 2;

R11', R12' are independently of each other H or (C₁-C₆)-alkyl

5

R32 is (C₁-C₆)-alkyl, COOR13, CONR14R15, SO₂R16 or OH;

R13 is H or (C₁-C₆)-alkyl;

10 R14, R15 are independently of each other H, (C₁-C₆)-alkyl, (C₁-C₆)-alkyl substituted with OR17, or (C₃-C₆)-cycloalkyl;
or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR18;

15 wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR19;

R16 is (C₁-C₆)-alkyl;

20

R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

25 R19 is H or (C₁-C₆)-alkyl;

R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

30

R3 is bond, CH₂ or CH₂-CH₂;

R4 is (C₁-C₆)-alkyl, OR8, (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl or 5- or 6-membered heteroaryl ring;

wherein the groups (C₃-C₈)-cycloalkyl, (C₅-C₈)-bicycloalkyl, 4-, 5- or 6-membered heterocycle, phenyl, 5- or 6-membered heteroaryl ring may be optionally substituted with 1 to 3 groups selected from (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, hydroxy, hydroxy-(C₁-C₄)-alkyl, (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl, oxo, F or Cl;

R₈ is H, (C₁-C₆)-alkyl, hydroxy-(C₁-C₄)-alkyl or (C₁-C₃)-alkyloxy-(C₁-C₄)-alkyl;

wherein at each occurrence the hydrogen atoms of alkyl groups may be partially or fully replaced by fluorine atoms;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

9. A compound of the formula Ia as claimed in claim 7 or 8, wherein

R₃₀ is (CR_{11'}R_{12'})_n-R₃₂ or OR₁₇;

n is 0, 1 or 2;

R_{11'}, R_{12'} are independently of each other H or (C₁-C₆)-alkyl;

R₃₂ is COOR₁₃, CONR₁₄R₁₅, SO₂R₁₆ or OH;

R₁₃ is H or (C₁-C₆)-alkyl;

R₁₄, R₁₅ are independently of each other H, (C₁-C₆)-alkyl, (C₁-C₆)-alkyl substituted with OR₁₇, or (C₃-C₆)-cycloalkyl;
or R₁₄ and R₁₅ form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the list O, S and NR₁₈;

wherein the 4-, 5- or 6-membered heterocycle may be optionally substituted with 1 to 3 groups selected from the list (C₁-C₄)-alkyl and OR₁₉;

R16 is (C₁-C₆)-alkyl;

R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

R19 is H or (C₁-C₆)-alkyl;

R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R3 is bond, CH₂ or CH₂-CH₂;

R4 (C₃-C₈)-cycloalkyl;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

10. A compound of the formula Ia as claimed in claim 7 to 9, wherein

R30 is R32;

R32 is CONR₁₄R₁₅, COOR₁₃;

R13 is H or (C₁-C₆)-alkyl;

R14, R15 are independently of each other H, (C₁-C₆)-alkyl or (C₁-C₆)-alkyl substituted with OR₁₇;
or R14 and R15 form together with the N-atom on which they are attached, a 4-, 5- or 6-membered heterocycle, optionally containing an additional heteroatom selected from the series O, S and NR₁₈;

R17 is H or (C₁-C₆)-alkyl;

R18 is H or (C₁-C₆)-alkyl;

5

R1a, R1c are independently of each other H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

R2a is H, F, Cl, Br, (C₁-C₆)-alkyl or CN;

10

R3 is CH₂;

R4 (C₃-C₆)-cycloalkyl;

in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a
15 physiologically acceptable salt thereof.

11. A compound of the formula Ia as claimed in claim 7 to 10, wherein

20

R30 is R32;

R32 is CONR₁₄R₁₅, COOR₁₃;

R14, R15 are independently of each other H, (C₁-C₆)-alkyl or (C₁-C₆)-alkyl
25 substituted with OR₁₇;

R17 is H or (C₁-C₆)-alkyl;

R1a is H or F;

30

R1c is H;

R2a is H;

R3 is CH₂;

R4 (C₃-C₆)-cycloalkyl;

5 in any of its stereoisomeric forms, or a mixture of stereoisomeric forms in any ratio, or a physiologically acceptable salt thereof.

12. A compound selected from the list

10

5-[(3R)-3-[[6-(Cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-N,N-dimethyl-3-oxo-indane-1-carboxamide,

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide,

15

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-3-oxo-indan-1-yl]-N-methyl-acetamide,

2-[6-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-4-fluoro-1-oxo-indan-2-yl]-N,N-dimethyl-acetamide,

20

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-3-oxo-indan-1-yl]acetamide and

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide

or a pharmaceutically acceptable salt thereof.

25

13. The compound

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide

30

or a pharmaceutically acceptable salt thereof.

14. The compound

2-[5-[(3R)-3-[[6-(cyclopropylmethoxy)-3-pyridyl]oxy]-2-oxo-pyrrolidin-1-yl]-7-fluoro-3-oxo-indan-1-yl]-N,N-dimethyl-acetamide

5

or a pharmaceutically acceptable salt thereof.

15. A pharmaceutical composition comprising at least one compound as claimed in any of claims 1 to 14 or a physiologically acceptable salt of any of them, for use as a pharmaceutical.

16. A pharmaceutical composition as claimed in claim 15, comprising additionally one or more active ingredients selected from the list:

Insulin and insulin derivatives, GLP-1, GLP-1 analogues and GLP-1 receptor agonists, polymer bound GLP-1 and GLP-1 analogues, dual GLP-1/GIP agonists, dual GLP-1/glucagon receptor agonists, PYY3-36 or analogues thereof, pancreatic polypeptide or analogues thereof, glucagon receptor agonists or antagonists, GIP receptor agonists or antagonists, ghrelin antagonists or inverse agonists, xenin and analogues thereof, DDP-IV inhibitors, SGLT-2 inhibitors, dual SGLT-2/SGLT-1 inhibitors, biguanides, thiazolidinediones, PPAR agonists, PPAR modulators, sulfonylureas, meglitinides, alpha-glucosidase inhibitors, amylin and amylin analogues, GPR119 agonists, GPR40 agonists, GPR120 agonists, GPR142 agonists, TGR5 agonists, AMPK stimulants, AMPK activators, inhibitors of 11-beta-HSD, activators of glucokinase, inhibitors of DGAT, inhibitors of protein tyrosine phosphatase 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, CCR-2 antagonists, modulators of glucose transporter-4, somatostatin receptor 3 agonists, HMG-CoA-reductase inhibitors, fibrates, nicotinic acid and derivatives thereof, nicotinic acid receptor 1 agonists, , ACAT inhibitors, cholesterol absorption inhibitors, bile acid-binding substances, IBAT inhibitors, MTP inhibitors, modulators of PCSK9, LDL receptor up-regulators (liver selective thyroid hormone receptor beta agonists), HDL-raising compounds, lipid metabolism

modulators, PLA2 inhibitors, ApoA-I enhancers, cholesterol synthesis inhibitors, omega-3 fatty acids and derivatives thereof, active substances for the treatment of obesity, CB1 receptor antagonists, MCH-1 antagonists, MC4 receptor agonists and partial agonists, NPY5 or NPY2 antagonists, NPY4 agonists, beta-3 adrenergic receptor agonists, leptin or leptin mimetics, 5HT2c receptor agonists, lipase inhibitors, angiogenesis inhibitors, H3 antagonists, AgRP inhibitors, triple monoamine uptake inhibitors, MetAP2 inhibitors, antisense oligonucleotides against production of fibroblast growth factor receptor 4 or prohibitin targeting peptide-1, drugs for influencing high blood pressure, chronic heart failure or atherosclerosis, angiotensin II receptor antagonists, dual angiotensin receptor blockers (ARB), angiotensin converting enzyme (ACE) inhibitors, angiotensin converting enzyme 2 (ACE-2) activators, , renin inhibitors, prorenin inhibitors, endothelin converting enzyme (ECE) inhibitors, endothelin receptor blockers, endothelin antagonists, diuretics, aldosterone antagonists, aldosterone synthase inhibitors, alpha-blockers, antagonists of the alpha-2 adrenergic receptor, beta-blockers, mixed alpha-/beta-blockers, calcium antagonists/calcium channel blockers (CBBs), dual mineralocorticoid/CCBs, centrally acting antihypertensives, inhibitors of neutral endopeptidase, aminopeptidase-A inhibitors, vaso peptide inhibitors, dual vaso peptide inhibitors, neprilysin-ACE inhibitors, neprilysin-ECE inhibitors, dual-acting Angiotensin (AT) receptor-neprilysin inhibitors, dual AT1/ endothelin-1 (ETA) antagonists, advanced glycation end-product breakers, recombinant renalase, blood pressure vaccines, anti-RAAS vaccines, AT1- or AT2- vaccines, modulators of genetic polymorphisms with antihypertensive response and thrombocyte aggregation inhibitors.

17. A pharmaceutical composition as claimed in claim 15, comprising additionally metformin.

18. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one DPP-IV inhibitor.

19. A pharmaceutical composition as claimed in claim 18, wherein the DPP-IV inhibitor is selected from the list alogliptin, linagliptin, saxagliptin, sitagliptin, anagliptin, teneligliptin, trelagliptin, vildagliptin, gemigliptin, omarigliptin, evogliptin and dutogliptin.

20. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one SGLT-2 inhibitor.

5

21. A pharmaceutical composition as claimed in claim 20, wherein the SGLT-2 inhibitor is selected from the list canagliflozin, dapagliflozin, remogliflozin, remogliflozin etabonate, sergliflozin, empagliflozin, ipragliflozin, tofogliflozin, luseogliflozin and ertugliflozin.

10

22. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one GPR40 agonist.

15

23. A pharmaceutical composition as claimed in claim 22, wherein the GPR40 agonist is selected from the list TUG-424, P-1736, P-11187, JTT-851, GW9508, CNX-011-67, AM-1638 and AM-5262.

20

24. A pharmaceutical composition as claimed in claim 15, comprising additionally ezetimibe.

25

25. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one HMG-CoA reductase inhibitor.

30

26. A pharmaceutical composition as claimed in claim 25, wherein the HMG-CoA reductase inhibitor is selected from the list simvastatin, atorvastatin, rosuvastatin, pravastatin, fluvastatin, pitavastatin, lovastatin, mevastatin, rivastatin and cerivastatin.

27. A pharmaceutical composition as claimed in claim 15, comprising additionally at least one PPAR agonist or PPAR modulator.

5 28. A pharmaceutical composition as claimed in claim 27, wherein the PPAR agonist or PPAR modulator is saroglitazar.

10 29. A pharmaceutical composition as claimed in claim 27, wherein the PPAR agonist or PPAR modulator is selected from the list pioglitazone, rosiglitazone and lobeglitazone.

15 30. A pharmaceutical composition as claimed in claim 15, comprising additionally acarbose.

20 31. A compound of the formula I as claimed in any of claims 1 to 14 for use as a pharmaceutical.

25 32. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of diabetes, obesity, dyslipidemia and related disorders.

33. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of diabetes.

30 34. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of obesity.

35. A compound of the formula I as claimed in any of claims 1 to 14 for the prevention and/or treatment of dyslipidemia.

36. A compound of the formula I as claimed in any of claims 1 to 14 for prevention and/or treatment of a disease associated with the GPR119.

5

37. Use of an effective amount of at least one compound of formula I as claimed in any of claims 1 to 14 for the manufacture of a medicament for treating diabetes, obesity or dyslipidemia.

10

38. Use of an effective amount of at least one compound of formula I as claimed in any of claims 1 to 14 and an effective amount of at least one other compound useful for treating diabetes, obesity, dyslipidemia or high blood pressure for the manufacture of a medicament for treating diabetes, obesity, dyslipidemia or high blood pressure.

15

39. The use as claimed in claim 38 wherein the medicament is to be administered simultaneously.

20

40. The use as claimed in claim 38 wherein the medicament is to be administered sequentially.