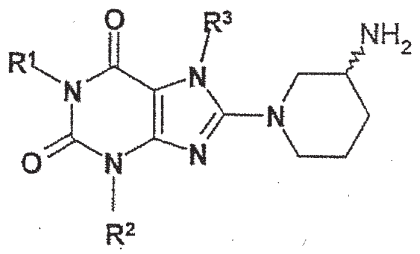
Claims

1. Process for preparing a compound of the general formula (I)



(I)

or an enantiomer or salt thereof

in which R^1 is a phenylcarbonylmethyl, benzyl, naphthylmethyl, pyridinylmethyl, pyrimidinylmethyl, quinolinylmethyl, isoquinolinylmethyl, quinazolinylmethyl, quinoxalinylmethyl, naphthyridinylmethyl or phenanthridinylmethyl group in which the aromatic or heteroaromatic moiety is in each case mono- or disubstituted by R_a, where the substituents may be the same or different and

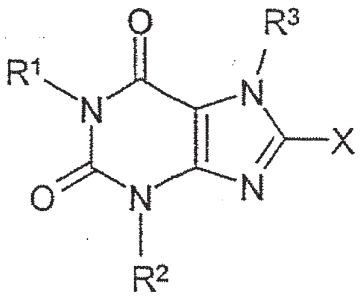
R_a is a hydrogen, fluorine, chlorine or bromine atom or a cyano, methyl, trifluoromethyl, ethyl, phenyl, methoxy, difluoromethoxy, trifluoromethoxy or ethoxy group,
or two R_a radicals, when they are bonded to adjacent carbon atoms, may also be an $-O-CH_2-O-$ or $-O-CH_2-CH_2-O-$ group,

R^2 is a methyl, ethyl, propyl, isopropyl, cyclopropyl or phenyl group and

R^3 is a 2-buten-1-yl, 3-methyl-2-buten-1-yl, 2-butyn-1-yl, 2-fluorobenzyl, 2-chlorobenzyl, 2-bromobenzyl, 2-iodobenzyl, 2-methylbenzyl, 2-(trifluoromethyl)benzyl or 2-cyanobenzyl group,

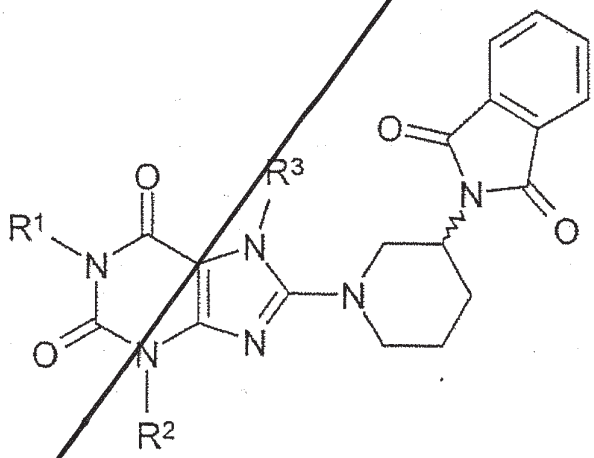
comprising the following synthesis steps:

a) reaction of a compound of the general formula (III)



in which X is a leaving group selected from the group of the halogens or the sulphonic esters and
R^1 to R^3 are each defined as mentioned above with 3-(phthalimido)piperidine or an enantiomer thereof,

b) deprotection of the thus obtained compound of the general formula (II)



in which R^1 to R^3 are each defined as mentioned above and

c) optional conversion to a physiologically tolerated salt.

2. Process according to Claim 1, in which

X is a chlorine or bromine atom,

R^1 is a phenylcarbonylmethyl, benzyl, naphthylmethyl, pyridinylmethyl, pyrimidinylmethyl, quinolinylmethyl, isoquinolinylmethyl, quinazolinylmethyl, quinoxalinylmethyl or naphthyridinylmethyl group in which the aromatic or heteroaromatic moiety is in each case mono- or disubstituted by R_a, where the substituents may be the same or different and

R_a is a hydrogen, fluorine or chlorine atom or a cyano, methyl, ethyl, methoxy or ethoxy group,

R^2 is a methyl, ethyl, propyl, isopropyl, cyclopropyl or phenyl group and

R^3 is a 2-buten-1-yl, 3-methyl-2-buten-1-yl, 2-butyn-1-yl, 2-fluorobenzyl, 2-chlorobenzyl, 2-bromobenzyl, 2-iodobenzyl, 2-methylbenzyl, 2-(trifluoromethyl)benzyl or 2-cyanobenzyl group.

3. Process according to Claim 2, in which

X is a chlorine or bromine atom,

R^1 is a cyanobenzyl, (cyanopyridinyl)methyl, quinolinylmethyl, (methylquinolinyl)methyl, isoquinolinylmethyl, (methylisoquinolinyl)methyl, quinazolinylmethyl, (methylquinazolinyl)methyl, quinoxazinylmethyl, (methylquinoxalinyl)methyl, (dimethylquinoxalinyl)methyl or naphthyridinylmethyl group,

R^2 is a methyl, cyclopropyl or phenyl group and

R^3 is a 2-buten-1-yl, 3-methyl-2-buten-1-yl, 2-butyn-1-yl, 2-chlorobenzyl, 2-bromobenzyl or 2-cyanobenzyl group.

4. Process according to Claim 3, in which
X is a bromine atom,
R^1 is a (4-methylquinazolin-2-yl)methyl, (3-methylisoquinolin-1-yl)methyl or (3-cyanopyridin-2-yl)methyl group,
R^2 is a methyl group and
R^3 is a 2-butyn-1-yl group.

5. Process according to one of Claims 1 to 4, in which the reactant used in step a) is (R)-3-(phthalimido)piperidine.

6. Process for preparing (R)-3-(phthalimido)piperidine, comprising the

following synthesis steps:

a) reaction of rac-3-aminopiperidine in suitable solvents with phthalic anhydride and

b) removal of the (R)-3-(phthalimido)piperidine from a solution of the thus obtained racemic 3-(phthalimido)piperidine by means of addition of D-tartaric acid and isolation of the precipitated tartrate.

7. Process for preparing (S)-3-(phthalimido)piperidine, comprising the following synthesis steps:

a) reaction of rac-3-aminopiperidine in suitable solvents with phthalic anhydride and

b) removal of the (S)-3-(phthalimido)piperidine from a solution of the thus obtained racemic 3-(phthalimido)piperidine by means of addition of L-tartaric acid and isolation of the precipitated tartrate.

8. Process for preparing (S)-3-(phthalimido)piperidine, comprising the following synthesis steps:

a) reaction of rac-3-aminopiperidine in suitable solvents with phthalic anhydride and

b) removal of the (R)-3-(phthalimido)piperidine from a solution of the thus obtained racemic 3-(phthalimido)piperidine by means of addition of D-tartaric acid and isolation of the precipitated tartrate and

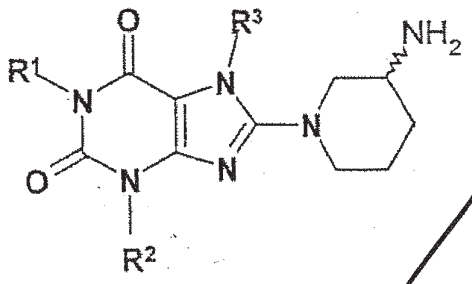
c) addition of L-tartaric acid to the thus obtained mother liquor of the first salt precipitation and isolation of the precipitated (S)-3-(phthalimido)piperidine tartrate.

9. Process according to one of Claims 6 to 8, in which the solvent used in step b) is ethanol.

10. (R)-3-(Phthalimido)piperidine.

11. (S)-3-(Phthalimido)piperidine.

12. Compounds of the general formula



(I)

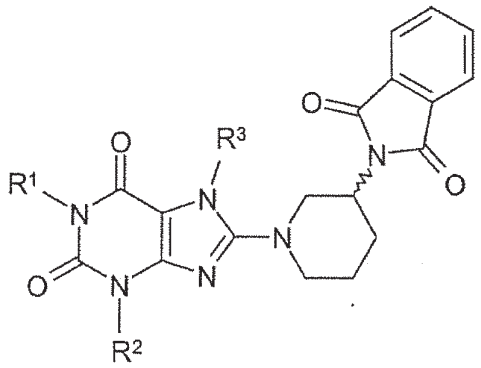
or an enantiomer thereof, in which R^1 to R^3 are each as defined in Claims 1 to 4, obtainable by the process according to one of Claims 1 to 5, or one of their salts.

13. Medicament comprising a compound according to Claim 12 as well as optionally one or more inert carriers and/or diluents.

14. Use of a compound according to Claim 12 for producing a medicament which is suitable for treating diabetes mellitus type I and type II, prediabetes or reduction of glucose tolerance, arthritis, obesity, allograft transplantation and osteoporosis caused by calcitonin.

Claims

1. A compound of the general formula (II)



or an enantiomer thereof,

in which

R^1 is a phenylcarbonylmethyl, benzyl, naphthylmethyl, pyridinylmethyl, pyrimidinylmethyl, quinolinylmethyl, isoquinolinylmethyl, quinazolinylmethyl, quinoxalinylmethyl, naphthyridinylmethyl or phenanthridinylmethyl group in which the aromatic or heteroaromatic moiety is in each case mono- or disubstituted by R_a, where the substituents may be the same or different and

R_a is a hydrogen, fluorine, chlorine or bromine atom or a cyano, methyl, trifluoromethyl, ethyl, phenyl, methoxy, difluoromethoxy, trifluoromethoxy or ethoxy group,

or two R_a radicals, when they are bonded to adjacent carbon atoms, may also be an $-O-CH_2-O-$ or $-O-CH_2-CH_2-O-$ group,

R^2 is a methyl, ethyl, propyl, isopropyl, cyclopropyl or phenyl group and

R^3 is a 2-buten-1-yl, 3-methyl-2-buten-1-yl, 2-butyn-1-yl, 2-flurobenzyl, 2-chlorobenzyl, 2-bromobenzyl, 2-iodobenzyl, 2-methylbenzyl, 2-(trifluoromethyl)benzyl or 2-cyanobenzyl group.

2. The compound of the general formula (II) according to Claim 1, in which

R^1 is a phenylcarbonylmethyl, benzyl, naphthylmethyl, pyridinylmethyl, pyrimidinylmethyl, quinolinylmethyl, isoquinolinylmethyl, quinazolinylmethyl quinoxalinylmethyl or naphthyridinylmethyl group in which the aromatic or heteroaromatic moiety is in each case mono- or disubstituted by R_a, where the substituents may be the same or different and

R_a is a hydrogen, fluorine or chlorine atom or a cyano, methyl, ethyl, methoxy or ethoxy group,

R^2 is a methyl, ethyl, propyl, isopropyl, cyclopropyl or phenyl group and

R^3 is a 2-buten-1-yl, 3-methyl-2-buten-1-yl, 2-butyn-1-yl, 2-flurobenzyl, 2-chlorobenzyl, 2-bromobenzyl, 2-iodobenzyl, 2-methylbenzyl, 2-(trifluoromethyl)benzyl or 2-cyanobenzyl group.

3. The compound of the general formula (II) according to Claim 2, in which

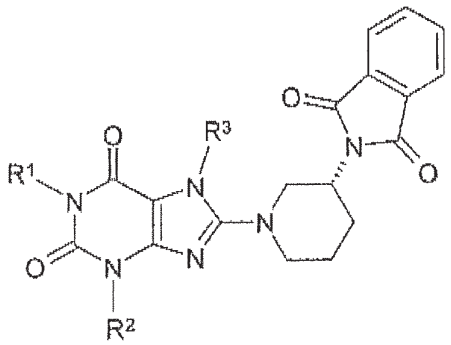
R^1 is a cyanobenzyl, (cyanopyridinyl)methyl, quinolinylmethyl, (methylquinolinyl)methyl, isoquinolinylmethyl, (methylisoquinolinyl)methyl, quinazolinylmethyl, (methylquinazolinyl)methyl, quinoxazinylmethyl, (methylquinoxalinyl)methyl, (dimethylquinoxalinyl)methyl or naphthyridinylmethyl group,

R^2 is a methyl, cyclopropyl or phenyl group and

R^3 is a 2-buten-1-yl, 3-methyl-2-buten-1-yl, 2-butyn-1-yl, 2-chlorobenzyl, 2-bromobenzyl or 2-cyanobenzyl group.

4. The compound of the general formula (II) according to Claim 3, in which
R^1 is a (4-methylquinazolin-2-yl)methyl, (3-methylisoquinolin-1-yl)methyl or (3-cyanopyridin-2-yl)methyl group,
R^2 is a methyl group and
R^3 is a butyn-1-yl group.

5. A compound according to Claim 4 which is of the general formula



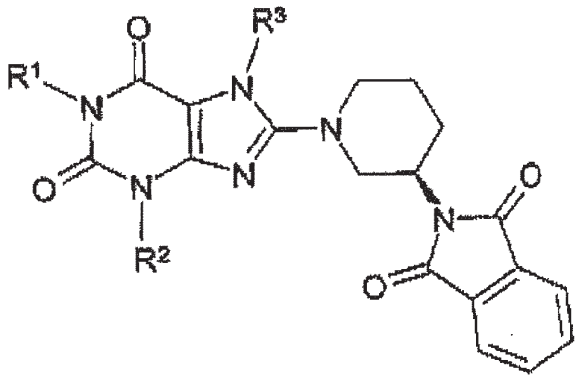
in which

R^1 is a (4-methylquinazolin-2-yl)methyl, (3-methylisoquinolin-1-yl)methyl or (3-cyanopyridin-2-yl)methyl group,

R^2 is a methyl group and

R^3 is a 2-butyn-1-yl group.

6. A compound of the following general formula



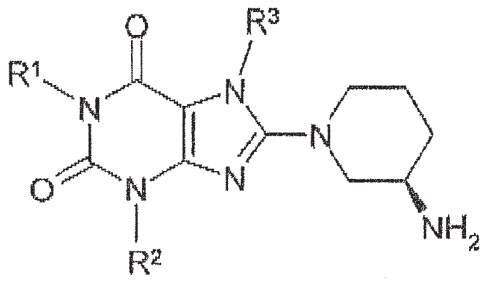
in which

R^1 is a (4-methylquinazolin-2-yl) methyl group,

R^2 is a methyl group and

R^3 is a 2-butyn-1-yl group.

7. A method of preparing a compound of the general formula



or a physiologically tolerated salt thereof,

in which

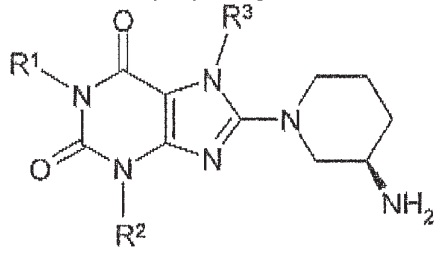
R^1 is a (4-methylquinazolin-2-yl)methyl, (3-methylisoquinolin-1-yl)methyl or (3-cyanopyridin-2-yl)methyl group,

R^2 is a methyl group and

R^3 is a 2-butyn-1-yl group,

said method comprising deprotecting a compound of Claim 13.

8. A method of preparing a compound of the following formula



in which

R^1 is a (4-methylquinazolin-2-yl)methyl group,

R^2 is a methyl group and

R^3 is a 2-butyn-1-yl group.

said method comprising detaching the phthalyl protecting group of the compound according to claim 6.

9. The method according to claim 8, wherein the phthalyl protecting group is detached in the presence of ethanolamine, preferably in toluene or in a mixture of tetrahydrofurane and water.

10. The method according to claim 8 or 9 further comprising crystallizing the deprotected compound from ethanol solution.