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Novel heterocyclically substituted α -hydroxycarboxylic acid derivatives, their preparation and use as endothelin receptor antagonists

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The present invention relates to novel carboxylic acid derivatives, their preparation and use.

- 10 Endothelin is a peptide constructed from 21 amino acids, which is synthesized and released by vascular endothelium. Endothelin exists in three isoforms, ET-1, ET-2 and ET-3. In the following text, "endothelin" or "ET" designates one or all isoforms of endothelin. Endothelin is a potent vasoconstrictor and has a
- 15 strong effect on the vascular tone. It is known that this vasoconstriction is caused by the binding of endothelin to its receptor (Nature, 332 (1988), 411-415; FEBS Letters, 231 (1988), 440-444 and Biochem. Biophys. Res. Commun., 154 (1988), 868-875).
- 20 Increased or abnormal release of endothelin causes a lasting vascular contraction in peripheral, renal and cerebral blood vessels, which can lead to diseases. As reported in the literature, endothelin is involved in a number of diseases. These include: hypertension, acute myocardial infarct, pulmonary
- 25 hypertension, Raynaud's syndrome, cerebral vasospasms, stroke, benign prostate hypertrophy, atherosclerosis, asthma and prostate cancer (J. Vascular Med. Biology 2 (1990), 207, J. Am. Med. Association 264 (1990), 2868, Nature 344 (1990), 114, N. Engl. J. Med. 322 (1989), 205, N. Engl. J. Med. 328 (1993), 1732, Nephron
- 30 66 (1994), 373, Stroke 25 (1994), 904, Nature 365 (1993), 759, J. Mol. Cell. Cardiol. 27 (1995), A234; Cancer Research 56 (1996), 663, Nature Medicine 1 (1995), 944).

- At least two endothelin receptor subtypes, ET_A and ET_B receptors,
- 35 have at present been described in the literature (Nature 348 (1990), 730, Nature 348 (1990), 732). Accordingly, substances which inhibit the binding of endothelin to one or both receptors should antagonize physiological effects of endothelin and therefore be useful pharmaceuticals.

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It is an object of the present invention to provide endothelin receptor antagonists which bind to the ET_A and/or the ET_B receptor.

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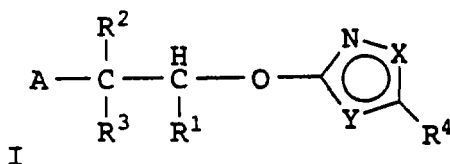


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We have found that this object is achieved by heterocyclically substituted α -hydroxycarboxylic acid derivatives of the formula I

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R¹ being tetrazole or a group

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where R has the following meanings:

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a) a radical OR^5 , where R^5 is:

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hydrogen, the cation of an alkali metal, the cation of an alkaline earth metal, a physiologically tolerable organic ammonium ion such as tertiary C₁-C₄-alkylammonium or the ammonium ion;

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C₃-C₈-cycloalkyl, C₁-C₈-alkyl, CH₂-phenyl, which can be substituted by one or more of the following radicals: halogen, nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl, hydroxyl, C₁-C₄-alkoxy, mercapto, C₁-C₄-alkylthio, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂;

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a C₃-C₈-alkenyl or a C₃-C₈-alkynyl group, it being possible for these groups for their part to carry one to five halogen atoms;

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R⁵ can furthermore be a phenyl radical which can carry one to five halogen atoms and/or one to three of the following radicals: nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl, hydroxyl, C₁-C₄-alkoxy, mercapto, C₁-C₄-alkylthio, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂.

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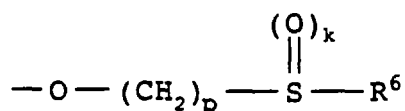
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- b) a 5-membered heteroaromatic linked via a nitrogen atom, such as pyrrolyl, pyrazolyl, imidazolyl or triazolyl, which can carry one or two halogen atoms, or one or two C₁-C₄-alkyl or one or two C₁-C₄-alkoxy groups.

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- c) a group

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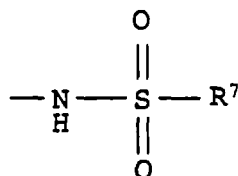


- 15 where k can assume the values 0, 1 or 2, p the values 1, 2, 3 or 4 and R⁶ is

- 20 C₁-C₄-alkyl, C₃-C₈-cycloalkyl, C₃-C₈-alkenyl, C₃-C₈-alkynyl or phenyl, which can be mono- to trisubstituted by: halogen, nitro, cyano, C₁-C₄-alkyl, hydroxyl, C₁-C₄-alkoxy, C₁-C₄-alkylthio, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, mercapto.

- 25 d) a radical

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where R⁷ is:

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C₁-C₄-alkyl, C₃-C₈-alkenyl, C₃-C₈-alkynyl, C₃-C₈-cycloalkyl, it being possible for these radicals to carry a C₁-C₄-alkoxy, C₁-C₄-alkylthio and/or a phenyl radical as mentioned under c);

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C₁-C₄-haloalkyl or phenyl, which can be substituted as mentioned under c).

The other substituents have the following meanings:

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A is NR⁸R⁹, azido, OR¹⁰, SR¹⁰ or C₁-C₄-alkyl.

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- X is oxygen, sulfur, CR¹¹ or NR¹²; with the proviso that if X = CR¹¹, then Y = oxygen or sulfur or NR¹⁴.
- Y is oxygen, sulfur, CR¹³ or NR¹⁴; with the proviso that if Y = oxygen or sulfur or NR¹⁴, then X = CR¹¹.
- R² and R³ (which can be identical or different):
- are phenyl or naphthyl, which can be substituted by one or more of the following radicals: halogen, nitro, cyano, hydroxyl, mercapto, C₁-C₄-alkyl, C₂-C₄-alkenyl, C₂-C₄-alkynyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, phenoxy, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂ or phenyl, which can be mono- or polysubstituted, e.g. mono- to trisubstituted, by halogen, nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy or C₁-C₄-alkylthio; or
- phenyl or naphthyl, which are connected to one another in the ortho-position via a direct bond, a methylene, ethylene or ethenylene group, an oxygen or sulfur atom or an SO₂, NH or N(C₁-C₄-alkyl) group;
- C₅-C₆-cycloalkyl, it being possible for these radicals in each case to be mono- or polysubstituted by: halogen, hydroxyl, mercapto, carboxyl, nitro, cyano, C₁-C₄-alkyl, C₂-C₄-alkenyl, C₂-C₄-alkynyl, C₁-C₄-alkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy.
- R⁴ and R¹¹ (which can be identical or different):
- are hydrogen, halogen, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₄-alkylthio, C₁-C₄-alkylcarbonyl, C₁-C₄-alkoxycarbonyl, hydroxyl, NH₂, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂
- C₁-C₄-alkyl, C₂-C₄-alkenyl, C₂-C₄-alkynyl, it being possible for these radicals to be substituted by halogen, hydroxyl, mercapto, carboxyl, cyano;
- or CR⁴, together with CR¹¹, forms a 5- or 6-membered alkylene or alkenylene ring which can be unsubstituted or substituted, and in which in each case one or more methylene groups can be replaced by oxygen, sulfur, -NH or -N(C₁-C₄-alkyl).

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- R⁸ is hydrogen, C₁-C₈-alkyl, C₃-C₈-alkenyl or C₃-C₈-alkynyl, C₁-C₅-alkylcarbonyl, it being possible for these radicals in each case to be mono- or polysubstituted by: halogen, hydroxyl, mercapto, carboxyl, nitro, amino, cyano,
- 5 C₁-C₄-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy, C₁-C₄-alkoxycarbonyl, C₃-C₈-alkylcarbonylalkyl, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, C₃-C₈-cycloalkyl, phenoxy or phenyl, it being possible for the aryl radicals mentioned for their part to be mono- or
- 10 polysubstituted, e.g. mono- to trisubstituted, by halogen, hydroxyl, mercapto, carboxyl, nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, phenyl or C₁-C₄-alkylthio;
- 15 phenyl or naphthyl, which in each case can be substituted by one or more of the following radicals: halogen, nitro, cyano, hydroxyl, amino, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, phenoxy, C₁-C₄-alkylthio, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, dioxomethylene or
- 20 dioxoethylene;
- C₃-C₈-cycloalkyl, it being possible for these radicals in each case to be mono- or polysubstituted by: halogen, hydroxyl, mercapto, carboxyl, nitro, cyano, C₁-C₄-alkyl, C₂-C₄-alkenyl,
- 25 C₂-C₄-alkynyl, C₁-C₄-alkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy;
- or R⁸, together with R⁹, forms a C₃-C₇-alkylene chain closed to give a ring, which can be mono- or polysubstituted by
- 30 C₁-C₄-alkyl, C₁-C₄-alkylthio, C₁-C₄-alkoxy, C₁-C₄-haloalkyl, C₁-C₄-haloalkoxy, and in which an alkylene group can be replaced by oxygen or sulfur, such as -(CH₂)₄-, -(CH₂)₅-, -(CH₂)₆-, -(CH₂)₇-, -(CH₂)₂-O-(CH₂)₂-, -(CH₂)₂-S-(CH₂)₂-.
- 35 R⁹ is hydrogen, C₁-C₄-alkyl;
- or R⁹ is as indicated under R⁸ linked with R⁸ to give a ring.
- 40 R¹⁰ is hydrogen, C₁-C₈-alkyl, C₃-C₈-alkenyl or C₃-C₈-alkynyl, it being possible for these radicals in each case to be mono- or polysubstituted by: halogen, hydroxyl, mercapto, carboxyl, nitro, amino, cyano, C₁-C₄-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy,
- 45 C₁-C₄-alkoxycarbonyl, C₃-C₈-alkylcarbonylalkyl, carboxamide, CONH(C₁-C₄-alkyl), CON(C₁-C₄-alkyl)₂, CONR¹⁵R¹⁶, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, C₃-C₈-cycloalkyl, heteroaryloxy or heteroaryl, which is five- or six-membered,

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- comprising one to three nitrogen atoms and/or a sulfur or oxygen atom, phenoxy or phenyl, it being possible for all aryl radicals mentioned, for their part, to be mono- or polysubstituted, e.g. mono- to trisubstituted, by halogen, hydroxyl, mercapto, carboxyl, nitro, cyano, C₁-C₄-alkyl, C₁-C₄-alkylcarboxyl, R¹⁹, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, phenyl or C₁-C₄-alkylthio;
- phenyl or naphthyl, which in each case can be substituted by one or more of the following radicals: halogen, nitro, cyano, hydroxyl, amino, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, phenoxy, C₁-C₄-alkylthio, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, dioxomethylene or dioxoethylene;
- C₃-C₈-cycloalkyl, it being possible for these radicals in each case to be mono- to trisubstituted by: halogen, hydroxyl, mercapto, carboxyl, nitro, cyano, C₁-C₄-alkyl, C₂-C₄-alkenyl, C₂-C₄-alkynyl, C₁-C₄-alkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy.
- R¹² is hydrogen, C₁-C₄-alkyl; or NR¹², together with CR⁴, forms a 5- or 6-membered alkylene or alkenylene ring which can be mono- to trisubstituted by C₁-C₄-alkyl, and in which in each case one or more methylene groups can be replaced by oxygen or sulfur.
- R¹³ is hydrogen, halogen, C₁-C₄-alkyl, C₂-C₄-alkenyl, it being possible for these radicals to be substituted by halogen.
- R¹⁴ is hydrogen, C₁-C₄-alkyl.
- R¹⁵ and R¹⁶:
- R¹⁵ and R¹⁶ together form a C₃-C₇-alkylene or C₄-C₇-alkenylene chain closed to give a ring, to which is fused a phenyl ring which can be mono- to trisubstituted by halogen, C₁-C₄-alkyl, C₁-C₄-alkylthio, C₁-C₄-alkoxy, C₁-C₄-haloalkyl, C₁-C₄-haloalkoxy, hydroxyl, carboxyl, amino.
- R¹⁹ is C₁-C₄-alkyl, C₁-C₄-alkylthio, C₁-C₄-alkoxy, which can carry one of the following radicals: hydroxyl, carboxyl, C₁-C₄-alkoxycarbonyl, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, carboxamide or CON(C₁-C₄-alkyl)₂.

The following definitions apply here and in the following text:

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an alkali metal is, for example, lithium, sodium, potassium;

an alkaline earth metal is, for example, calcium, magnesium, barium;

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C₃-C₈-cycloalkyl is, for example, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl or cyclooctyl;

- 10 C₁-C₄-haloalkyl can be linear or branched, such as, for example, fluoromethyl, difluoromethyl, trifluoromethyl, chlorodifluoromethyl, dichlorofluoromethyl, trichloromethyl, 1-fluoroethyl, 2-fluoroethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 2,2,2-trichloroethyl or pentafluoroethyl;

- C₁-C₄-haloalkoxy can be linear or branched, such as, for example, difluoromethoxy, trifluoromethoxy, chlorodifluoromethoxy, 20 1-fluoroethoxy, 2,2-difluoroethoxy, 1,1,2,2-tetrafluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-1,1,2-trifluoroethoxy, 2-fluoroethoxy or pentafluoroethoxy;

- C₁-C₄-alkyl can be linear or branched, such as, for example, 25 methyl, ethyl, 1-propyl, 2-propyl, 2-methyl-2-propyl, 2-methyl-1-propyl, 1-butyl or 2-butyl;

- C₂-C₄-alkenyl can be linear or branched, such as, for example, 30 ethenyl, 1-propen-3-yl, 2-propen-3-yl, 1-propen-1-yl, 2-methyl-1-propenyl, 1-butenyl or 2-butenyl;

- C₂-C₄-alkynyl can be linear or branched, such as, for example, ethynyl, 1-propyn-1-yl, 1-propyn-3-yl, 1-butyn-4-yl or 35 2-butyn-4-yl;

- C₁-C₄-alkoxy can be linear or branched, such as, for example, methoxy, ethoxy, propoxy, 1-methylethoxy, butoxy, 1-methylpropoxy, 2-methylpropoxy or 1,1-dimethylethoxy; 40

C₃-C₆-alkenyloxy can be linear or branched, such as, for example, allyloxy, 2-buten-1-yloxy or 3-buten-2-yloxy;

- 45 C₃-C₆-alkynyloxy can be linear or branched, such as, for example, 2-propyn-1-yloxy, 2-butyn-1-yloxy or 3-butyn-2-yloxy;

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C₁-C₄-alkylthio can be linear or branched, such as, for example, methylthio, ethylthio, propylthio, 1-methylethylthio, butylthio, 1-methylpropylthio, 2-methylpropylthio or 1,1-dimethylethylthio;

- 5 C₁-C₄-alkylcarbonyl can be linear or branched, such as, for example, acetyl, ethylcarbonyl or 2-propylcarbonyl;

- 10 C₁-C₄-alkoxycarbonyl can be linear or branched, such as, for example, methoxycarbonyl, ethoxycarbonyl, n-propoxycarbonyl, i-propoxycarbonyl or n-butoxycarbonyl;

C₃-C₈-alkylcarbonylalkyl can be linear or branched, e.g. 2-oxoprop-1-yl, 3-oxobut-1-yl or 3-oxobut-2-yl;

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C₁-C₈-alkyl can be linear or branched, such as, for example, C₁-C₄-alkyl, pentyl, hexyl, heptyl or octyl;

- 20 halogen is, for example, fluorine, chlorine, bromine, iodine.

The invention further relates to those compounds from which the compounds of the formula I can be released (prodrugs).

- 25 Preferred prodrugs are those in which the release proceeds under conditions such as prevail in certain body compartments, e.g. in the stomach, intestine, blood circulation, liver.

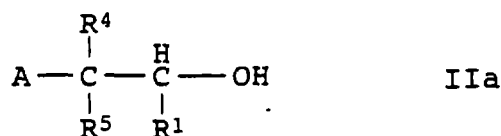
- 30 The invention further relates to the use of the abovementioned carboxylic acid derivatives for the production of drugs, in particular for the production of inhibitors for ET_A and ET_B receptors.

- 35 The compounds I and also the intermediates for their preparation, such as, for example, II, can have one or more asymmetrically substituted carbon atoms. Such compounds can be present as pure enantiomers or pure diastereomers or as a mixture thereof. The use of an enantiomerically pure compound as the active compound is preferred.

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The compounds having the formula IIa in which A is C₁-C₄-alkyl, azido, SR¹⁰ or OR¹⁰ can be prepared as described in WO 96/11914, DE 19614533.3 or DE 19726146.9.

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Compounds of the formula IIb where A is SR^{10} or OR^{10} can be obtained in enantiomerically pure form via an acid-catalyzed transesterification, such as has been described in DE 19636046.3.

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Enantiomerically pure compounds of the formula II can furthermore be obtained by carrying out a classical resolution with racemic or diastereomeric compounds of the formula II using suitable enantiomerically pure bases. Suitable bases of this kind are, for example, 4-chlorophenylethylamine and the bases which are

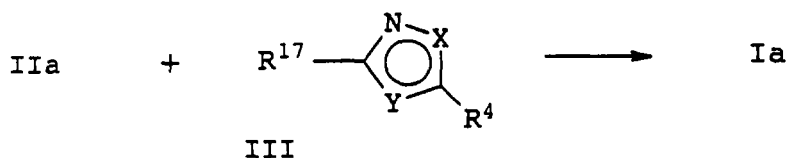
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mentioned in WO 96/11914.

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The compounds Ia according to the invention, where A is C_1 - C_4 -alkyl, azido, SR^{10} or OR^{10} and the other substituents have the meaning given under the formula I, can be prepared, for example, by reacting the carboxylic acid derivatives of the formula IIa, where the substituents have the given meaning, with compounds of the formula III.

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In formula III, R^{17} is halogen or $\text{R}^{18}\text{-SO}_2$, it being possible for R^{18} to be C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl or phenyl. The reaction preferably takes place in an inert solvent or diluent with addition of a suitable base, i.e. of a base which brings about a

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deprotonation of the intermediate IIa, in a temperature range from room temperature up to the boiling point of the solvent.

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Compounds of the type Ia where $\text{R}^1 = \text{COOH}$ can be obtained directly in this manner if the intermediate IIa, where R^1 is COOH , is deprotonated using two equivalents of a suitable base and reacted with compounds of the formula III. Here too, the reaction takes place in an inert solvent and in a temperature range from room temperature up to the boiling point of the solvent.

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Examples of such solvents or diluents are aliphatic, alicyclic and aromatic hydrocarbons, which in each case may or may not be chlorinated, such as, for example, hexane, cyclohexane, petroleum ether, naphtha, benzene, toluene, xylene, methylene chloride, 5 chloroform, carbon tetrachloride, ethyl chloride and trichloroethylene, ethers, such as, for example, diisopropyl ether, dibutyl ether, methyl tert-butyl ether, propylene oxide, dioxane and tetrahydrofuran, nitriles, such as, for example, acetonitrile and propionitrile, acid amides, such as, for 10 example, dimethylformamide, dimethylacetamide and N-methylpyrrolidone, sulfoxides and sulfones, such as, for example, dimethyl sulfoxide and sulfolane.

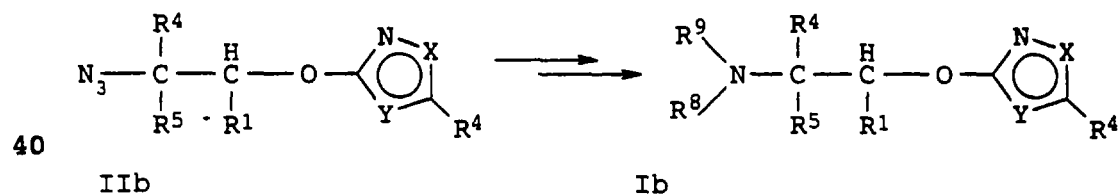
Compounds of the formula III are known or can be prepared in a 15 generally known manner such as, for example:

H. Erlenmeyer, G. Bischoff, *Helv. Chim. Acta*, 29 (1946), 280-283, G. Kjellin, J. Sandström, *Acta Chim. Scand.*, 23 (1969), 2879, E. R. Buchmann, A. O. Reims, H. Sargent, *J. Org. Chem.*, 6 (1941), 20 764-766, F. C. James, H. D. Krebs, *Aust. J. Chem.*, 35 (1982), 385-391, G. R. Humphrey, S. H. B. Wright, *J. Heterocyclic Chem.*, 26 (1989), 23.

The base used can be an alkali metal or alkaline earth metal 25 hydride such as sodium hydride, potassium hydride or calcium hydride, a carbonate such as an alkali metal carbonate, e.g. sodium or potassium carbonate, an alkali metal or alkaline earth metal hydroxide such as sodium or potassium hydroxide, an organometallic compound such as butyllithium or an alkali metal 30 amide such as lithium diisopropylamide or lithium amide.

Compounds of the formula IIb can be reacted similarly to the methods described in DE 19726146.9 to give the compounds Ib.

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Compounds of the formula I can also be prepared by starting from 45 the corresponding carboxylic acids, i.e. compounds of the formula I where R¹ is COOH, and converting these first in a customary manner into an activated form such as an acid halide, an

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anhydride or imidazolidine and then reacting this with an appropriate hydroxyl compound HOR^5 . This reaction can be carried out in the customary solvents and often necessitates the addition of a base, those mentioned above being suitable. These two steps
5 can also be simplified, for example, by allowing the carboxylic acid to act on the hydroxyl compound in the presence of a dehydrating agent such as a carbodiimide.

10 Additionally, compounds of the formula I can also be prepared by starting from the salts of the corresponding carboxylic acids, i.e. from compounds of the formula I where R^1 is a group COOM , it being possible for M to be an alkali metal cation or the equivalent of an alkaline earth metal cation. These salts can be
15 reacted with many compounds of the formula R-W , W being a customary nucleofugic leaving group, for example a halogen such as chlorine, bromine, iodine or aryl- or alkylsulfonyl which is unsubstituted or substituted by halogen, alkyl or haloalkyl, such as, for example, toluenesulfonyl and methylsulfonyl or another
20 equivalent leaving group. Compounds of the formula R-W having a reactive substituent W are known or easy to obtain using common expert knowledge. This reaction can be carried out in the customary solvents and is advantageously carried out with addition of a base, those mentioned above being suitable.
25 In some cases, the use of generally known protective group techniques is necessary for preparing the compounds I according to the invention. If, for example, $\text{R}^{10} = 4\text{-hydroxyphenyl}$, the hydroxyl group can first be protected as a benzyl ether, which is
30 then cleaved at a suitable stage in the reaction sequence.

Compounds of the formula I where R^1 is tetrazole can be prepared as described in WO 96/11914.

35 With respect to the biological action, carboxylic acid derivatives of the formula I - both as pure enantiomers or pure diastereomers or as a mixture thereof - are preferred in which the substituents have the following meanings:

40 A is NR^8R^9 , azido, OR^{10} , SR^{10} or $\text{C}_1\text{-C}_4\text{-alkyl}$.

X is oxygen, sulfur, CR^{11} or NR^{12} ; with the proviso that if $\text{X} = \text{CR}^{11}$, then $\text{Y} = \text{oxygen or sulfur or NR}^{14}$.

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Y is oxygen, sulfur, CR^{13} or NR^{14} ; with the proviso that if Y = oxygen or sulfur or NR^{14} , then X = CR^{11} .

5 R^2 and R^3 (which can be identical or different):

10 are phenyl or naphthyl, which can be substituted by one or more of the following radicals: halogen, cyano, hydroxyl, mercapto, amino, C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy, phenoxy, C_1 - C_4 -alkylthio, $NH(C_1$ - C_4 -alkyl) or $N(C_1$ - C_4 -alkyl) $_2$ or phenyl, which can be mono- to trisubstituted by halogen, cyano, C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy or C_1 - C_4 -alkylthio; or

15 phenyl or naphthyl, which are connected to one another in the ortho-position by a direct bond, a methylene, ethylene or ethenylene group, an oxygen or sulfur atom or an SO_2 , NH or $N(C_1$ - C_4 -alkyl) group;

20 C_5 - C_6 -cycloalkyl, it being possible for these radicals in each case to be mono- to tri-substituted by: halogen, C_1 - C_4 -alkyl, C_1 - C_4 -alkoxy, C_1 - C_4 -alkylthio, C_1 - C_4 -haloalkoxy.

25 R^4 and R^{11} (which can be identical or different):

are C_1 - C_4 -alkyl, it being possible for these radicals to be substituted by halogen, hydroxyl;

30 hydrogen, halogen, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy, C_1 - C_4 -alkylthio, hydroxyl, NH_2 , $NH(C_1$ - C_4 -alkyl), $N(C_1$ - C_4 -alkyl) $_2$;

35 or CR^4 , together with CR^{11} , forms a 5- or 6-membered alkylene or alkenylene ring which can be mono- to trisubstituted by C_1 - C_4 -alkyl and in which in each case one to three methylene groups can be replaced by oxygen or sulfur.

40 R^8 is hydrogen, C_1 - C_8 -alkyl, C_1 - C_5 -alkylcarbonyl, it being possible for these radicals in each case to be mono- to trisubstituted by: halogen, hydroxyl, carboxyl, amino, C_1 - C_4 -alkoxy, C_1 - C_4 -alkylthio, C_1 - C_4 -haloalkoxy, C_1 - C_4 -alkoxycarbonyl, $NH(C_1$ - C_4 -alkyl), $N(C_1$ - C_4 -alkyl) $_2$, C_5 - C_6 -cycloalkyl, phenoxy or phenyl, it being possible for the
45 aryl radicals mentioned, for their part, to be mono- to trisubstituted by halogen, hydroxyl, C_1 - C_4 -alkyl,

13

C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, phenyl or C₁-C₄-alkylthio;

5 phenyl or naphthyl, which in each case can be mono- to trisubstituted by halogen, hydroxyl, amino, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, phenoxy, C₁-C₄-alkylthio, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, dioxomethylene or dioxoethylene;

10 C₃-C₈-cycloalkyl, it being possible for these radicals in each case to be mono- to trisubstituted by: halogen, C₁-C₄-alkyl, C₁-C₄-alkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy;

15 or R⁸, together with R⁹, forms a C₄-C₆-alkylene chain closed to give a ring, which can be mono- to trisubstituted by C₁-C₄-alkyl, C₁-C₄-haloalkyl, and in which an alkylene group can be replaced by oxygen or sulfur, such as -(CH₂)₄-, -(CH₂)₅-, -(CH₂)₆-, -(CH₂)₂-O-(CH₂)₂-, -(CH₂)₂-S-(CH₂)₂-.

20 R⁹ is hydrogen, C₁-C₄-alkyl;

or R⁹ is as given under R⁸ linked with R⁸ to give a ring.

25 R¹⁰ is hydrogen, C₁-C₈-alkyl, C₃-C₈-alkenyl or C₃-C₈-alkynyl, it being possible for these radicals in each case to be mono- to trisubstituted by: halogen, hydroxyl, mercapto, carboxyl, amino, C₁-C₄-alkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy, C₁-C₄-alkoxycarbonyl, carboxamide, CONH(C₁-C₄-alkyl),
30 CON(C₁-C₄-alkyl)₂, CONR¹⁵R¹⁶, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, C₅-C₆-cycloalkyl, phenoxy or phenyl, it being possible for the aryl radicals mentioned for their part to be mono- to trisubstituted by halogen, hydroxyl, C₁-C₄-alkyl, C₁-C₄-alkylcarboxyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy,
35 C₁-C₄-haloalkoxy, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, phenyl, C₁-C₄-alkylthio or R¹⁹;

40 phenyl or naphthyl, which in each case can be mono- to trisubstituted by: halogen, hydroxyl, amino, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, dioxomethylene or dioxoethylene;

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C₃-C₈-cycloalkyl, it being possible for these radicals in each case to be mono- to trisubstituted by: halogen, C₁-C₄-alkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkyl.

5 R¹² is hydrogen, methyl; or

NR¹², together with CR⁴, forms a 5- or 6-membered alkylene ring which can be mono- to trisubstituted by methyl.

10

R¹³ is hydrogen, halogen, C₁-C₄-alkyl, it being possible for these radicals to be mono- to trisubstituted by halogen.

R¹⁴ is hydrogen, methyl.

15

R¹⁵ and R¹⁶:

R¹⁵ and R¹⁶ together form a C₃-C₇-alkylene chain or C₄-C₇-alkenylene chain closed to give a ring, to which a phenyl ring is fused, such as 7-aza-bicyclo[4.2.0]-octa-1,3,5-triene, 2,3-dihydroindole, indole, 1,3-dihydroisoindole, 1,2,3,4-tetrahydroquinoline, 1,2,3,4-tetrahydroisoquinoline, it being possible in each case for the phenyl ring to be mono- to trisubstituted by halogen, C₁-C₄-alkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkyl, C₁-C₄-haloalkoxy.

R¹⁹ is methyl, ethyl, methoxy or ethoxy, which carry one of the following radicals: hydroxyl, carboxyl, C₁-C₄-alkoxycarbonyl, amino, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, carboxamide or CON(C₁-C₄-alkyl)₂.

Particularly preferred compounds of the formula I (both as pure enantiomers or pure diastereomers or as a mixture thereof - are those in which the substituents have the following meanings:

A is NR⁸R⁹, azido, OR¹⁰, SR¹⁰ or C₁-C₄-alkyl

40 X is oxygen, sulfur or CR¹¹; with the proviso that if X = CR¹¹, then Y = oxygen or sulfur.

Y is oxygen, sulfur or CR¹³; with the proviso that if Y = oxygen or sulfur, then X = CR¹¹.

45

R² and R³ (which can be identical or different):

15

are phenyl or naphthyl, which in each case can be mono- to trisubstituted by: halogen, hydroxyl, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, phenoxy or phenyl, which can be mono- to trisubstituted by halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy or C₁-C₄-haloalkoxy; or

phenyl or naphthyl, which are connected to one another in the ortho-position via a direct bond, a methylene, ethylene or ethenylene group, an oxygen or sulfur atom or an SO₂, NH or N(C₁-C₄-alkyl) group;

cyclohexyl.

R⁴ and R¹¹ (which can be identical or different):

are hydrogen, halogen, C₁-C₄-alkyl, trifluoromethyl, hydroxymethylene, C₁-C₄-alkoxy, C₁-C₄-alkylthio, N(C₁-C₄-alkyl)₂;

or CR⁴, together with CR¹¹, forms a 5- or 6-membered alkylene or, alkenylene ring which can be mono- or disubstituted by methyl, and in which in each case a methylene group can be replaced by oxygen;

R⁸ is hydrogen, C₁-C₄-alkyl, C₁-C₄-alkylcarbonyl, it being possible for these radicals to mono- to trisubstituted by: halogen, hydroxyl, carboxyl, amino, C₁-C₄-alkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkoxy, C₁-C₄-alkoxycarbonyl, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂, C₅-C₆-cycloalkyl, phenyl, which for its part can be mono- to trisubstituted by halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio;

phenyl which can be mono- to trisubstituted by halogen, hydroxyl, C₁-C₄-alkyl, trifluoromethyl, C₁-C₄-alkoxy, C₁-C₄-alkylthio, dioxomethylene or dioxoethylene;

C₅-C₆-cycloalkyl, it being possible for these radicals in each case to be mono- to trisubstituted by: halogen, C₁-C₄-alkyl, C₁-C₄-alkoxy;

or R⁸, together with R⁹, forms a C₄-C₆-alkylene chain closed to give a ring, which can be mono- to trisubstituted by C₁-C₄-alkyl, C₁-C₄-haloalkyl, and in which an alkylene group

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can be replaced by oxygen, such as $-(CH_2)_4-$, $-(CH_2)_5-$,
 $-(CH_2)_6-$, $-(CH_2)_2-O-(CH_2)_2-$.

5 R^9 is hydrogen, C_1 - C_4 -alkyl;

or R^9 is as indicated under R^8 linked with R^8 to give a ring.

10 R^{10} is hydrogen, C_1 - C_4 -alkyl, it being possible for these radicals
in each case to be mono- to trisubstituted by: halogen,
hydroxyl, carboxyl, C_1 - C_4 -alkoxy, C_1 - C_4 -alkoxycarbonyl,
carboxamide, $CONH(C_1-C_4-alkyl)$, $CON(C_1-C_4-alkyl)_2$, $CONR^{15}R^{16}$,
15 $NH(C_1-C_4-alkyl)$, $N(C_1-C_4-alkyl)_2$, C_5 - C_6 -cycloalkyl, phenyl,
which for its part can be mono- to trisubstituted by halogen,
hydroxyl, C_1 - C_4 -alkyl, C_1 - C_4 -alkylcarboxyl, trifluoromethyl,
15 C_1 - C_4 -alkoxy, $NH(C_1-C_4-alkyl)$, R^{19} , $N(C_1-C_4-alkyl)_2$, phenyl or
 C_1 - C_4 -alkylthio;

20 phenyl which can be mono- to trisubstituted by halogen,
hydroxyl, C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl, C_1 - C_4 -alkoxy,
 C_1 - C_4 -alkylthio, $NH(C_1-C_4-alkyl)$, $N(C_1-C_4-alkyl)_2$,
dioxomethylene or dioxoethylene;

25 C_3 - C_8 -cycloalkyl, it being possible for these radicals in each
case to be mono- or polysubstituted by: halogen, C_1 - C_4 -alkyl,
 C_1 - C_4 -alkoxy.

R^{13} is hydrogen, halogen, C_1 - C_4 -alkyl, trifluoromethyl.

30

R^{15} and R^{16} :

R^{15} and R^{16} together form a C_3 - C_7 -alkylene chain closed to give
a ring, to which a phenyl ring is fused, such as
2,3-dihydroindole, indole, 1,3-dihydroisoindole,
35 1,2,3,4-tetrahydroquinoline, 1,2,3,4-tetrahydroisoquinoline,
it being possible for the phenyl ring in each case to be
mono- to trisubstituted by halogen, C_1 - C_4 -alkyl, C_1 - C_4 -alkoxy,
hydroxyl;

40 R^{19} is methoxy or ethoxy, which carry one of the following
radicals: hydroxyl, carboxyl, C_1 - C_4 -alkoxycarbonyl, amino,
 $NH(C_1-C_4-alkyl)$, $N(C_1-C_4-alkyl)_2$, carboxamide or
 $CON(C_1-C_4-alkyl)_2$.

45

The compounds of the present invention offer a novel therapeutic potential for the treatment of hypertension, high pulmonary pressure, myocardial infarct, angina pectoris, arrhythmia, acute/chronic kidney failure, chronic cardiac insufficiency, renal insufficiency, cerebral vasospasms, cerebral ischemia, subarachnoid hemorrhages, migraine, asthma, atherosclerosis, endotoxic shock, endotoxin-induced organ failure, intravascular coagulation, restenosis after angioplasty and bypass operations, benign prostate hyperplasia, kidney failure or hypertension caused by ischemia and by intoxication, metastasis and growth of mesenchymal tumors such as prostate carcinoma, contrast agent-induced kidney failure, pancreatitis, gastrointestinal ulcers.

The invention further relates to combinations of endothelin receptor antagonists of the formula I and inhibitors of the renin-angiotension system. Inhibitors of the renin-angiotension system are renin inhibitors, angiotension II antagonists and angiotension-converting enzyme (ACE) inhibitors. Combinations of endothelin receptor antagonists of the formula I and ACE inhibitors are preferred.

The invention further relates to combinations of endothelin receptor antagonists of the formula I and calcium antagonists such as verapamil.

The invention further relates to combinations of endothelin receptor antagonists of the formula I and beta-blockers.

The invention further relates to combinations of endothelin receptor antagonists of the formula I and diuretics.

The invention further relates to combinations of endothelin receptor antagonists of the formula I and substances which block the action of VEGF (vascular endothelial growth factor). Such substances are, for example, antibodies directed against VEGF or specific binding proteins or alternatively low molecular weight substances which can specifically inhibit VEGF release or receptor binding.

The abovementioned combinations can be administered simultaneously or sequentially. They can be employed both in a single pharmaceutical formulation or alternatively in separate formulations. The administration form can also be different, for

18

example the endothelin receptor antagonists can be administered orally and VEGF inhibitors parenterally.

5 These combination preparations are especially suitable for the treatment and prevention of hypertension and its sequelae and also for the treatment of cardiac insufficiency.

10 The good action of the compounds can be seen in the following experiments:

Receptor binding studies

15 For binding studies, cloned human ET_A or ET_B receptor-expressing CHO cells were employed.

Membrane preparation

20 The ET_A or ET_B receptor-expressing CHO cells were proliferated in DMEM NUT MIX F₁₂ medium (Gibco, No. 21331-020) using 10% fetal calf serum (PAA Laboratories GmbH, Linz, No. A15-022), 1 mM glutamine (Gibco No. 25030-024), 100 U/ml of penicillin and 100 µg/ml of streptomycin (Gibco, Sigma No P-0781). After 25 48 hours, the cells were washed with PBS and incubated at 37°C for 5 minutes with 0.05% trypsin-containing PBS. Neutralization with medium was then carried out and the cells were collected by centrifugation at 300 x g.

30 For the membrane preparation, the cells were adjusted to a concentration of 10⁸ cells/ml of buffer (50 mM tris-HCl buffer, pH 7.4) and then disintegrated by means of ultrasound Branson Sonifier 250, 40-70 seconds/constant/output [sic] 20).

35 Binding tests

For the ET_A and ET_B receptor binding test, the membranes were suspended in incubation buffer (50 mM tris HCl, pH 7.4 with 5 mM MnCl₂, 40 mg/ml of bacitracin and 0.2% BSA) in a 40 concentration of 50 µg of protein per test batch and incubated at 25°C with 25 pM [¹²⁵I]-ET₁ (ET_A receptor test) or 25 pM [¹²⁵I]-ET₃ (ET_B receptor test) in the presence or absence of test substance. The nonspecific binding was determined with 10⁻⁷ M ET₁. After 30 min, the free and the bound radioligand were separated by 45 filtration through GF/B glass fiber filters (Whatman, England) on a Skatron cell collector (Skatron, Lier, Norway) and the filters were washed with ice-cold tris HCl buffer, pH 7.4 with 0.2% BSA.

19

The radioactivity collected on the filters was quantified using a Packard 2200 CA liquid scintillation counter.

Testing of the ET antagonists in vivo:

5

Male SD rats weighing 250 - 300 g were anesthetized with amobarbital, artificially ventilated, vagotomized and pithed. The carotid artery and jugular vein were catheterized.

10

In control animals, the intravenous administration of 1 mg/kg of ET1 leads to a clear blood pressure rise, which lasts for a relatively long period.

15 The test animals were injected i.v. (1 ml/kg) with the test compounds 30 min before ET1 administration. To determine the ET-antagonistic properties, the blood pressure changes in the test animals were compared with the those in the control animals.

20 p.o. Testing of the mixed ET_A and ET_B antagonists:

Male normotonic rats (Sprague Dawley, Janvier) weighing 250-350 g are orally pretreated with the test substances. 80 minutes later, the animals are anesthetized with urethane and the carotid artery is catheterized (for blood pressure measurement) and also the jugular vein (administration of big endothelin/endothelin 1).

After a stabilization phase, big endothelin (20 µg/kg, admr. vol. 0.5 ml/kg) or ET1 (0.3 µg/kg, admr. vol. 0.5 ml/kg) is given intravenously. Blood pressure and heart rate are recorded continuously for 30 minutes. The clear and long-lasting blood pressure changes are calculated as the area under the curve (AUC). To determine the antagonistic action of the test substances, the AUC of the substance-treated animals is compared with the AUC of the control animals.

The compounds according to the invention can be administered orally or parentally (subcutaneously, intravenously, intramuscularly, intraperitoneally) in a customary manner. Administration can also be carried out through the nasopharynx using vapors or sprays.

The dose depends on the age, condition and weight of the patient and also on the manner of administration. As a rule, the daily active compound dose is from approximately 0.5 to 100 mg/kg of body weight in the case of oral administration and from

20

approximately 0.1 to 10 mg/kg of body weight in the case of parenteral administration.

5 The novel compounds can be administered in solid or liquid form in the conventional pharmaceutical administration forms, e.g. as tablets, film-coated tablets, capsules, powders, granules, coated tablets, suppositories, solutions, ointments, creams or sprays. These are prepared in a customary manner. The active compounds can in this case be processed with the customary pharmaceutical
10 auxiliaries such as tablet binders, fillers, preservatives, tablet disintegrants, flow-regulating agents, plasticizers, wetting agents, dispersants, emulsifiers, solvents, release-delaying agents, antioxidants and/or propellants (cf. H. Sucker et al.: Pharmazeutische Technologie [Pharmaceutical
15 Technology], Thieme-Verlag, Stuttgart, 1991). The application forms thus obtained normally contain the active compound in an amount from 0.1 to 90% by weight.

20 Synthesis examples

Example 1:

2-Methylsulfonyl-4,5-dimethylthiazole

25

2.7 g of 2-methylmercapto-4,5-dimethylthiazole were initially introduced into methylene chloride at ice temperature and 5.9 g of mCPBA were added. The batch was stirred at room temperature for 16 hours and then extracted once with sodium hydrogen-
30 carbonate solution and with sodium thiosulfate solution. The organic phase was dried over magnesium sulfate, the solvent was distilled off and 2.88 g of oil were isolated, which were directly employed further.

35 $^1\text{H-NMR}$ (200 MHz): 3.25 ppm (3 H, s), 2.50 (3 H, s), 2.40 (3 H, s).

ESI-MS: $\text{M}^+ = 191$

40 Example 2:

2-Methylmercapto-4,5-cyclopentenothiazole

45 10.4 g of ammonium dithiocarbamate were initially introduced into ethanol and 7.5 g of 2-chlorocyclopentanone were added. After 30 minutes, the reaction was complete and the reaction mixture was added to water. The aqueous phase was rendered strongly

21

alkaline using sodium hydroxide solution, extracted with methylene chloride and then adjusted to pH 2 using concentrated hydrochloric acid. The aqueous phase was extracted with ethyl acetate, the organic phase was dried with magnesium sulfate and the solvent was distilled off. The residue was taken up in toluene, a spatula tipful of p-toluenesulfonic acid was added and the solvent was distilled off at 60°C. 7.9 g of oil were dissolved in 75 ml of water and 2.4 g of NaOH and 5.7 ml of dimethyl sulfate were rapidly added dropwise. After one hour, the reaction was complete and the mixture was added to water. The aqueous phase was extracted with ether, the organic phase was dried with magnesium sulfate and the solvent was distilled off. The residue was employed in the following reaction without further purification.

15

Example 3:

2-Methylsulfonyl-4,5-cyclopentenothiazole

20

1.9 g of 2-methylmercapto-4,5-cyclopentenothiazole were initially introduced at ice temperature into methylene chloride and 7.3 g of mCPBA were added. The batch was stirred at room temperature for 16 hours and then extracted once with 1 N sodium hydroxide solution and with sodium thiosulfate solution. The organic phase was dried over magnesium sulfate, the solvent was distilled off and 2.25 g of oil were isolated, which were directly employed further.

30 ¹H-NMR (200 MHz): 3.26 ppm (3 H, s), 3.05 (2 H, dd), 2.95 (2 H, dd), 2.55 (2 H, dddd).

ESI-MS: M⁺ = 203

35

Example 4:

2-Methylsulfonyl-4,5-dimethyloxazole

40 3 g of 2-methylthio-4,5-dimethyloxazole were dissolved in 100 ml of methylene chloride and 13 g of mCPBA were added at ice temperature. The batch was stirred for three hours and then added to sodium thiosulfate solution. It was neutralized with sodium hydrogencarbonate and the product was extracted with methylene chloride. After drying over magnesium sulfate, the solvent was

22

distilled off and 2 g of crude product were isolated, which it was directly possible to employ further.

¹H-NMR (200 MHz): 3.30 ppm (3 H, s), 2.35 (3 H, s), 2.15 (3 H, s).

5 ESI-MS: M⁺ = 175

Example 5:

10 (S)-2-(4,5-Dimethylthiazol-2-yloxy)-3-methoxy-3,3-diphenylpropionic acid (I-1)

320 mg of 55% NaH were added to an initial mixture of 1 g of S-2-hydroxy-3-methoxy-3,3-diphenylpropionic acid in 20 ml of THF/
15 20 ml of DMF and the mixture was stirred for 15 minutes. 700 mg of 2-methylsulfonyl-4,5-dimethylthiazole were added to this mixture and it was stirred at room temperature for 16 hours. The batch was then treated with water, the mixture was acidified with citric acid and the product was extracted with ether. After
20 drying over magnesium sulfate and distilling off the solvent, it was purified chromatographically and the product was crystallized from ether/n-hexane. 522 mg of crystals were isolated.

25 ¹H-NMR (200 MHz): 7.35-7.20 ppm (10 H, m), 6.25 (1 H, s), 3.30 (3 H, s), 2.25 (3 H, s), 2.20 (3 H, s).

ESI-MS: M⁺ = 383

30 Example 6:

2-(4,5-Cyclopentenothiazol-2-yloxy)-3-(2-(3,4-dimethoxyphenyl)-ethoxy)-3,3-diphenylpropionic acid (I-17)

35 ¹H-NMR (200 MHz): 7.30-7.20 ppm (10 H, m), 6.80-6.60 (3 H, m), 6.25 (1 H, s), 3.85 (3 H, s), 3.80 (3 H, s), 3.70-3.40 (2 H, m), 2.9-2.6 (4 H, m), 2.30-2.25 (2 H, m).

40 ESI-MS: M⁺ = 545

2-(4,5-Dimethyloxazol-2-yloxy)-3-(2-(3,4-dimethoxyphenyl)-ethoxy)-3,3-diphenylpropionic acid (I-15)

45

23

¹H-NMR (200 MHz): 7.30-7.20 ppm (10 H, m), 6.80-6.60 (3 H, m), 6.00 (1 H, s), 3.85 (3 H, s), 3.80 (3 H, s), 3.70-3.40 (2 H, m), 2.80 (2 H, tr), 2.10 (3 H, s), 1.90 (3 H, s).

5 ESI-MS: M⁺ = 517

(S)-2-(Benzothiazol-2-yloxy)-3-methoxy-3,3-diphenylpropionic acid (I-6)

10

¹H-NMR (200 MHz): 7.70-7.50 (2 H, m), 7.35-7.20 (12 H, m), 6.50 (1 H, s), 3.30 (3 H, s).

ESI-MS: M⁺ = 405

15

(S)-2-(4,5-Cyclopentenothiazol-2-yloxy)-3-methoxy-3,3-diphenylpropionic acid (I-5)

20

¹H-NMR (200 MHz): 7.50-7.20 ppm (10 H, m), 6.40 (1 H, s), 3.30 (3 H, s), 2.80-2.60 (4 H, m), 2.30 (2 H, m).

ESI-MS: M⁺ = 395

25 (S)-2-(4,5-Dimethylthiazol-2-yloxy)-3-methoxy-3,3-diphenylpropionic acid (I-4)

30

¹H-NMR (200 MHz): 7.50-7.20 ppm (10 H, m), 6.10 (1 H, s), 3.25 (3 H, s), 2.1 (3H, s), 1.90 (3 H, s).

ESI-MS: M⁺ = 367

35 2-(4,5-Dimethylthiazol-2-yloxy)-3-(2-(3,4-dimethoxyphenyl)-ethoxy)-3,3-diphenylpropionic acid (I-13)

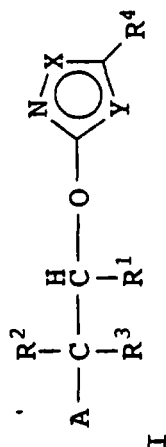
40

¹H-NMR (200 MHz): 7.30-7.20 ppm (10 H, m), 6.70-6.50 (3 H, m), 6.20 (1 H, s), 3.90 (3 H, s), 3.85 (3 H, s), 3.70-3.40 (2 H, m), 2.80 (2 H, tr), 2.20 (3 H, s), 1.15 (3 H, s).

ESI-MS: M⁺ = 533.

45 The compounds in Table I can be prepared similarly or as described in the general section.

Table I



No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-1	COOH	phenyl	MeO	CMe	Me	S
I-2	COOH	4-Cl-phenyl	MeO	CMe	Me	S
I-3	COOH	4-F-phenyl	MeO	CMe	Me	S
I-4	COOH	phenyl	MeO	CMe	Me	O
I-5	COOH	phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-6	COOH	phenyl	MeO	C-CH=CH-CH=CH		S
I-7	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-8	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-9	COOH	4-F-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-10	COOH	4-Cl-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-11	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-12	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-13	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-14	COOH	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-15	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-16	COOH	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-17	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-18	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-19	COOH	phenyl	(4-MeO-phenyl)CH ₂ O	CMe	Me	S
I-20	COOH	4-F-phenyl	(4-MeO-phenyl)CH ₂ O	CMe	Me	S
I-21	COOH	4-Cl-phenyl	(4-MeO-phenyl)CH ₂ O	CMe	Me	S
I-22	COOH	phenyl	(4-MeO-phenyl)CH ₂ O	CMe	Me	O
I-23	COOH	phenyl	(4-MeO-phenyl)CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-24	COOH	phenyl	(4-MeO-phenyl)CH ₂ O	C-CH=CH-CH=CH		S
I-25	COOH	phenyl	(4-MeO-phenyl)O	CMe	Me	S
I-26	COOH	phenyl	(4-MeO-phenyl)O	CMe	Me	O
I-27	COOH	phenyl	(4-MeO-phenyl)O	C-CH ₂ -CH ₂ -CH ₂		S
I-28	COOH	phenyl	(4-MeO-phenyl)O	C-CH=CH-CH=CH		S
I-29	COOH	phenyl	(3-MeO-4-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-30	COOH	4-Cl-phenyl	(3-MeO-4-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-31	COOH	phenyl	(3-MeO-4-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-32	COOH	4-F-phenyl	(3-MeO-4-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-33	COOH	phenyl	(3-MeO-4-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-34	COOH	phenyl	(3-MeO-4-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-35	COOH	4-F-phenyl	(3-MeO-4-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-36	COOH	phenyl	(3-MeO-4-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-37	COOH	phenyl	(3-MeO-4-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-38	COOH	4-Cl-phenyl	(3-MeO-4-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-39	COOH	phenyl	(3-MeO-4-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-40	COOH	phenyl	(3-MeO-4-Me ₂ NOCCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-41	COOH	phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-42	COOH	4-F-phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-43	COOH	4-Cl-phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-44	COOH	phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-45	COOH	phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-46	COOH	phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-47	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-48	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-49	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-50	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-51	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ O	CMe	Me	S
I-52	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ O	CMe	Me	O
I-53	COOH	4-F-phenyl	(4-HO ₂ C-phenyl)CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-54	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-55	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ O	C-CH=CH-CH=CH		S
I-56	COOH	phenyl	(4-Me-phenyl)O	CMe	Me	S
I-57	COOH	4-F-phenyl	(4-Me-phenyl)O	CMe	Me	S
I-58	COOH	4-Cl-phenyl	(4-Me-phenyl)O	CMe	Me	S
I-59	COOH	phenyl	(4-Me-phenyl)O	CMe	Me	O
I-60	COOH	phenyl	(4-Me-phenyl)O	C-CH ₂ -CH ₂ -CH ₂		S
I-61	COOH	phenyl	(4-Me-phenyl)O	C-CH=CH-CH=CH		S
I-62	COOH	phenyl	(4-Me-phenyl)CH ₂ O	CMe	Me	S
I-63	COOH	phenyl	(4-Me-phenyl)CH ₂ O	CMe	Me	O
I-64	COOH	phenyl	(4-Me-phenyl)CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-65	COOH	4-F-phenyl	(4-Me-phenyl)CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-66	COOH	phenyl	(4-Me-phenyl)CH ₂ O	C-CH=CH-CH=CH		S
I-67	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-68	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-69	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-70	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-71	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-72	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-73	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-74	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-75	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-76	COOH	4-Cl-phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-77	COOH	4-F-phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-78	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-79	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-80	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-81	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-82	COOH	4-F-phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-83	COOH	4-Cl-phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-84	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-85	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-86	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-87	COOH	phenyl	(3-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-88	COOH	phenyl	(3-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-89	COOH	phenyl	(3-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-90	COOH	phenyl	(3-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-91	COOH	phenyl	N-Me-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-92	COOH	4-F-phenyl	N-Me-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-93	COOH	4-Cl-phenyl	N-Me-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-94	COOH	phenyl	N-Me-N-phenyl-NOCCH ₂ O	CMe	Me	O
I-95	COOH	phenyl	N-Me-N-phenyl-NOCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-96	COOH	phenyl	N-Me-N-phenyl-NOCCH ₂ O	C-CH=CH-CH=CH		S
I-97	COOH	phenyl	N-Bu-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-98	COOH	4-F-phenyl	N-Bu-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-99	COOH	4-Cl-phenyl	N-Bu-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-100	COOH	phenyl	N-Bu-N-phenyl-NOCCH ₂ O	CMe	Me	O
I-101	COOH	phenyl	N-Bu-N-phenyl-NOCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-102	COOH	phenyl	N-Bu-N-phenyl-NOCCH ₂ O	C-CH=CH-CH=CH		S
I-103	COOH	phenyl	Bu ₂ NOCCH ₂ O	CMe	Me	S
I-104	COOH	phenyl	Bu ₂ NOCCH ₂ O	CMe	Me	S
I-105	COOH	4-F-phenyl	Bu ₂ NOCCH ₂ O	CMe	Me	S
I-106	COOH	4-Cl-phenyl	Bu ₂ NOCCH ₂ O	CMe	Me	O
I-107	COOH	phenyl	Bu ₂ NOCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-108	COOH	phenyl	Bu ₂ NOCCH ₂ O	C-CH=CH-CH=CH		S
I-109	COOH	phenyl	phenyl-HNOCCH ₂ O	CMe	Me	S
I-110	COOH	4-Cl-phenyl	phenyl-HNOCCH ₂ O	CMe	Me	S
I-111	COOH	4-F-phenyl	phenyl-HNOCCH ₂ O	CMe	Me	S
I-112	COOH	phenyl	phenyl-HNOCCH ₂ O	CMe	Me	O
I-113	COOH	phenyl	phenyl-HNOCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-114	COOH	phenyl	phenyl-HNOCCH ₂ O	C-CH=CH-CH=CH		S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-115	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCl ₂ O	CMe	Me	S
I-116	COOH	4-Cl-phenyl	(2,6-diethyl-phenyl)-HNOCCl ₂ O	CMe	Me	S
I-117	COOH	4-F-phenyl	(2,6-diethyl-phenyl)-HNOCCl ₂ O	CMe	Me	S
I-118	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCl ₂ O	CMe	Me	O
I-119	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCl ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-120	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCl ₂ O	C-CH=CH-CH=CH		S
I-121	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	CMe	Me	S
I-122	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	CMe	Me	O
I-123	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-124	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	C-CH=CH-CH=CH		S
I-125	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	CMe	Me	S
I-126	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	CMe	Me	O
I-127	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-128	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCl ₂ O	C-CH=CH-CH=CH		S
I-129	COOH	phenyl	Me	CMe	Me	S
I-130	COOH	4-F-phenyl	Me	CMe	Me	S
I-131	COOH	4-Cl-phenyl	Me	CMe	Me	S
I-132	COOH	phenyl	Me	CMe	Me	O
I-133	COOH	phenyl	Me	C-CH ₂ -CH ₂ -CH ₂		S
I-134	COOH	phenyl	Me	C-CH=CH-CH=CH		S
I-135	COOH	phenyl	MeS	CMe	Me	S
I-136	COOH	4-F-phenyl	MeS	CMe	Me	S
I-137	COOH	4-Cl-phenyl	MeS	CMe	Me	S
I-138	COOH	phenyl	MeS	CMe	Me	O
I-139	COOH	4-F-phenyl	MeS	C-CH ₂ -CH ₂ -CH ₂		S

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No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-140	COOH	phenyl	MeS	C-CH ₂ -CH ₂ -CH ₂		S
I-141	COOH	phenyl	MeS	C-CH=CH-CH=CH		S
I-142	COOH	phenyl	CH ₃ CONH	CMe	Me	S
I-143	COOH	4-F-phenyl	CH ₃ CONH	CMe	Me	S
I-144	COOH	4-Cl-phenyl	CH ₃ CONH	CMe	Me	S
I-145	COOH	phenyl	CH ₃ CONH	CMe	Me	O
I-146	COOH	phenyl	CH ₃ CONH	C-CH ₂ -CH ₂ -CH ₂		S
I-147	COOH	phenyl	CH ₃ CONH	C-CH=CH-CH=CH		S
I-148	COOH	phenyl	(CH ₃) ₃ CCONH	CMe	Me	S
I-149	COOH	4-F-phenyl	(CH ₃) ₃ CCONH	CMe	Me	S
I-150	COOH	4-Cl-phenyl	(CH ₃) ₃ CCONH	CMe	Me	S
I-151	COOH	phenyl	(CH ₃) ₃ CCONH	CMe	Me	O
I-152	COOH	phenyl	(CH ₃) ₃ CCONH	C-CH ₂ -CH ₂ -CH ₂		S
I-153	COOH	phenyl	(CH ₃) ₃ CCONH	C-CH=CH-CH=CH		S
I-154	COOH	phenyl	(-CH ₂ CH ₂ -)CHCONH	CMe	Me	S
I-155	COOH	phenyl	(-CH ₂ CH ₂ -)CHCONH	CMe	Me	O
I-156	COOH	phenyl	(-CH ₂ CH ₂ -)CHCONH	C-CH ₂ -CH ₂ -CH ₂		S
I-157	COOH	phenyl	(-CH ₂ CH ₂ -)CHCONH	C-CH=CH-CH=CH		S
I-158	COOH	phenyl	Et	CMe	Me	S
I-159	COOH	phenyl	Et	CMe	Me	O
I-160	COOH	phenyl	Et	C-CH ₂ -CH ₂ -CH ₂		S
I-161	COOH	phenyl	Et	C-CH=CH-CH=CH		S
I-162	COOH	phenyl	phenyl-CH ₂ CH ₂ S	CMe	Me	S
I-163	COOH	phenyl	phenyl-CH ₂ CH ₂ S	CMe	Me	O
I-164	COOH	phenyl	phenyl-CH ₂ CH ₂ S	C-CH ₂ -CH ₂ -CH ₂		S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-165	COOH	phenyl	phenyl-CH ₂ CH ₂ S	C-CH=CH-CH=CH		S
I-166	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-167	COOH	4-Cl-phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-168	COOH	4-F-phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-169	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-170	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-171	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-172	CONHISO ₂ Me	phenyl	Me	CMe	Me	S
I-173	CONHISO ₂ Me	4-F-phenyl	Me	CMe	Me	S
I-174	CONHISO ₂ Me	4-Cl-phenyl	Me	CMe	Me	S
I-175	CONHISO ₂ Me	phenyl	Me	CMe	Me	O
I-176	CONHISO ₂ Me	phenyl	Me	C-CH ₂ -CH ₂ -CH ₂		S
I-177	CONHISO ₂ Me	phenyl	Me	C-CH=CH-CH=CH		S
I-178	CONHISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-179	CONHISO ₂ Me	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-180	CONHISO ₂ Me	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-181	CONHISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-182	CONHISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-183	CONHISO ₂ Me	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-184	CONHISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-185	COOH	phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-186	COOH	phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-187	COOH	phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-188	COOH	phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-189	COOH	phenyl	HOCH ₂ (HOCH)CH ₂ O	CMe	Me	S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-190	COOH		HOCH ₂ (HOCH) ₂ CH ₂ O	CMe	Me	S
I-191	COOH	4-F-phenyl	HOCH ₂ (HOCH) ₂ CH ₂ O	CMe	Me	S
I-192	COOH	4-Cl-phenyl	HOCH ₂ (HOCH) ₂ CH ₂ O	CMe	Me	O
I-193	COOH	phenyl	HOCH ₂ (HOCH) ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂ -CH ₂		S
I-194	COOH	phenyl	HOCH ₂ (HOCH) ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-195	COOH	phenyl	HOCCCH ₂ O	CMe	Me	S
I-196	COOH	phenyl	HOCCCH ₂ O	CMe	Me	O
I-197	COOH	phenyl	HOCCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂ -CH ₂		S
I-198	COOH	phenyl	HOCCCH ₂ O	C-CH=CH-CH=CH		S
I-199	CONHSO ₂ Me	phenyl	MeO	CMe	Me	S
I-200	CONHSO ₂ Me	4-F-phenyl	MeO	CMe	Me	S
I-201	CONHSO ₂ Me	4-Cl-phenyl	MeO	CMe	Me	S
I-202	CONHSO ₂ Me	phenyl	MeO	CMe	Me	O
I-203	CONHSO ₂ Me	phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂ -CH ₂		S
I-204	CONHSO ₂ Me	phenyl	MeO	C-CH=CH-CH=CH		S
I-205	COOH	phenyl	(4-EtO-3-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-206	COOH	phenyl	(4-EtO-3-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-207	COOH	phenyl	(4-EtO-3-MeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂ -CH ₂		S
I-208	COOH	phenyl	(4-EtO-3-MeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-209	COOH	phenyl	EtOCCCH ₂ O	CMe	Me	S
I-210	COOH	phenyl	EtOCCCH ₂ O	CMe	Me	O
I-211	COOH	phenyl	EtOCCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂ -CH ₂		S
I-212	COOH	phenyl	EtOCCCH ₂ O	C-CH=CH-CH=CH		S
I-213	COOH	phenyl	(3-MeO-4-EtO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-214	COOH	phenyl	(3-MeO-4-EtO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	CMe	Me	O

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-215	COOH	phenyl	(3-MeO-4-EtO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-216	COOH	phenyl	(3-MeO-4-EtO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-217	COOMe	phenyl	MeO	CMe	Me	S
I-218	COOMe	phenyl	MeO	CMe	Me	O
I-219	COOMe	phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-220	COOMe	phenyl	MeO	C-CH=CH-CH=CH		S
I-221	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-222	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	O
I-223	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-224	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-225	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-226	COOH	4-Cl-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-227	COOH	4-F-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-228	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	O
I-229	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-230	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-231	COOH	phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-232	COOH	4-F-phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-233	COOH	4-Cl-phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-234	COOH	phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	O
I-235	COOH	phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-236	COOH	phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-237	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-238	COOH	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-239	COOH	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-240	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	O
I-241	COOH	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-242	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-243	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-244	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	S
I-245	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ CH ₂ O	CMe	Me	O
I-246	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-247	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-248	CONISO ₂ phenyl	phenyl	MeO	CMe	Me	S
I-249	CONISO ₂ phenyl	4-F-phenyl	MeO	CMe	Me	S
I-250	CONISO ₂ phenyl	4-Cl-phenyl	MeO	CMe	Me	S
I-251	CONISO ₂ phenyl	phenyl	MeO	CMe	Me	O
I-252	CONISO ₂ phenyl	4-F-phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-253	CONISO ₂ phenyl	4-Cl-phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-254	CONISO ₂ phenyl	phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-255	CONISO ₂ phenyl	phenyl	MeO	C-CH=CH-CH=CH		S
I-256	CONISO ₂ phenyl	phenyl	Me	CMe	Me	S
I-257	CONISO ₂ phenyl	4-F-phenyl	Me	CMe	Me	S
I-258	CONISO ₂ phenyl	4-Cl-phenyl	Me	CMe	Me	S
I-259	CONISO ₂ phenyl	phenyl	Me	CMe	Me	O
I-260	CONISO ₂ phenyl	phenyl	Me	C-CH ₂ -CH ₂ -CH ₂		S
I-261	CONISO ₂ phenyl	phenyl	Me	C-CH=CH-CH=CH		S
I-262	CONISO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-263	CONISO ₂ phenyl	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-264	CONISO ₂ phenyl	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-265	CONHSO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-266	CONHSO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-267	CONHSO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-268	CONHSO ₂ phenyl	phenyl	N-Me-N-phenyl-NOCCH ₂ O	CMe	Me	S
I-269	CONHSO ₂ phenyl	phenyl	N-Me-N-phenyl-NOCCH ₂ O	CMe	Me	O
I-270	CONHSO ₂ phenyl	phenyl	N-Me-N-phenyl-NOCCH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-271	CONHSO ₂ phenyl	phenyl	N-Me-N-phenyl-NOCCH ₂ O	C-CH=CH-CH=CH		S
I-272	COOH	phenyl	(4-Me-phenyl)O	CMe	Me	S
I-273	COOH	phenyl	(4-Me-phenyl)O	CMe	Me	O
I-274	COOH	phenyl	(4-Me-phenyl)O	C-CH ₂ -CH ₂ -CH ₂		S
I-275	COOH	phenyl	(4-Me-phenyl)O	C-CH=CH-CH=CH		S
I-276	COOH	4-F-phenyl	MeO	S	Me	CH
I-277	COOH	4-Cl-phenyl	MeO	S	Me	CH
I-278	COOH	phenyl	MeO	O	Me	CMe
I-279	COOH	phenyl	MeO	S	Me	CH
I-280	COOH	phenyl	MeO	O	Me	CH
I-281	COOH	4-F-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-282	COOH	4-Cl-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-283	COOH	4-Cl-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-284	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-285	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-286	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-287	COOH	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-288	COOH	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-289	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-290	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-291	COOH	phenyl	(4-MeO-phenyl)CH ₂ O	S	Me	CH
I-292	COOH	phenyl	(4-MeO-phenyl)CH ₂ O	O	Me	CH
I-293	COOH	phenyl	(4-MeO-phenyl) O	S	Me	CH
I-294	COOH	phenyl	(4-MeO-phenyl) O	O	Me	CH
I-295	COOH	phenyl	(3-MeO-4-HO ₂ CCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-296	COOH	phenyl	(3-MeO-4-HO ₂ CCl ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-297	COOH	4-F-phenyl	(3-MeO-4-HO ₂ CCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-298	COOH	4-Cl-phenyl	(3-MeO-4-HO ₂ CCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-299	COOH	phenyl	(3-MeO-4-HO ₂ CCl ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-300	COOH	phenyl	(3-MeO-4-Me ₂ NOCCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-301	COOH	phenyl	(3-MeO-4-Me ₂ NOCCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CMe
I-302	COOH	4-F-phenyl	(3-MeO-4-Me ₂ NOCCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-303	COOH	4-Cl-phenyl	(3-MeO-4-Me ₂ NOCCl ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-304	COOH	phenyl	(3-MeO-4-Me ₂ NOCCl ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-305	COOH	phenyl	(3-MeO-4-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-306	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-307	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-308	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ O	S	Me	CH
I-309	COOH	phenyl	(4-HO ₂ C-phenyl)CH ₂ O	O	Me	CH
I-310	COOH	phenyl	(4-Me-phenyl)O	S	Me	CH
I-311	COOH	phenyl	(4-Me-phenyl)O	O	Me	CH
I-312	COOH	phenyl	(4-Me-phenyl)CH ₂ O	S	Me	CH
I-313	COOH	phenyl	(4-Me-phenyl)CH ₂ O	O	Me	CH
I-314	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ O	S	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-315	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-316	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-317	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-318	COOH	4-F-phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-319	COOH	4-Cl-phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-320	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-321	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-322	COOH	phenyl	(3-HO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-323	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-324	COOH	4-F-phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-325	COOH	4-Cl-phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-326	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-327	COOH	phenyl	(3-Me ₂ NOCCCH ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-328	COOH	phenyl	(3-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-329	COOH	phenyl	(3-Me ₂ NCH ₂ CH ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-330	COOH	phenyl	N-Me-N-phenyl-NOCCCH ₂ O	S	Me	CH
I-331	COOH	4-F-phenyl	N-Me-N-phenyl-NOCCCH ₂ O	S	Me	CH
I-332	COOH	4-Cl-phenyl	N-Me-N-phenyl-NOCCCH ₂ O	S	Me	CH
I-333	COOH	phenyl	N-Me-N-phenyl-NOCCCH ₂ O	O	Me	CMe
I-334	COOH	phenyl	N-Me-N-phenyl-NOCCCH ₂ O	O	Me	CH
I-335	COOH	phenyl	N-Bu-N-phenyl-NOCCCH ₂ O	S	Me	CH
I-336	COOH	phenyl	N-Bu-N-phenyl-NOCCCH ₂ O	O	Me	CH
I-337	COOH	phenyl	Bu ₂ NOCCCH ₂ O	S	Me	CH
I-338	COOH	4-F-phenyl	Bu ₂ NOCCCH ₂ O	S	Me	CH
I-339	COOH	4-Cl-phenyl	Bu ₂ NOCCCH ₂ O	S	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-340	COOH	phenyl	Bu ₂ NOCCH ₂ O	O	Me	CMe
I-341	COOH	phenyl	Bu ₂ NOCCH ₂ O	O	Me	CH
I-342	COOH	phenyl	phenyl-HNOCCH ₂ O	S	Me	CH
I-343	COOH	phenyl	phenyl-HNOCCH ₂ O	O	Me	CH
I-344	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCH ₂ O	S	Me	CH
I-345	COOH	4-F-phenyl	(2,6-diethyl-phenyl)-HNOCCH ₂ O	S	Me	CH
I-346	COOH	4-Cl-phenyl	(2,6-diethyl-phenyl)-HNOCCH ₂ O	S	Me	CH
I-347	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCH ₂ O	O	Me	CMe
I-348	COOH	phenyl	(2,6-diethyl-phenyl)-HNOCCH ₂ O	O	Me	CH
I-349	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCH ₂ O	S	Me	CH
I-350	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCH ₂ O	O	Me	CH
I-351	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCH ₂ O	S	Me	CH
I-352	COOH	phenyl	(-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -)NOCCH ₂ O	O	Me	CH
I-353	COOH	phenyl	Me	S	Me	CH
I-354	COOH	4-F-phenyl	Me	S	Me	CH
I-355	COOH	4-Cl-phenyl	Me	S	Me	CH
I-356	COOH	phenyl	Me	O	Me	CMe
I-357	COOH	phenyl	Me	O	Me	CH
I-358	COOH	phenyl	MeS	S	Me	CH
I-359	COOH	phenyl	MeS	O	Me	CH
I-360	COOH	phenyl	CH ₃ CONH	S	Me	CH
I-361	COOH	4-F-phenyl	CH ₃ CONH	S	Me	CH
I-362	COOH	4-Cl-phenyl	CH ₃ CONH	S	Me	CH
I-363	COOH	phenyl	CH ₃ CONH	O	Me	CMe
I-364	COOH	phenyl	CH ₃ CONH	O	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-365	COOH	phenyl	(CH ₃) ₃ CCONH	S	Me	CH
I-366	COOH	phenyl	(CH ₃) ₃ CCONH	O	Me	CH
I-367	COOH	phenyl	(-CH ₂ CH ₂ -)CHCONH	S	Me	CH
I-368	COOH	phenyl	(-CH ₂ CH ₂ -)CHCONH	O	Me	CH
I-369	COOH	phenyl	Et	S	Me	CH
I-370	COOH	phenyl	Et	O	Me	CH
I-371	COOH	phenyl	phenyl-CH ₂ CH ₂ S	S	Me	CH
I-372	COOH	phenyl	phenyl-CH ₂ CH ₂ S	O	Me	CH
I-373	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-374	COOH	4-F-phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-375	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-376	COOH	phenyl	(4-MeS-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-377	CONISO ₂ Me	phenyl	Me	S	Me	CH
I-378	CONISO ₂ Me	4-F-phenyl	Me	S	Me	CH
I-379	CONISO ₂ Me	4-Cl-phenyl	Me	S	Me	CH
I-380	CONISO ₂ Me	phenyl	Me	O	Me	CMe
I-381	CONISO ₂ Me	phenyl	Me	O	Me	CH
I-382	CONISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-383	CONISO ₂ Me	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-384	CONISO ₂ Me	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-385	CONISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-386	CONISO ₂ Me	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-387	COOH	phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-388	COOH	4-F-phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-389	COOH	4-Cl-phenyl	(4-HO-3-MeO-phenyl)CH ₂ CH ₂ O	S	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-390	COOH	phenyl	(4-IIO-3-MeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-391	COOH	phenyl	(4-IIO-3-MeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-392	COOH	phenyl	HOCH ₂ (HOCH)CH ₂ O	O	Me	CH
I-393	COOH	phenyl	HOCH ₂ (HOCH)CH ₂ O	S	Me	CH
I-394	COOH	phenyl	HOCCCH ₂ O	O	Me	CH
I-395	COOH	phenyl	HOCCCH ₂ O	S	Me	CH
I-396	CONHISO ₂ Me	phenyl	MeO	O	Me	CH
I-397	CONHISO ₂ Me	4-F-phenyl	MeO	S	Me	CH
I-398	CONHISO ₂ Me	4-Cl-phenyl	MeO	S	Me	CH
I-399	CONHISO ₂ Me	phenyl	MeO	O	Me	CMe
I-400	CONHISO ₂ Me	phenyl	MeO	S	Me	CH
I-401	COOH	phenyl	(4-EtO-3-MeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-402	COOH	phenyl	(4-EtO-3-MeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-403	COOH	phenyl	EtOCCCH ₂ O	O	Me	CH
I-404	COOH	phenyl	EtOCCCH ₂ O	S	Me	CH
I-405	COOH	phenyl	(3-MeO-4-EtO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-406	COOH	phenyl	(3-MeO-4-EtO ₂ CCH ₂ O-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-407	COOMe	phenyl	MeO	O	Me	CH
I-408	COOMe	4-Cl-phenyl	MeO	S	Me	CH
I-409	COOMe	4-F-phenyl	MeO	S	Me	CH
I-410	COOMe	phenyl	MeO	O	Me	CMe
I-411	COOMe	phenyl	MeO	S	Me	CH
I-412	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CH
I-413	COOH	phenyl	(4-Me-phenyl)CH ₂ CH ₂ CH ₂ O	S	Me	CH
I-414	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-415	COOH	phenyl	(4-MeO-phenyl)CH ₂ CH ₂ CH ₂ O	S	Me	CH
I-416	COOH	phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CH
I-417	COOH	phenyl	(4-HOOC-phenyl)CH ₂ CH ₂ CH ₂ O	S	Me	CH
I-418	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CH
I-419	COOH	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	S	Me	CH
I-420	COOH	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	S	Me	CH
I-421	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CMe
I-422	COOH	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CH
I-423	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ CH ₂ O	S	Me	CH
I-424	COOH	phenyl	(4-Cl-phenyl)CH ₂ CH ₂ CH ₂ O	O	Me	CH
I-425	COOH	phenyl	(4-Me-phenyl)O	S	Me	CH
I-426	COOH	phenyl	(4-Me-phenyl)O	O	Me	CH
I-427	CONHSO ₂ phenyl	phenyl	MeO	O	Me	CH
I-428	CONHSO ₂ phenyl	4-F-phenyl	MeO	S	Me	CH
I-429	CONHSO ₂ phenyl	4-Cl-phenyl	MeO	S	Me	CH
I-430	CONHSO ₂ phenyl	phenyl	MeO	O	Me	CMe
I-431	CONHSO ₂ phenyl	phenyl	MeO	S	Me	CH
I-432	CONHSO ₂ phenyl	phenyl	Me	S	Me	CH
I-433	CONHSO ₂ phenyl	4-F-phenyl	Me	S	Me	CH
I-434	CONHSO ₂ phenyl	4-Cl-phenyl	Me	S	Me	CH
I-435	CONHSO ₂ phenyl	phenyl	Me	O	Me	CMe
I-436	CONHSO ₂ phenyl	phenyl	Me	O	Me	CH
I-437	CONHSO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-438	CONHSO ₂ phenyl	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-439	CONHSO ₂ phenyl	4-Cl-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-440	CONHSO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-441	CONHSO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-442	COOH	phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-443	COOH	4-F-phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-444	COOH	4-Cl-phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-445	COOH	phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-446	COOH	phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-447	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-448	COOH	4-F-phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-449	COOH	4-Cl-phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-450	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-451	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-452	COOH	phenyl	nbutyl	S	Me	CH
I-453	COOH	4-F-phenyl	nbutyl	S	Me	CH
I-454	COOH	4-Cl-phenyl	nbutyl	S	Me	CH
I-455	COOH	phenyl	nbutyl	O	Me	CMe
I-456	COOH	phenyl	nbutyl	O	Me	CH
I-457	COOH	phenyl	(cyclohexyl)CH ₂ CH ₂ O	S	Me	CH
I-458	COOH	4-F-phenyl	(cyclohexyl)CH ₂ CH ₂ O	S	Me	CH
I-459	COOH	4-Cl-phenyl	(cyclohexyl)CH ₂ CH ₂ O	S	Me	CH
I-460	COOH	phenyl	(cyclohexyl)CH ₂ CH ₂ O	O	Me	CMe
I-461	COOH	phenyl	(cyclohexyl)CH ₂ CH ₂ O	O	Me	CH
I-462	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	S	Me	CH
I-463	COOH	4-F-phenyl	(cyclopentyl)CH ₂ CH ₂ O	S	Me	CH
I-464	COOH	4-Cl-phenyl	(cyclopentyl)CH ₂ CH ₂ O	S	Me	CH

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-465	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	O	Me	CMe
I-466	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	O	Me	CH
I-467	COOH	phenyl	CH ₂ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	S	Me	CH
I-468	COOH	4-F-phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	S	Me	CH
I-469	COOH	4-Cl-phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	S	Me	CH
I-470	COOH	phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	O	Me	CMe
I-471	COOH	phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	O	Me	CH
I-472	COOH	phenyl	(3,4-dioxomethylenephenyl)CH ₂ CH ₂ O	S	Me	CH
I-473	COOH	4-F-phenyl	(3,4-dioxomethylenephenyl)CH ₂ CH ₂ O	S	Me	CH
I-474	COOH	4-Cl-phenyl	(3,4-dioxomethylenephenyl)CH ₂ CH ₂ O	S	Me	CH
I-475	COOH	phenyl	(3,4-dioxomethylenephenyl)CH ₂ CH ₂ O	O	Me	CMe
I-476	COOH	phenyl	(3,4-dioxomethylenephenyl)CH ₂ CH ₂ O	O	Me	CH
I-477	COOH	phenyl	HOCH ₂ CH ₂	S	Me	CH
I-478	COOH	4-F-phenyl	HOCH ₂ CH ₂	S	Me	CH
I-479	COOH	4-Cl-phenyl	HOCH ₂ CH ₂	S	Me	CH
I-480	COOH	phenyl	HOCH ₂ CH ₂	O	Me	CMe
I-481	COOH	phenyl	HOCH ₂ CH ₂	O	Me	CH
I-482	COOH	phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-483	COOH	4-F-phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-484	COOH	4-Cl-phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	S	Me	CH
I-485	COOH	phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CMe
I-486	COOH	phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	O	Me	CH
I-487	COOH	phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-488	COOH	4-Cl-phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-489	COOH	4-F-phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
1-490	COOH	phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
1-491	COOH	phenyl	(3,5-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
1-492	COOH	phenyl	HOCH ₂ CH ₂	CMe	Me	S
1-493	COOH	phenyl	HOCH ₂ CH ₂	CMe	Me	O
1-494	COOH	4-F-phenyl	HOCH ₂ CH ₂	CMe	Me	S
1-495	COOH	4-Cl-phenyl	HOCH ₂ CH ₂	CMe	Me	O
1-496	COOH	phenyl	HOCH ₂ CH ₂	C-CH ₂ -CH ₂ -CH ₂		S
1-497	COOH	phenyl	(3,4-dioxomethylenepheryl)CH ₂ CH ₂ O	CMe	Me	S
1-498	COOH	4-F-phenyl	(3,4-dioxomethylenepheryl)CH ₂ CH ₂ O	CMe	Me	S
1-499	COOH	phenyl	(3,4-dioxomethylenepheryl)CH ₂ CH ₂ O	CMe	Me	O
1-500	COOH	4-F-phenyl	(3,4-dioxomethylenepheryl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
1-501	COOH	phenyl	(3,4-dioxomethylenepheryl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
1-502	COOH	phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	CMe	Me	S
1-503	COOH	4-F-phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	CMe	Me	S
1-504	COOH	4-Cl-phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	CMe	Me	S
1-505	COOH	phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	CMe	Me	O
1-506	COOH	phenyl	CH ₃ CH ₂ -Z-CH=CHCH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
1-507	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	CMe	Me	S
1-508	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	CMe	Me	O
1-509	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
1-510	COOH	phenyl	(cyclopentyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
1-511	COOH	phenyl	(cyclohexyl)CH ₂ CH ₂ O	CMe	Me	S
1-512	COOH	4-Cl-phenyl	(cyclohexyl)CH ₂ CH ₂ O	CMe	Me	S
1-513	COOH	phenyl	(cyclohexyl)CH ₂ CH ₂ O	CMe	Me	O
1-514	COOH	4-F-phenyl	(cyclohexyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-515	COOH	phenyl	(cyclohexyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-516	COOH	4-F-phenyl	n-butyl	CMe	Me	S
I-517	COOH	phenyl	n-butyl	CMe	Me	S
I-518	COOH	phenyl	n-butyl	CMe	Me	O
I-519	COOH	4-Cl-phenyl	n-butyl	C-CH ₂ -CH ₂ -CH ₂		S
I-520	COOH	phenyl	n-butyl	C-CH ₂ -CH ₂ -CH ₂		S
I-521	COOH	phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-522	COOH	phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-523	COOH	4-F-phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-524	COOH	4-Cl-phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-525	COOH	phenyl	(2,3,4-TriMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-526	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-527	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-528	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-529	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-530	COOH	phenyl	(iPrO-phenyl)CH ₂ CH ₂ O	C-CH=CH-CH=CH		S
I-531	CONHSO ₂ phenyl	phenyl	MeO	CMe	Me	S
I-532	CONHSO ₂ phenyl	4-Cl-phenyl	MeO	CMe	Me	S
I-533	CONHSO ₂ phenyl	4-F-phenyl	MeO	CMe	Me	S
I-534	CONHSO ₂ phenyl	phenyl	MeO	CMe	Me	O
I-535	CONHSO ₂ phenyl	phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-536	CONHSO ₂ phenyl	phenyl	Me	CMe	Me	S
I-537	CONHSO ₂ phenyl	phenyl	Me	CMe	Me	O
I-538	CONHSO ₂ phenyl	4-F-phenyl	Me	CMe	Me	S
I-539	CONHSO ₂ phenyl	4-Cl-phenyl	Me	CMe	Me	O

No.	R ¹	R ² , R ³	A	X	R ⁴	Y
I-540	CONISO ₂ phenyl	phenyl	Me	C-CH ₂ -CH ₂ -CH ₂		S
I-541	CONISO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-542	CONISO ₂ phenyl	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-543	CONISO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O
I-544	CONISO ₂ phenyl	4-F-phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-545	CONISO ₂ phenyl	phenyl	(3,4-DiMeO-phenyl)CH ₂ CH ₂ O	C-CH ₂ -CH ₂ -CH ₂		S
I-546	COOH	phenyl, 4-Cl-phenyl	MeO	CMe	Me	S
I-547	COOH	4-Cl-phenyl, 4-F-phenyl	MeO	CMe	Me	S
I-548	COOH	4-F-phenyl, phenyl	MeO	CMe	Me	S
I-549	COOH	4-Me-phenyl, naphthyl	MeO	CMe	Me	O
I-550	COOH	2-F-phenyl, phenyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-551	COOH	2-F-phenyl, 4-Me-phenyl	MeO	C-CH=CH-CH=CH		S
I-552	COOH	naphthyl, phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	S
I-553	COOH	phenyl, 4-Cl-phenyl	CH ₃ CH ₂ O	CMe	Me	S
I-554	COOH	4-Cl-phenyl, 4-F-phenyl	CH ₃ CH ₂ O	CMe	Me	S
I-555	COOH	4-F-phenyl, phenyl	isopropylO	CMe	Me	S
I-556	COOH	naphthyl, naphthyl	MeO	CMe	Me	S
I-557	COOH	naphthyl, naphthyl	MeO	C-CH ₂ -CH ₂ -CH ₂		S
I-558	COOH	4-F-phenyl, 4-Cl-phenyl	(4-MeO-phenyl)CH ₂ CH ₂ O	CMe	Me	O

Example 7:

- 5 According to the binding test described above, receptor binding data were measured for the compounds shown below.

The results are shown in Table 2.

10 Table 2

Receptor binding data (K_i values)

15	Compound	ET _A [nM/l]	ET _B [nM/l]
	I-1	13	650
	I-15	215	485
	I-6	900	>7100
20	I-5	50	>700
	I-4	29	3100
	I-13	145	210

25

30

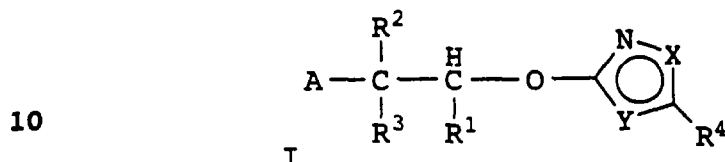
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40

45

We claim:

1. A heterocyclically substituted α -hydroxycarboxylic acid derivative



where R^1 is tetrazole or a group



where R has the following meanings:

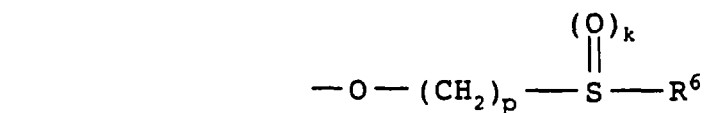
- a) a radical OR^5 , where R^5 is:

hydrogen, the cation of an alkali metal, the cation of an alkaline earth metal or a physiologically tolerable organic ammonium ion;

C_3 - C_8 -cycloalkyl, C_1 - C_8 -alkyl, CH_2 -phenyl, C_3 - C_8 -alkenyl, C_3 - C_8 -alkynyl or phenyl, in each case unsubstituted or substituted.

- b) a five-membered heteroaromatic linked via a nitrogen atom.

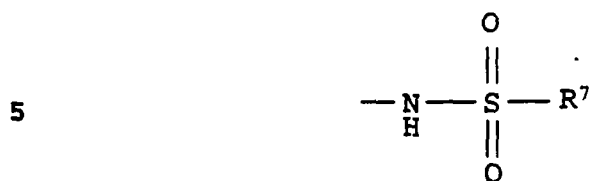
- c) a group



in which k can assume the values 0, 1 or 2, p can assume the values 1, 2, 3 or 4 and R^6 is

C_1 - C_4 -alkyl, C_3 - C_8 -cycloalkyl, C_3 - C_8 -alkenyl, C_3 - C_8 -alkynyl or unsubstituted or substituted phenyl.

d) a radical



10 where R⁷ is:

C₁-C₄-alkyl, C₃-C₈-alkenyl, C₃-C₈-alkynyl, C₃-C₈-cycloalkyl, it being possible for these radicals to carry a C₁-C₄-alkoxy, C₁-C₄-alkylthio and/or a phenyl radical;

15 C₁-C₄-haloalkyl or phenyl, which is unsubstituted or substituted.

20 A is NR⁸R⁹, azido, OR¹⁰, SR¹⁰ or C₁-C₄-alkyl

X is oxygen, sulfur, CR¹¹ or NR¹²; with the proviso that if X = CR¹¹, then Y = oxygen or sulfur or NR¹⁴;

25 Y is oxygen, sulfur, CR¹³ or NR¹⁴; with the proviso that if Y = oxygen or sulfur or NR¹⁴, then X = CR¹¹;

R² and R³ (which can be identical or different):

30 are phenyl or naphthyl, which is unsubstituted or substituted, or

35 phenyl or naphthyl, which are connected to one another in the ortho-position via a direct bond, a methylene, ethylene or ethenylene group, an oxygen or sulfur atom or an SO₂, NH or N(C₁-C₄-alkyl) group

40 C₅-C₆-cycloalkyl, which is unsubstituted or substituted;

R⁴ and R¹¹ (which can be identical or different):

45 are hydrogen, halogen, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₄-alkylthio, C₁-C₄-alkylcarbonyl, C₁-C₄-alkoxycarbonyl, hydroxyl, NH₂, NH(C₁-C₄-alkyl), N(C₁-C₄-alkyl)₂

50

C₁-C₄-alkyl, C₂-C₄-alkenyl, C₂-C₄-alkynyl, it being possible for these radicals to be unsubstituted or substituted;

5 or CR⁴, together with CR¹¹, forms a 5- or 6-membered alkylene or alkenylene ring, which can be unsubstituted or substituted, and in which in each case one or more methylene groups can be replaced by oxygen, sulfur, -NH or -N(C₁-C₄-alkyl);

10

R⁸ is hydrogen, C₁-C₈-alkyl, C₃-C₈-alkenyl, C₃-C₈-alkynyl, C₁-C₅-alkylcarbonyl, it being possible for these radicals to be unsubstituted or substituted;

15

phenyl or naphthyl, which is unsubstituted or substituted;

unsubstituted or substituted C₃-C₈-cycloalkyl;

20

or R⁸, together with R⁹, forms a C₃-C₇-alkylene chain, which can be unsubstituted or substituted and is closed to give a ring, and in which an alkylene group can be replaced by oxygen or sulfur;

25

R⁹ is hydrogen, C₁-C₄-alkyl;

or R⁹ is linked with R⁸ as indicated under R⁸ to give a ring;

30

R¹⁰ is hydrogen, C₁-C₈-alkyl, C₃-C₈-alkenyl, C₃-C₈-alkynyl, it being possible for these radicals to be unsubstituted or substituted; phenyl or naphthyl, which is unsubstituted or substituted;

35

unsubstituted or substituted C₃-C₈-cycloalkyl;

R¹² is hydrogen, C₁-C₄-alkyl;

40

or NR¹², together with CR⁴, forms a 5- or 6-membered alkylene or alkenylene ring, which can be unsubstituted or substituted, and in which in each case one or more methylene groups can be replaced by oxygen or sulfur;

45

51

R¹³ is hydrogen, halogen, C₁-C₄-alkyl, C₂-C₄-alkenyl, C₂-C₄-alkynyl, it being possible for these radicals to be unsubstituted or substituted;

R¹⁴ is hydrogen, C₁-C₄-alkyl;

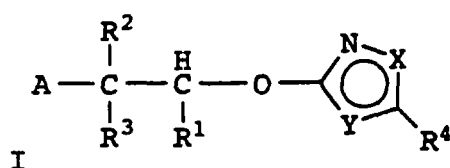
and the physiologically tolerable salts, and the possible enantiomerically pure and diastereoisomerically pure forms.

2. The use of the heterocyclically substituted α -hydroxycarboxylic acid derivatives I as claimed in claim 1 for the preparation of a medicament for treating chronic cardiac insufficiency, restenosis, high blood pressure, high pulmonary pressure, acute/chronic kidney failure, cerebral ischemia, asthma, benign prostrate hyperplasia and prostrate cancer.
3. A combination of heterocyclically substituted α -hydroxycarboxylic acid derivatives I as claimed in claim 1 and one or more active compounds selected from inhibitors of the renin-angiotensin system such as renin inhibitors, angiotensin II antagonists, angiotensin-converting enzyme (ACE) inhibitors, mixed ACE/neutral endopeptidase (NEP) inhibitors, β -blockers, diuretics, calcium antagonists and VEGF-blocking substances.
4. A pharmaceutical preparation for oral and parenteral use comprising per individual dose, in addition to the customary drug auxiliaries, at least one carboxylic acid derivative I as claimed in claim 1.
5. The use of the heterocyclically substituted α -hydroxycarboxylic acid derivatives I as claimed in claim 1 for the preparation of a medicament for inhibiting the binding of endothelin to endothelin receptors in a subject in need of such inhibition.

Novel heterocyclically substituted α -hydroxycarboxylic acid derivatives, their preparation and use as endothelin receptor antagonists

Abstract

The present invention relates to carboxylic acid derivatives of the formula I



the substituents having the meanings explained in the description, preparation and use as endothelin receptor antagonists.