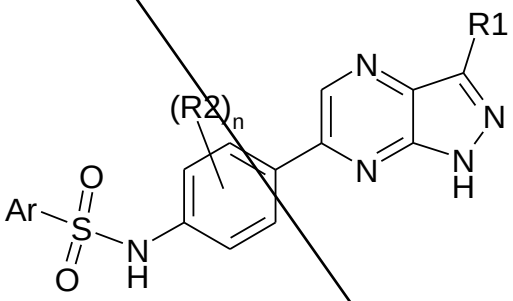
Claims

1 A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof,



I

wherein

Ar is selected from the series consisting of phenyl and a 5-membered or 6-membered monocyclic aromatic heterocycle comprising 1, 2 or 3 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur and bonded via a ring carbon atom, which are all unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0, 1 and 2;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-S(O)$_2$-R15, -N(R13)-C(O)-NH-R14, -C(O)-N(R16)-R17, -CN, (C_1-C_4)-alkyl and -(C_1-C_4)-alkyl-O-R18;

R2 is selected from the series consisting of halogen, -(C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl and -CN;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, -O-(C_1-C_4)-alkyl, -O-(C_3-C_7)-cycloalkyl,

-O-(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl-, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2, -C(O)-N(R23)-R24 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 8-membered unsaturated ring which comprises 0, 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen, -(C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl and -CN;

R11 and R12 are independently of one another selected from the series consisting of hydrogen, (C_1-C_4)-alkyl, (C_3-C_7)-cycloalkyl and -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl,

or R11 and R12, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 7-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R11 and R12, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R16 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R17 is selected from the series consisting of hydrogen, (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30,

or R16 and R17, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 7-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R16 and R17, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R18 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R19 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R20 is selected from the series consisting of hydrogen, (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30,

or R19 and R20, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 7-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R19 and R20, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl, (C_3-C_7)-cycloalkyl and -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl;

R23 and R24 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl and -CN;

Het is a monocyclic, 4-membered to 7-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

2. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to claim 1, wherein

Ar is selected from the series consisting of phenyl and a 5-membered or 6-membered monocyclic aromatic heterocycle comprising 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur and bonded via a ring carbon atom, which are all unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0, 1 and 2;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14, (C_1-C_4)-alkyl and -(C_1-C_4)-alkyl-O-R18;

R2 is selected from the series consisting of halogen, -(C_1-C_4)-alkyl and -CN;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2, -C(O)-N(R23)-R24 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 7-membered unsaturated ring which comprises 0, 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen, -(C_1-C_4)-alkyl and -CN;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl,

or R11 and R12, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R11 and R12, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein

phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R18 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R19 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R20 is selected from the series consisting of hydrogen, (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl and -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl;

or R19 and R20, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R19 and R20, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R23 and R24 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen, (C_1-C_4)-alkyl and -CN;

Het is a monocyclic, 4-membered to 7-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

3. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 and 2, wherein

Ar is selected from the series consisting of phenyl and a 5-membered or 6-membered monocyclic aromatic heterocycle comprising 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur and bonded via a ring carbon atom, which are all unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 7-membered unsaturated ring which comprises 0, 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl,

or R11 and R12, together with the nitrogen atom carrying them, form a monocyclic, 5-membered or 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R11 and R12, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R19 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R20 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

or R19 and R20, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R19 and R20, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen, (C_1-C_4)-alkyl and -CN;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

4. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 3, wherein

Ar is phenyl which is unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 7-membered unsaturated ring which comprises 0, 1 or 2 oxygen atoms as ring heteroatoms, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R19 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R20 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen and (C_1-C_4)-alkyl;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

5. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 4, wherein

Ar is selected from the series consisting of 2,3-dichloro-phenyl, 2,5-dichloro-phenyl, 5-chloro-2-hydrazino-phenyl, 5-chloro-2-cyano-phenyl, 2-cyano-5-methyl-phenyl, 2-fluoro-5-methyl-phenyl, 2-chloro-5-methoxy-phenyl, 2,5-dichloro-thiophen-3-yl, 8-chloro-3,4-dihydro-2H-benzo[b][1,4]dioxepin-7-yl, 5-chloro-1,3-dimethyl-pyrazol-4-yl, naphthalen-1-yl, 2,4,6-trichloro-phenyl, 5-chloro-2-fluoro-phenyl, 2,4,5-trifluoro-phenyl, 2,4,5-trichloro-phenyl, 5-chloro-2,4-difluoro-phenyl, 2,3,4-trichloro-phenyl, 2,3,4-trifluoro-phenyl, 2-chloro-4-trifluoromethyl-phenyl, 5-cyano-2-fluoro-phenyl, 2-cyano-5-methoxy-phenyl, 2-cyano-5-fluoro-phenyl, 2-fluoro-5-methoxy-phenyl, 4-acetylamino-2-methyl-phenyl, 2-methyl-5-nitro-phenyl, and 2-nitro-4-trifluoromethyl-phenyl;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R30 is selected from the series consisting of halogen and (C_1-C_4)-alkyl;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

6. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 5, wherein

Ar is selected from the series consisting of 2,3-dichloro-phenyl, 2,5-dichloro-phenyl, 5-chloro-2-hydrazino-phenyl, 5-chloro-2-cyano-phenyl, 2-cyano-5-methyl-phenyl, 2-fluoro-5-methyl-phenyl, 2-chloro-5-methoxy-phenyl, 2,5-dichloro-thiophen-3-yl, 8-chloro-3,4-dihydro-2H-benzo[b][1,4]dioxepin-7-yl, 5-chloro-1,3-dimethyl-pyrazol-4-yl, naphthalen-1-yl, 5-cyano-2-fluoro-phenyl, 2-cyano-5-methoxy-phenyl, 2-cyano-5-fluoro-phenyl, 2-fluoro-5-methoxy-phenyl, 4-acetylamino-2-methyl-phenyl, 2-methyl-5-nitro-phenyl, and 2-nitro-4-trifluoromethyl-phenyl;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-S(O)$_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R30 is selected from the series consisting of halogen and (C_1-C_4)-alkyl;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

7. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof,

according to any of claims 1 to 6, wherein R1 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl.

8. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 6, wherein R1 is selected from the series consisting of -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15 and -N(R13)-C(O)-NH-R14.

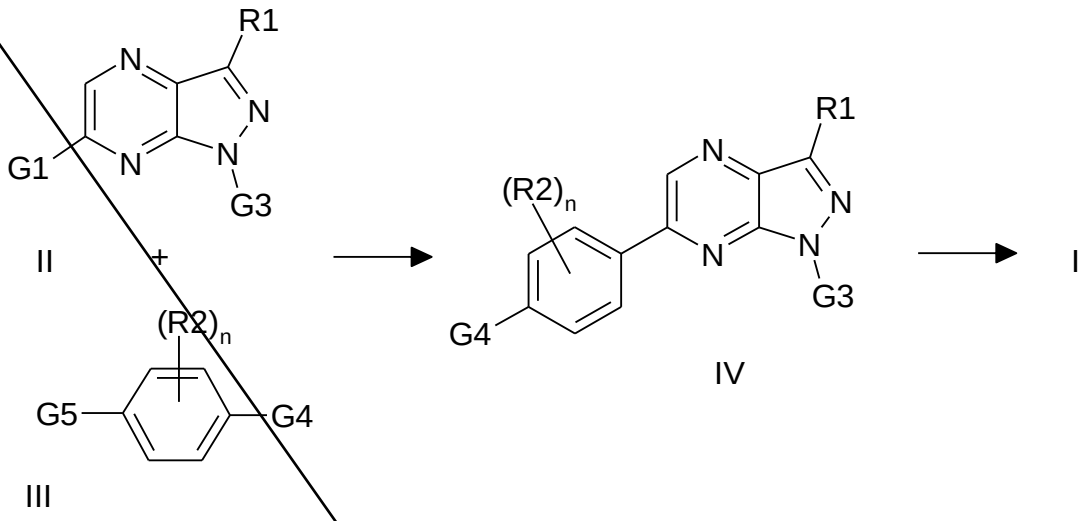
9. A compound of the formula I, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 8, which is selected from the series consisting of:
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,3-dichloro-benzenesulfonamide,
2,5-dichloro-N-[4-(1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2,5-dichloro-N-[2-fluoro-4-(1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2,3-dichloro-N-[2-fluoro-4-(1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,5-dichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-2-hydrazino-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-2-fluoro-phenyl]-5-chloro-2-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-2-fluoro-phenyl]-2,5-dichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-2-fluoro-phenyl]-2,3-dichloro-benzenesulfonamide,
2,5-dichloro-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2,3-dichloro-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,

5-chloro-2-fluoro-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
5-chloro-2-cyano-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2-cyano-5-methyl-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2-fluoro-5-methyl-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2-chloro-5-methoxy-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-cyano-5-methyl-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-chloro-5-methoxy-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-fluoro-5-methyl-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-5-chloro-2-cyano-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,5-dichloro-thiophene-3-sulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-8-chloro-3,4-dihydro-2H-benzo[b][1,4]dioxepine-7-sulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-1,3-dimethyl-pyrazole-4-sulfonamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]cyclopropanecarboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]tetrahydropyran-4-carboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]piperidine-4-carboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]cyclopentanecarboxamide,

2,3-dichloro-N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]benzamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]cyclohexanecarboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]-2-phenyl-acetamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]thiophene-3-carboxamide,
4-chloro-N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]benzamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]naphthalene-1-sulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,4,6-trichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-2-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,4,5-trifluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,4,5-trichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-2,4-difluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,3,4-trichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,3,4-trifluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-chloro-4-trifluoromethyl-benzenesulfonamide,
5-chloro-N-[4-[3-[(5-chloro-2,4-difluoro-phenyl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]-2,4-difluoro-benzenesulfonamide,
5-chloro-N-[4-[3-[(5-chloro-1,3-dimethyl-pyrazol-4-yl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]-1,3-dimethyl-pyrazole-4-sulfonamide,

2,4,5-trifluoro-N-[4-[3-[(2,4,5-trifluorophenyl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-5-cyano-2-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-2-cyano-5-methoxy-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-2-cyano-5-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-2-fluoro-5-methoxy-benzenesulfonamide,
1-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]-3-(3-pyridyl)urea,
1-(4-chlorophenyl)-3-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]urea,
2-chloro-N-[4-[3-[[2-chloro-4-trifluoromethyl-phenyl]sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]-4-trifluoromethyl-benzenesulfonamide,
N-[6-[4-(1-naphthylsulfonylamino)phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]naphthalene-1-sulfonamide,
2,4,6-trichloro-N-[4-[3-[(2,4,6-trichlorophenyl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]benzenesulfonamide,
N-[3-methyl-4-[[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]sulfamoyl]phenyl]acetamide,
2-methyl-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-nitro-benzenesulfonamide, and
N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-nitro-4-trifluoromethyl-benzenesulfonamide.

10. A process for the preparation of a compound of the formula I according to any of claims 1 to 9,



which comprises reacting a compound of the formula II and a compound of the formula III to give a compound of the formula IV, and converting the compound of the formula IV into a compound of the formula I, wherein R1, R2 and n in the compounds of the formulae II, III and IV are defined as in the compound of the formula I or functional groups are present in protected form or in the form of a precursor group, the group G1 in the compound of the formula II is halogen or a sulfonyloxy group, the group G3 in the compounds of formulae II and IV is hydrogen or a protecting group, the group G4 in the compounds of formulae III and IV is the group of the formula Ar-S$(O)_2$-NH- in which Ar is defined as in the compound of the formula I or functional groups are present in protected form or in the form of a precursor group, or G4 is an amino group, a protected amino group or a precursor group of an amino group, and the group G5 in the compound of formula III is a trialkylstannyl group or a boronic acid group, a boronic acid ester group or cyclic boronic acid ester group.

11. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, for use as a pharmaceutical.

12. A pharmaceutical composition, comprising a compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a

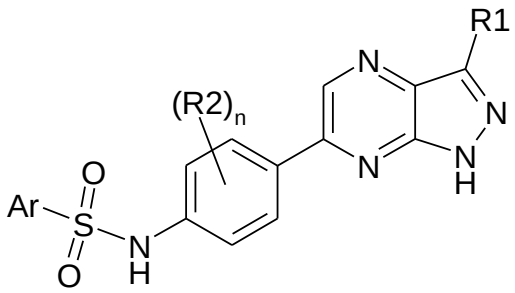
pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, and a pharmaceutically acceptable carrier.

13. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, for use as an inhibitor of serum and glucocorticoid regulated kinase (SGK), or in the treatment of degenerative joint disorders, degenerative cartilage changes, diabetes, cardiovascular diseases, fibrosis, inflammatory processes, pain, tumors or cerebral infarctions.

14. Use of a compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, for the manufacture of a medicament for inhibition of serum and glucocorticoid regulated kinase (SGK), or for the treatment of degenerative joint disorders or degenerative cartilage changes.

Claims

1 A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof,



I

wherein

Ar is selected from the series consisting of phenyl and a 5-membered or 6-membered monocyclic aromatic heterocycle comprising 1, 2 or 3 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur and bonded via a ring carbon atom, which are all unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0, 1 and 2;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-S(O)$_2$-R15, -N(R13)-C(O)-NH-R14, -C(O)-N(R16)-R17, -CN, (C_1-C_4)-alkyl and -(C_1-C_4)-alkyl-O-R18;

R2 is selected from the series consisting of halogen, -(C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl and -CN;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, -O-(C_1-C_4)-alkyl, -O-(C_3-C_7)-cycloalkyl,

-O-(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl-, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2, -C(O)-N(R23)-R24 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 8-membered unsaturated ring which comprises 0, 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen, -(C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl and -CN;

R11 and R12 are independently of one another selected from the series consisting of hydrogen, (C_1-C_4)-alkyl, (C_3-C_7)-cycloalkyl and -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl,

or R11 and R12, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 7-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R11 and R12, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R16 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R17 is selected from the series consisting of hydrogen, (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30,

or R16 and R17, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 7-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R16 and R17, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R18 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R19 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R20 is selected from the series consisting of hydrogen, (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl, -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30,

or R19 and R20, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 7-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R19 and R20, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen, (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl, (C_3-C_7)-cycloalkyl and -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl;

R23 and R24 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl and -CN;

Het is a monocyclic, 4-membered to 7-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

2. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to claim 1, wherein

Ar is selected from the series consisting of phenyl and a 5-membered or 6-membered monocyclic aromatic heterocycle comprising 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur and bonded via a ring carbon atom, which are all unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0, 1 and 2;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14, (C_1-C_4)-alkyl and -(C_1-C_4)-alkyl-O-R18;

R2 is selected from the series consisting of halogen, -(C_1-C_4)-alkyl and -CN;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2, -C(O)-N(R23)-R24 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 7-membered unsaturated ring which comprises 0, 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen, -(C_1-C_4)-alkyl and -CN;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl,

or R11 and R12, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R11 and R12, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein

phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R18 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R19 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R20 is selected from the series consisting of hydrogen, (C_1-C_8)-alkyl, (C_3-C_7)-cycloalkyl and -(C_1-C_4)-alkyl-(C_3-C_7)-cycloalkyl;

or R19 and R20, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R19 and R20, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl and (C_3-C_7)-cycloalkyl;

R23 and R24 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen, (C_1-C_4)-alkyl and -CN;

Het is a monocyclic, 4-membered to 7-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

3. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 and 2, wherein

Ar is selected from the series consisting of phenyl and a 5-membered or 6-membered monocyclic aromatic heterocycle comprising 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur and bonded via a ring carbon atom, which are all unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 7-membered unsaturated ring which comprises 0, 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl,

or R11 and R12, together with the nitrogen atom carrying them, form a monocyclic, 5-membered or 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R11 and R12, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R19 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R20 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

or R19 and R20, together with the nitrogen atom carrying them, form a monocyclic, 4-membered to 6-membered, saturated heterocycle which, in addition to the nitrogen atom carrying R19 and R20, comprises 0 or 1 further ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is unsubstituted or substituted by one ore more identical or different substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen, (C_1-C_4)-alkyl and -CN;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 or 2 identical or different ring heteroatoms selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

4. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 3, wherein

Ar is phenyl which is unsubstituted or substituted by one or more identical or different substituents R10;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R10 is selected from the series consisting of halogen, (C_1-C_4)-alkyl, -O-(C_1-C_4)-alkyl, -N(R19)-R20, -N(R21)-N(R19)-R20, -N(R21)-C(O)-R22, -NO_2 and -CN,

and two groups R10 bonded to adjacent ring carbon atoms in Ar, together with the carbon atoms carrying them, can form a 5-membered to 7-membered unsaturated ring which comprises 0, 1 or 2 oxygen atoms as ring heteroatoms, and which is unsubstituted or substituted by one or more identical or different substituents selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R19 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R20 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R21 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R22 is selected from the series consisting of (C_1-C_4)-alkyl;

R30 is selected from the series consisting of halogen and (C_1-C_4)-alkyl;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

5. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 4, wherein

Ar is selected from the series consisting of 2,3-dichloro-phenyl, 2,5-dichloro-phenyl, 5-chloro-2-hydrazino-phenyl, 5-chloro-2-cyano-phenyl, 2-cyano-5-methyl-phenyl, 2-fluoro-5-methyl-phenyl, 2-chloro-5-methoxy-phenyl, 2,5-dichloro-thiophen-3-yl, 8-chloro-3,4-dihydro-2H-benzo[b][1,4]dioxepin-7-yl, 5-chloro-1,3-dimethyl-pyrazol-4-yl, naphthalen-1-yl, 2,4,6-trichloro-phenyl, 5-chloro-2-fluoro-phenyl, 2,4,5-trifluoro-phenyl, 2,4,5-trichloro-phenyl, 5-chloro-2,4-difluoro-phenyl, 2,3,4-trichloro-phenyl, 2,3,4-trifluoro-phenyl, 2-chloro-4-trifluoromethyl-phenyl, 5-cyano-2-fluoro-phenyl, 2-cyano-5-methoxy-phenyl, 2-cyano-5-fluoro-phenyl, 2-fluoro-5-methoxy-phenyl, 4-acetylamino-2-methyl-phenyl, 2-methyl-5-nitro-phenyl, and 2-nitro-4-trifluoromethyl-phenyl;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R30 is selected from the series consisting of halogen and (C_1-C_4)-alkyl;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

6. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 5, wherein

Ar is selected from the series consisting of 2,3-dichloro-phenyl, 2,5-dichloro-phenyl, 5-chloro-2-hydrazino-phenyl, 5-chloro-2-cyano-phenyl, 2-cyano-5-methyl-phenyl, 2-fluoro-5-methyl-phenyl, 2-chloro-5-methoxy-phenyl, 2,5-dichloro-thiophen-3-yl, 8-chloro-3,4-dihydro-2H-benzo[b][1,4]dioxepin-7-yl, 5-chloro-1,3-dimethyl-pyrazol-4-yl, naphthalen-1-yl, 5-cyano-2-fluoro-phenyl, 2-cyano-5-methoxy-phenyl, 2-cyano-5-fluoro-phenyl, 2-fluoro-5-methoxy-phenyl, 4-acetylamino-2-methyl-phenyl, 2-methyl-5-nitro-phenyl, and 2-nitro-4-trifluoromethyl-phenyl;

n is selected from the series consisting of 0 and 1;

R1 is selected from the series consisting of hydrogen, -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15, -N(R13)-C(O)-NH-R14 and (C_1-C_4)-alkyl;

R2 is selected from the series consisting of halogen and -(C_1-C_4)-alkyl;

R11 and R12 are independently of one another selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R13 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl;

R14 and R15 are independently of one another selected from the series consisting of (C_3-C_7)-cycloalkyl, phenyl, -(C_1-C_4)-alkyl-phenyl, Het and -(C_1-C_4)-alkyl-Het, wherein phenyl and Het all are unsubstituted or substituted by one or more identical or different substituents R30;

R30 is selected from the series consisting of halogen and (C_1-C_4)-alkyl;

Het is a monocyclic, 5-membered or 6-membered, saturated, partially unsaturated or aromatic heterocycle which comprises 1 ring heteroatom selected from the series consisting of nitrogen, oxygen and sulfur, and which is bonded via a ring carbon atom;

wherein all cycloalkyl groups can be substituted by one or more identical substituents selected from the series consisting of fluorine and (C_1-C_4)-alkyl;

wherein all alkyl groups, independently of any other substituents which can be present on an alkyl group, can be substituted by one ore more fluorine substituents.

7. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof,

according to any of claims 1 to 6, wherein R1 is selected from the series consisting of hydrogen and (C_1-C_4)-alkyl.

8. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 6, wherein R1 is selected from the series consisting of -N(R11)-R12, -N(R13)-C(O)-R14, -N(R13)-$S(O)_2$-R15 and -N(R13)-C(O)-NH-R14.

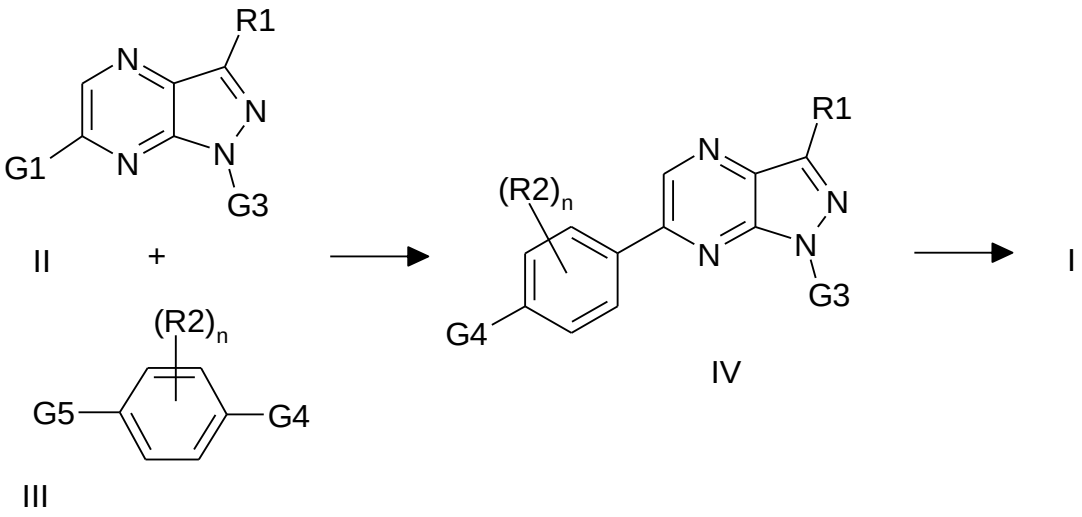
9. A compound of the formula I, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 8, which is selected from the series consisting of:
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,3-dichloro-benzenesulfonamide,
2,5-dichloro-N-[4-(1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2,5-dichloro-N-[2-fluoro-4-(1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2,3-dichloro-N-[2-fluoro-4-(1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,5-dichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-2-hydrazino-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-2-fluoro-phenyl]-5-chloro-2-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-2-fluoro-phenyl]-2,5-dichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-2-fluoro-phenyl]-2,3-dichloro-benzenesulfonamide,
2,5-dichloro-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2,3-dichloro-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,

5-chloro-2-fluoro-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
5-chloro-2-cyano-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2-cyano-5-methyl-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2-fluoro-5-methyl-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
2-chloro-5-methoxy-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-cyano-5-methyl-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-chloro-5-methoxy-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-fluoro-5-methyl-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-5-chloro-2-cyano-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,5-dichloro-thiophene-3-sulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-8-chloro-3,4-dihydro-2H-benzo[b][1,4]dioxepine-7-sulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-1,3-dimethyl-pyrazole-4-sulfonamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]cyclopropanecarboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]tetrahydropyran-4-carboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]piperidine-4-carboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]cyclopentanecarboxamide,

2,3-dichloro-N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]benzamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]cyclohexanecarboxamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]-2-phenyl-acetamide,
N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]thiophene-3-carboxamide,
4-chloro-N-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]benzamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]naphthalene-1-sulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,4,6-trichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-2-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,4,5-trifluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,4,5-trichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-chloro-2,4-difluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,3,4-trichloro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2,3,4-trifluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-chloro-4-trifluoromethyl-benzenesulfonamide,
5-chloro-N-[4-[3-[(5-chloro-2,4-difluoro-phenyl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]-2,4-difluoro-benzenesulfonamide,
5-chloro-N-[4-[3-[(5-chloro-1,3-dimethyl-pyrazol-4-yl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]-1,3-dimethyl-pyrazole-4-sulfonamide,

2,4,5-trifluoro-N-[4-[3-[(2,4,5-trifluorophenyl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-5-cyano-2-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-2-cyano-5-methoxy-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-2-cyano-5-fluoro-benzenesulfonamide,
N-[4-(3-amino-1H-pyrazolo[3,4-b]pyrazin-6-yl)-phenyl]-2-fluoro-5-methoxy-benzenesulfonamide,
1-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]-3-(3-pyridyl)urea,
1-(4-chlorophenyl)-3-[6-[4-[(2-fluoro-5-methyl-phenyl)sulfonylamino]phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]urea,
2-chloro-N-[4-[3-[[2-chloro-4-trifluoromethyl-phenyl]sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]-4-trifluoromethyl-benzenesulfonamide,
N-[6-[4-(1-naphthylsulfonylamino)phenyl]-1H-pyrazolo[3,4-b]pyrazin-3-yl]naphthalene-1-sulfonamide,
2,4,6-trichloro-N-[4-[3-[(2,4,6-trichlorophenyl)sulfonylamino]-1H-pyrazolo[3,4-b]pyrazin-6-yl]phenyl]benzenesulfonamide,
N-[3-methyl-4-[[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]sulfamoyl]phenyl]acetamide,
2-methyl-N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-5-nitro-benzenesulfonamide, and
N-[4-(3-methyl-1H-pyrazolo[3,4-b]pyrazin-6-yl)phenyl]-2-nitro-4-trifluoromethyl-benzenesulfonamide.

10. A process for the preparation of a compound of the formula I according to any of claims 1 to 9,



which comprises reacting a compound of the formula II and a compound of the formula III to give a compound of the formula IV, and converting the compound of the formula IV into a compound of the formula I, wherein R1, R2 and n in the compounds of the formulae II, III and IV are defined as in the compound of the formula I or functional groups are present in protected form or in the form of a precursor group, the group G1 in the compound of the formula II is halogen or a sulfonyloxy group, the group G3 in the compounds of formulae II and IV is hydrogen or a protecting group, the group G4 in the compounds of formulae III and IV is the group of the formula Ar-$S(O)_2$-NH- in which Ar is defined as in the compound of the formula I or functional groups are present in protected form or in the form of a precursor group, or G4 is an amino group, a protected amino group or a precursor group of an amino group, and the group G5 in the compound of formula III is a trialkylstannyl group or a boronic acid group, a boronic acid ester group or cyclic boronic acid ester group.

11. A compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, for use as a pharmaceutical.

12. A pharmaceutical composition, comprising a compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, and a pharmaceutically acceptable carrier.

13. Use of a compound of the formula I, in any of its stereoisomeric forms or a mixture of stereoisomeric forms in any ratio, or a pharmaceutically acceptable salt thereof, according to any of claims 1 to 9, for the manufacture of a medicament for the treatment of degenerative joint disorders, degenerative cartilage changes, diabetes, cardiovascular diseases, fibrosis, inflammatory processes, pain, tumors or cerebral infarctions.