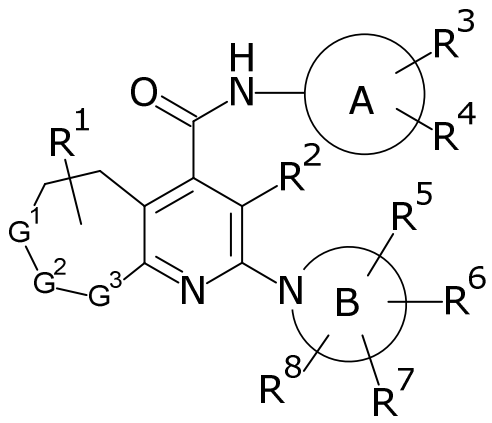
Claims

1. A compound of the formula (I) or a salt thereof:



(I)

In the formula,

R1 is H or lower alkyl,

R^2 is H or CN,

any one of G^1, G^2, and G^3 is O, and the other two of G^1, G^2, and G^3 are CH_2,

ring A is aryl, or nitrogen-containing heteroaryl,

ring B is cyclic amino,

R^3 and R^4 are the same as or different each other, and are H, halogen, lower alkyl, -lower alkylene-OH, halo-lower alkyl, -O-lower alkyl, -O-halo-lower alkyl, cycloalkyl, CN, OH, -N(lower alkyl)$_2$, or -C(=O)NH_2,

R^5, R^6, R^7 and R^8 are the same as or different from each other, and are H, halogen, lower alkyl, halo-lower alkyl, -O-lower alkyl, or CN, or

in the case where R^5 and R^6 are bonded to the same carbon atom, R^5 and R^6 may form cycloalkane or cyclic ether together with the carbon atom, and may form a spiro ring together with Ring B, or

ring B may form 6,7-dihydro[1,3]oxazolo[4,5-c]pyridin-5(4H)-yl together with R^5 and R^6.

2. The compound or a salt thereof according to claim 1, wherein

R^1 is H,

R^2 is H,

G^1 is O,

G^2 and G^3 are CH_2,

ring A is phenyl, or nitrogen-containing heteroaryl,

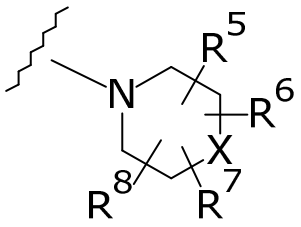
ring B is 5- or 6-membered cyclic amino, and

R^5, R^6, R^7 and R^8 are the same as or different from each other, and are H, halogen,

lower alkyl, halo-lower alkyl, -O-lower alkyl, or CN.

3. The compound or a salt thereof according to claim 2, wherein
ring A is nitrogen-containing monocyclic heteroaryl,
R^3 is H or lower alkyl, and
R^4 is H, halogen, lower alkyl, -lower alkylene-OH, halo-lower alkyl, -O-lower alkyl, -O-halo-lower alkyl, cycloalkyl, CN, OH, -N(lower alkyl)$_2$, or-C(=O)NH_2.

4. The compound or a salt thereof according to claim 2 or 3, wherein
ring B and R^5, R^6, R^7, and R^8 are the formula (II):



(II)

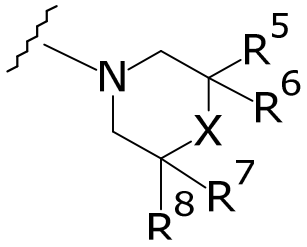
,

X is CH_2, O, or a bond,
in the case where X is CH_2, R^5 and R^6 may be substituted with X, and
R^5, R^6, R^7, and R^8 are the same as or different from each other, and are H, halogen, lower alkyl, or halo-lower alkyl.

5. The compound or a salt thereof according to claim 4, wherein
X is CH_2 or O.

6. The compound or a salt thereof according to claim 4, wherein
X is bond.

7. The compound or a salt thereof according to claim 5, wherein
ring A is nitrogen-containing 6-membered heteroaryl having one or two nitrogen atoms as ring atoms,
ring B, and, R^5, R^6, R^7, and R^8 are the formula (III):


(III)

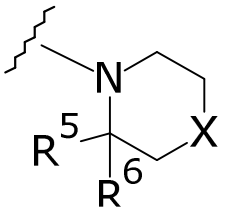
,

R^5 is halogen or lower alkyl,
R^6 is H,
R^7 is H, and
R^8 is H or lower alkyl.

8. The compound or a salt thereof according to claim 7, wherein
ring A is pyridyl,
X is CH_2,
R^5 is halogen, and
R^8 is H.

9. The compound or a salt thereof according to claim 7, wherein
ring A is pyridyl,
X is O,
R^5 is lower alkyl, and
R^8 is lower alkyl.

10. The compound or a salt thereof according to claim 6, wherein
ring A is nitrogen-containing 6-membered heteroaryl having two nitrogen atoms as ring atoms,
ring B, and, R^5, R^6, R^7, and R^8 are the formula (IV):


(IV)

,

R^5 is halogen or lower alkyl,
R^6 is H,
R^7 is H, and
R^8 is H.

11. The compound or a salt thereof according to claim 1, which is selected from the group consisting of:

N-(5-chloropyridin-2-yl)-2-[(2R,6S)-2,6-dimethylmorpholin-4-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

N-(6-methoxypyridazin-3-yl)-2-[(2R)-2-methylpyrrolidin-1-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

N-(6-methylpyrazin-2-yl)-2-[(2S)-2-methylpyrrolidin-1-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

2-[(2R)-2-ethylmorpholin-4-yl]-N-(6-methylpyridin-3-yl)-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

2-(4-fluoropiperidin-1-yl)-N-(pyridazin-3-yl)-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

N-(5,6-dimethylpyrazin-2-yl)-2-[(2S)-2-methylpyrrolidin-1-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

2-[(2S)-2-methylpiperidin-1-yl]-N-(pyridazin-3-yl)-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

2-[(2S)-2-methylpiperidin-1-yl]-N-(pyrazin-2-yl)-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide, and,

N-(5-chloropyridin-2-yl)-2-[(3S)-3-fluoropiperidin-1-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide,

or a salt thereof.

12. The compound or a salt thereof according to claim 11, which is N-(5-chloropyridin-2-yl)-2-[(2R,6S)-2,6-dimethylmorpholin-4-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide or a salt thereof.

13. The compound or a salt thereof according to claim 11, which is N-(6-methoxypyridazin-3-yl)-2-[(2R)-2-methylpyrrolidin-1-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide or a salt thereof.

14. The compound or a salt thereof according to claim 11, which is N-(5-chloropyridin-2-yl)-2-[(3S)-3-fluoropiperidin-1-yl]-5,6,8,9-tetrahydrooxepino[4,5-b]pyridine-4-carboxamide or a salt thereof.

15. A pharmaceutical composition comprising the compound or the salt thereof according to claim 1, and a pharmaceutically acceptable excipient.

16. The pharmaceutical composition according to claim 15, which is a positive allosteric modulator on an α7 nicotinic acetylcholine receptor.

17. The pharmaceutical composition according to claim 15, which is a pharmaceutical composition for preventing or treating dementia, cognitive impairment, schizophrenia, Alzheimer’s disease, CIAS, negative symptoms of schizophrenia, inflammatory diseases, or pain.

18. Use of the compound or the salt thereof according to claim 1 for the manufacture of a pharmaceutical composition for preventing or treating dementia, cognitive impairment, schizophrenia, Alzheimer’s disease, CIAS, negative symptoms of schizophrenia, inflammatory diseases, or pain.

19. The compound or the salt thereof according to claim 1, for use in preventing or treating dementia, cognitive impairment, schizophrenia, Alzheimer’s disease, CIAS, negative symptoms of schizophrenia, inflammatory diseases, or pain.