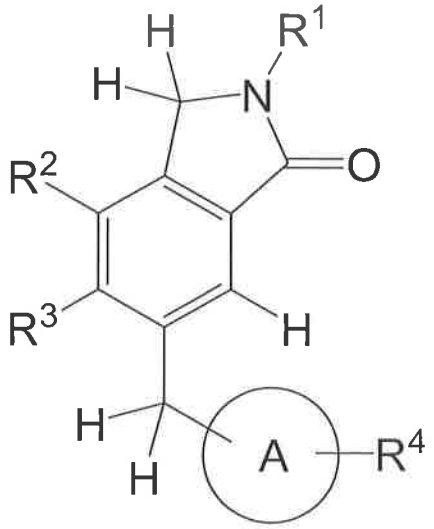
CLAIMS

1. A compound represented by the formula (I):



(I)

wherein

R^1 is

(1) a phenyl group optionally substituted by 1 to 3 substituents selected from

(i) a halogen atom, and

(ii) a cyano group,

(2) a C_{5-6} cycloalkyl group optionally substituted by 1 to 3 substituents selected from

(i) a hydroxy group,

(ii) a C_{1-6} alkyl group optionally substituted by 1 to 3 hydroxy groups, and

(iii) a C_{1-6} alkoxy group,

(3) a 5- or 6-membered monocyclic non-aromatic heterocyclic group optionally substituted by 1 to 3 hydroxy groups,

(4) a 5- or 6-membered monocyclic aromatic heterocyclic group optionally substituted by 1 to 3 halogen atoms, or

(5) a C_{1-6} alkyl group optionally substituted by 1 to 3 substituents selected from

(i) a hydroxy group, and

(ii) a 3- to 8-membered monocyclic non-aromatic heterocyclic group;

R^2 is

(1) a hydrogen atom,

(2) a halogen atom, or

(3) a C_{1-6} alkyl group;

R^3 is

(1) a hydrogen atom,

(2) a halogen atom,

(3) a cyano group,

(4) a C_{1-6} alkyl group optionally substituted by 1 to 3 halogen atoms,

(5) a C_{1-6} alkoxy group, or

(6) a C_{3-6} cycloalkyl group;

R^4 is

(1) a halogen atom,

(2) a cyano group,

(3) a C_{1-6} alkyl group,

(4) a C_{1-6} alkoxy group optionally substituted by 1 to 3 halogen atoms,

(5) a carbamoyl group,

(6) a mono- or di-C_{1-6} alkyl-carbamoyl group, or

(7) a 5- or 6-membered monocyclic aromatic heterocyclic group optionally substituted by 1 to 3 C_{1-6} alkyl groups; and

Ring A is a 6-membered aromatic ring optionally further substituted by 1 to 3 substituents, in addition to R^4, selected from

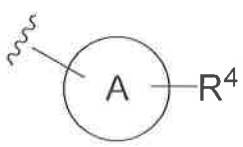
(a) a halogen atom,

(b) a C_{1-6} alkyl group, and

(c) a C_{1-6} alkoxy group,

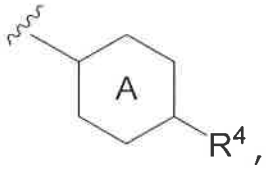
or a salt thereof.

2. The compound according to claim 1, wherein the partial structure represented by the following formula:



in the formula (I) is a partial structure represented by the

following formula:



or a salt thereof.

3. The compound according to claim 1, wherein

R^1 is

(1) a phenyl group optionally substituted by 1 to 3 substituents selected from

(i) a halogen atom, and

(ii) a cyano group,

(2) a C_{5-6} cycloalkyl group optionally substituted by 1 to 3 hydroxy groups,

(3) a 5- or 6-membered monocyclic non-aromatic heterocyclic group optionally substituted by 1 to 3 hydroxy groups,

(4) a 5- or 6-membered monocyclic aromatic heterocyclic group optionally substituted by 1 to 3 halogen atoms, or

(5) a C_{1-6} alkyl group optionally substituted by 1 to 3 substituents selected from

(i) a hydroxy group, and

(ii) a 3- to 8-membered monocyclic non-aromatic heterocyclic group;

R^2 is

(1) a hydrogen atom,

(2) a halogen atom, or

(3) a C_{1-6} alkyl group;

R^3 is

(1) a hydrogen atom,

(2) a halogen atom,

(3) a cyano group,

(4) a C_{1-6} alkyl group optionally substituted by 1 to 3 halogen atoms,

(5) a C_{1-6} alkoxy group, or

(6) a C_{3-6} cycloalkyl group;

R^4 is

(1) a halogen atom,

(2) a cyano group,

(3) a C_{1-6} alkyl group,

(4) a C_{1-6} alkoxy group optionally substituted by 1 to 3 halogen atoms,

(5) a carbamoyl group,

(6) a mono- or di-C_{1-6} alkyl-carbamoyl group, or

(7) a 5- or 6-membered monocyclic aromatic heterocyclic group optionally substituted by 1 to 3 C_{1-6} alkyl groups; and

Ring A is a 6-membered aromatic ring optionally further substituted by 1 to 3 substituents, in addition to R^4, selected from

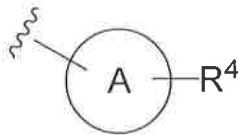
(a) a halogen atom,

(b) a C_{1-6} alkyl group, and

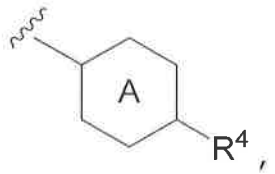
(c) a C_{1-6} alkoxy group,

or a salt thereof.

4. The compound according to claim 3, wherein the partial structure represented by the following formula:



in the formula (I) is a partial structure represented by the following formula:



or a salt thereof.

5. The compound according to claim 1, wherein

R^1 is

(1) a phenyl group optionally substituted by 1 to 3 substituents selected from

(i) a halogen atom, and

(ii) a cyano group,

(2) a C_{5-6} cycloalkyl group optionally substituted by 1 to 3 hydroxy groups,

(3) a 5- or 6-membered monocyclic non-aromatic heterocyclic group optionally substituted by 1 to 3 hydroxy groups, or

(4) a C_{1-6} alkyl group optionally substituted by 1 to 3 substituents selected from

(i) a hydroxy group, and

(ii) a 3- to 8-membered monocyclic non-aromatic heterocyclic group;

R^2 is

(1) a hydrogen atom,

(2) a halogen atom, or

(3) a C_{1-6} alkyl group;

R^3 is

(1) a hydrogen atom,

(2) a halogen atom,

(3) a cyano group,

(4) a C_{1-6} alkyl group optionally substituted by 1 to 3 halogen atoms,

(5) a C_{1-6} alkoxy group, or

(6) a C_{3-6} cycloalkyl group;

R^4 is

(1) a halogen atom,

(2) a cyano group,

(3) a C_{1-6} alkyl group,

(4) a C_{1-6} alkoxy group optionally substituted by 1 to 3 halogen atoms,

(5) a mono- or di-C_{1-6} alkyl-carbamoyl group, or

(6) a 5- or 6-membered monocyclic aromatic heterocyclic group

optionally substituted by 1 to 3 C_{1-6} alkyl groups; and

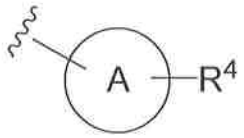
Ring A is a 6-membered aromatic ring optionally further substituted by 1 to 3 substituents, in addition to R^4, selected from

(a) a halogen atom, and

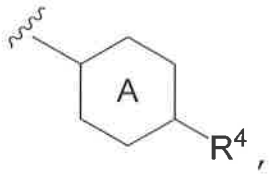
(b) a C_{1-6} alkoxy group,

or a salt thereof.

6. The compound according to claim 5, wherein the partial structure represented by the following formula:



in the formula (I) is a partial structure represented by the following formula:



or a salt thereof.

7. The compound according to claim 1, wherein

R^1 is

(1) a C_{5-6} cycloalkyl group optionally substituted by 1 to 3 hydroxy groups, or

(2) a 5- or 6-membered monocyclic non-aromatic heterocyclic group optionally substituted by 1 to 3 hydroxy groups;

R^2 is

(1) a halogen atom, or

(2) a C_{1-6} alkyl group;

R^3 is a C_{1-6} alkyl group;

R^4 is

(1) a C_{1-6} alkyl group,

(2) a C_{1-6} alkoxy group, or

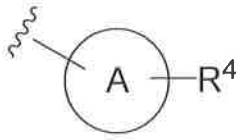
(3) a 5- or 6-membered monocyclic aromatic heterocyclic group;

and

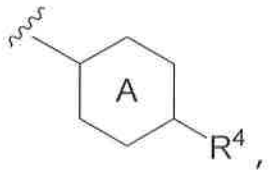
Ring A is a benzene ring or a pyridine ring, each of which is unsubstituted, in addition to R^4,

or a salt thereof.

8. The compound according to claim 7, wherein the partial structure represented by the following formula:



in the formula (I) is a partial structure represented by the following formula:



or a salt thereof.

9. The compound according to claim 1, wherein

R^1 is

(1) a cyclohexyl group substituted by one hydroxy group, or

(2) a tetrahydropyranyl group substituted by one hydroxy group;

R^2 is

(1) a halogen atom, or

(2) a C_{1-6} alkyl group;

R^3 is a C_{1-6} alkyl group;

R^4 is

(1) a C_{1-6} alkyl group,

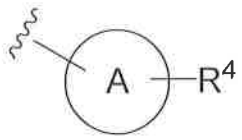
(2) a C_{1-6} alkoxy group, or

(3) a pyrazolyl group; and

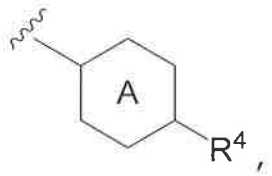
Ring A is a benzene ring or a pyridine ring, each of which is unsubstituted, in addition to R^4,

or a salt thereof.

10. The compound according to claim 9, wherein the partial structure represented by the following formula:



in the formula (I) is a partial structure represented by the following formula:



or a salt thereof.

11. 2-[(3S,4S)-4-Hydroxytetrahydro-2H-pyran-3-yl]-6-(4-methoxybenzyl)-4,5-dimethyl-2,3-dihydro-1H-isoindol-1-one, or a salt thereof.

12. 4-Fluoro-2-[(3S,4S)-4-hydroxytetrahydro-2H-pyran-3-yl]-5-methyl-6-[4-(1H-pyrazol-1-yl)benzyl]-2,3-dihydro-1H-isoindol-1-one, or a salt thereof.

13. 2-((1S,2S)-2-Hydroxycyclohexyl)-4,5-dimethyl-6-((6-methylpyridin-3-yl)methyl)isoindolin-1-one, or a salt thereof.

14. A medicament comprising the compound according to claim 1 or a salt thereof.

15. The medicament according to claim 14, which is a cholinergic muscarinic M1 receptor positive allosteric modulator.

16. The medicament according to claim 14, which is an agent for the prophylaxis or treatment of Alzheimer's disease, schizophrenia, pain, sleep disorder, Parkinson's disease dementia or dementia with Lewy bodies.

17. The compound according to claim 1 or a salt thereof for use in the prophylaxis or treatment of Alzheimer's disease, schizophrenia, pain, sleep disorder, Parkinson's disease dementia or dementia with Lewy bodies.

18. Use of the compound according to claim 1 or a salt thereof for the production of an agent for the prophylaxis or treatment of Alzheimer's disease, schizophrenia, pain, sleep disorder, Parkinson's disease dementia or dementia with Lewy bodies.