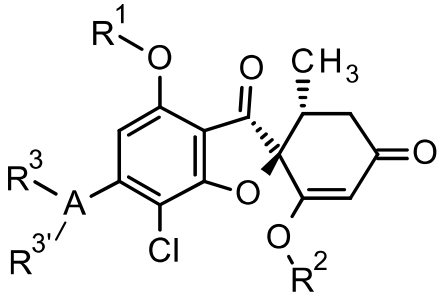
SUMMARY

[0007] The present disclosure is based on the determination that the compounds of the disclosure act to improve physiolgocial characteristics associated with cognition and memory, such as enhancing neuronal transmission in the hippocampus, improving scopolamine-induced cognitive impairment, ameliorating cognitive deficits involved in NMDA receptor hypofunction, and increasing long-term potentiation. Further, the compounds of the disclosure have been shown in clinical studies to improve concentration and decision making.

[0007a] In another aspect, there is provided the use of the compound of Formula 1 or a pharmaceutically acceptable salt thereof:



(1)

in the manufacture of a medicament for improving memory function, cognition function, and/or learning function in a subject in need thereof,

wherein:

R^1 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from a substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

R^2 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

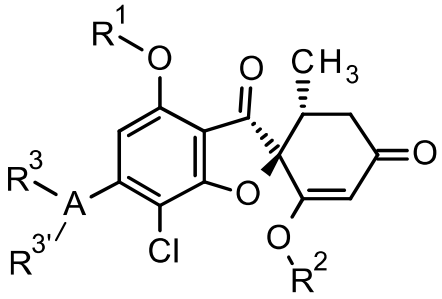
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
A is a 5-membered aromatic heterocyclic ring,
a 6-membered aromatic heterocyclic ring,
an 8-10 membered condensed aromatic heterocyclic ring,
a 5-7 membered unsaturated heterocyclic ring,
a 4-7 membered saturated heterocyclic ring,
a benzene ring, -CH=, or a cyano group, wherein when A is a cyano group, R^3 and $R^{3'}$ do not exist,
R^3 and $R^{3'}$ are each independently a hydrogen atom, a halogen atom, a cyano group, a hydroxy group, an oxo group,
a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxy group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkynyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an amino group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxycarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a carbamoyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a phenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-7 membered unsaturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an 8-10 membered condensed aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X, or
R^3 and $R^{3'}$ may form a 5-7 membered unsaturated heterocyclic ring, a 4-7 membered saturated heterocyclic ring, or a C3-C6 cycloalkyl ring as a ring that binds to each other and condenses with A, and the ring is optionally substituted with the same or different one to two substituents selected from the substituent group X,
substituent group X is a halogen atom, a cyano group, a hydroxy group, an oxo group, a C1-C6 alkyl group, a hydroxy C1-C6 alkyl group, a C1-C6 alkoxy C1-C6 alkyl group, a C1-C6 haloalkyl group, a C3-C6 cycloalkyl group, a C3-C6 halocycloalkyl group,
a phenyl group optionally substituted with the same or different one to two substituents selected from a substituent group Y,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxy group, a C1-C6 haloalkoxy group, a C3-C6 cycloalkoxy group, a C3-C6 halocycloalkoxy group,
a phenoxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,

a 6-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxycarbonyl group, a C3-C6 cycloalkoxycarbonyl group, a carboxy group, a C1-C6 alkylcarbonyl group, a C3-C6 cycloalkylcarbonyl group,
a phenylcarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a carbamoyl group, a mono (C1-C6 alkyl) aminocarbonyl group, a di (C1-C6 alkyl) aminocarbonyl group, a mono (C1-C6 alkyl) aminosulfonyl group, a di (C1-C6 alkyl) aminosulfonyl group, an amino group, a mono (C1-C6 alkyl) amino group, a di (C1-C6 alkyl) amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group,
a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group,
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group,
thereby improving memory function, cognition function, and/or learning function in the subject.

[0007b]

In another aspect, there is provided the use of a compound of Formula 1 or a pharmaceutically acceptable salt thereof:



(1)

in the manufacture of a medicament for delaying or slowing a decrease in memory function, cognition function, and/or learning function in a subject in need thereof,

wherein:

R^1 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from a substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

R^2 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

A is a 5-membered aromatic heterocyclic ring,

a 6-membered aromatic heterocyclic ring,

an 8-10 membered condensed aromatic heterocyclic ring,

a 5-7 membered unsaturated heterocyclic ring,

a 4-7 membered saturated heterocyclic ring,

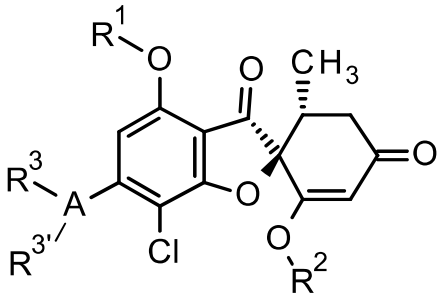
a benzene ring, -CH=, or a cyano group, wherein when A is a cyano group, R^3 and $R^{3'}$ do not exist,

R^3 and $R^{3'}$ are each independently a hydrogen atom, a halogen atom, a cyano group, a hydroxy group, an oxo group,
a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxy group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkynyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an amino group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxycarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a carbamoyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a phenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-7 membered unsaturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an 8-10 membered condensed aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

R^3 and $R^{3'}$ may form a 5-7 membered unsaturated heterocyclic ring, a 4-7 membered saturated heterocyclic ring, or a C3-C6 cycloalkyl ring as a ring that binds to each other and condenses with A, and the ring is optionally substituted with the same or different one to two substituents selected from the substituent group X,
substituent group X is a halogen atom, a cyano group, a hydroxy group, an oxo group, a C1-C6 alkyl group, a hydroxy C1-C6 alkyl group, a C1-C6 alkoxy C1-C6 alkyl group, a C1-C6 haloalkyl group, a C3-C6 cycloalkyl group, a C3-C6 halocycloalkyl group,
a phenyl group optionally substituted with the same or different one to two substituents selected from a substituent group Y,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxy group, a C1-C6 haloalkoxy group, a C3-C6 cycloalkoxy group, a C3-C6 halocycloalkoxy group,
a phenoxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxycarbonyl group, a C3-C6 cycloalkoxycarbonyl group, a carboxy group, a C1-C6 alkylcarbonyl group, a C3-C6 cycloalkylcarbonyl group,
a phenylcarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a carbamoyl group, a mono (C1-C6 alkyl) aminocarbonyl group, a di (C1-C6 alkyl) aminocarbonyl group, a mono (C1-C6 alkyl) aminosulfonyl group, a di (C1-C6 alkyl)

aminosulfonyl group, an amino group, a mono (C1-C6 alkyl) amino group, a di (C1-C6 alkyl) amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group,
a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group,
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group,
thereby delaying or slowing the decrease in memory function, cognition function, and/or learning function in the subject.

[0008] Thus, one example of the disclosure relates to a method of improving memory function, cognition function, and/or learning function in a subject in need thereof, comprising administering to the subject a therapeutically effective amount of the compound of Formula 1 or a pharmaceutically acceptable salt thereof:



(1)

wherein:
R^1 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from a substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

R^2 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxycarbonyl group, a C3-C6 cycloalkoxycarbonyl group, a carboxy group, a C1-C6 alkylcarbonyl group, a C3-C6 cycloalkylcarbonyl group,
a phenylcarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a carbamoyl group, a mono (C1-C6 alkyl) aminocarbonyl group, a di (C1-C6 alkyl) aminocarbonyl group, a mono (C1-C6 alkyl) aminosulfonyl group, a di (C1-C6 alkyl) aminosulfonyl group, an amino group, a mono (C1-C6 alkyl) amino group, a di (C1-C6 alkyl) amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group,
a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group,
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group,
thereby improving memory function, cognition function, and/or learning function in the subject.

[0009] Another example of the disclosure relates to a method of delaying or slowing a decrease in memory function, cognition function, and/or learning function in a subject in need thereof, comprising administering to the subject a therapeutically effective amount of a compound of Formula 1 or a pharmaceutically acceptable salt thereof:

amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group,
a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group,
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group,
thereby delaying or slowing a decrease in memory function, cognition function, and/or learning function in the subject.

[0010] The disclosure additionally relates to use of the compounds of the disclosure to improve memory function, cognition function, and/or learning function.

[0011] The disclosure further relates to use of the compounds of the disclosure to delay or slow a decrease in memory function, cognition function, and/or learning function.

[0012] The disclosure additionally relates to use of the compounds of the disclosure in the preparation of a medicament to improve memory function, cognition function, and/or learning function.

[0013] The disclosure further relates to use of the compounds of the disclosure in the preparation of a medicament to delay or slow a decrease in memory function, cognition function, and/or learning function.

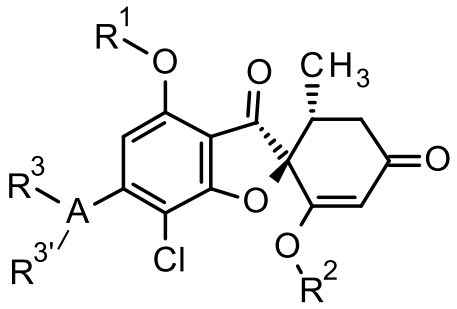
[0014] These and other examples of the disclosure are set forth in more detail in the description of the disclosure below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 shows paired-pulse ratio (PPF index is defined as slopes of fEPSP2/fEPSP1) at interstimulus intervals of 50-400 ms from rats after perfusion with compound 1 (10 nM) or vehicle (0.01% DMSO) or positive control (dopamine 30 μM). Response is stratum radiatum

We Claim:

1. Use of the compound of Formula 1 or a pharmaceutically acceptable salt thereof:



(1)

in the manufacture of a medicament for improving memory function, cognition function, and/or learning function in a subject in need thereof,

wherein:

R^1 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from a substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

R^2 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

A is a 5-membered aromatic heterocyclic ring,

a 6-membered aromatic heterocyclic ring,

an 8-10 membered condensed aromatic heterocyclic ring,

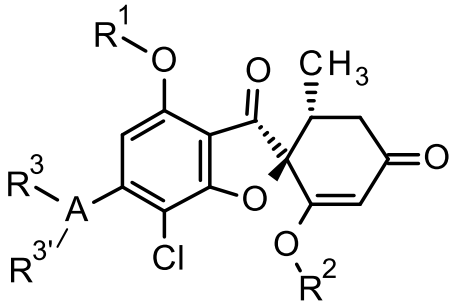
a 5-7 membered unsaturated heterocyclic ring,

a 4-7 membered saturated heterocyclic ring,
a benzene ring, -CH=, or a cyano group, wherein when A is a cyano group, R^3 and $R^{3'}$ do not exist,
R^3 and $R^{3'}$ are each independently a hydrogen atom, a halogen atom, a cyano group, a hydroxy group, an oxo group,
a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxy group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkynyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an amino group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxycarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a carbamoyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a phenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-7 membered unsaturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,

an 8-10 membered condensed aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X, or
R^3 and $R^{3'}$ may form a 5-7 membered unsaturated heterocyclic ring, a 4-7 membered saturated heterocyclic ring, or a C3-C6 cycloalkyl ring as a ring that binds to each other and condenses with A, and the ring is optionally substituted with the same or different one to two substituents selected from the substituent group X,
substituent group X is a halogen atom, a cyano group, a hydroxy group, an oxo group, a C1-C6 alkyl group, a hydroxy C1-C6 alkyl group, a C1-C6 alkoxy C1-C6 alkyl group, a C1-C6 haloalkyl group, a C3-C6 cycloalkyl group, a C3-C6 halocycloalkyl group,
a phenyl group optionally substituted with the same or different one to two substituents selected from a substituent group Y,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxy group, a C1-C6 haloalkoxy group, a C3-C6 cycloalkoxy group, a C3-C6 halocycloalkoxy group,
a phenoxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxycarbonyl group, a C3-C6 cycloalkoxycarbonyl group, a carboxy group, a C1-C6 alkylcarbonyl group, a C3-C6 cycloalkylcarbonyl group,
a phenylcarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,

a carbamoyl group, a mono (C1-C6 alkyl) aminocarbonyl group, a di (C1-C6 alkyl) aminocarbonyl group, a mono (C1-C6 alkyl) aminosulfonyl group, a di (C1-C6 alkyl) aminosulfonyl group, an amino group, a mono (C1-C6 alkyl) amino group, a di (C1-C6 alkyl) amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group,
a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group,
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group,
thereby improving memory function, cognition function, and/or learning function in the subject.

2. Use of a compound of Formula 1 or a pharmaceutically acceptable salt thereof:



(1)

in the manufacture of a medicament for delaying or slowing a decrease in memory function, cognition function, and/or learning function in a subject in need thereof,
wherein:
R^1 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from a substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
R^2 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
A is a 5-membered aromatic heterocyclic ring,
a 6-membered aromatic heterocyclic ring,
an 8-10 membered condensed aromatic heterocyclic ring,
a 5-7 membered unsaturated heterocyclic ring,
a 4-7 membered saturated heterocyclic ring,
a benzene ring, -CH=, or a cyano group, wherein when A is a cyano group, R^3 and $R^{3'}$ do not exist,
R^3 and $R^{3'}$ are each independently a hydrogen atom, a halogen atom, a cyano group, a hydroxy group, an oxo group,
a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxy group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkynyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an amino group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a C1-C6 alkoxycarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a carbamoyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a phenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-7 membered unsaturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an 8-10 membered condensed aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X, or
R^3 and $R^{3'}$ may form a 5-7 membered unsaturated heterocyclic ring, a 4-7 membered saturated heterocyclic ring, or a C3-C6 cycloalkyl ring as a ring that binds to each other and condenses with A, and the ring is optionally substituted with the same or different one to two substituents selected from the substituent group X,
substituent group X is a halogen atom, a cyano group, a hydroxy group, an oxo group, a C1-C6 alkyl group, a hydroxy C1-C6 alkyl group, a C1-C6 alkoxy C1-C6 alkyl group, a C1-C6 haloalkyl group, a C3-C6 cycloalkyl group, a C3-C6 halocycloalkyl group,
a phenyl group optionally substituted with the same or different one to two substituents selected from a substituent group Y,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,

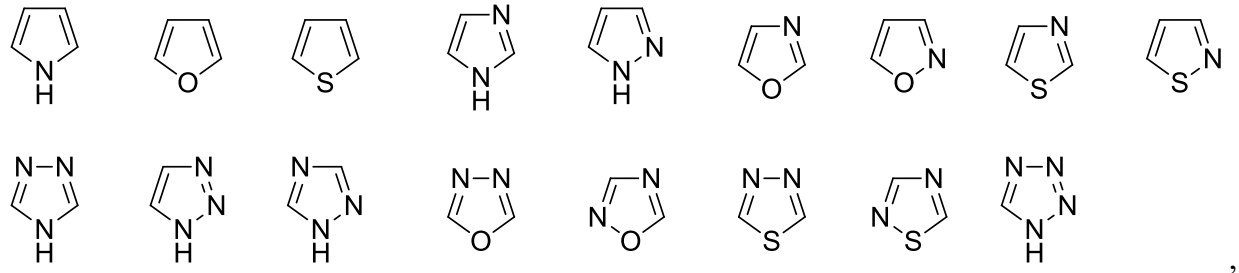
a C1-C6 alkoxy group, a C1-C6 haloalkoxy group, a C3-C6 cycloalkoxy group, a C3-C6 halocycloalkoxy group,
a phenoxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxycarbonyl group, a C3-C6 cycloalkoxycarbonyl group, a carboxy group, a C1-C6 alkylcarbonyl group, a C3-C6 cycloalkylcarbonyl group,
a phenylcarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a carbamoyl group, a mono (C1-C6 alkyl) aminocarbonyl group, a di (C1-C6 alkyl) aminocarbonyl group, a mono (C1-C6 alkyl) aminosulfonyl group, a di (C1-C6 alkyl) aminosulfonyl group, an amino group, a mono (C1-C6 alkyl) amino group, a di (C1-C6 alkyl) amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group,
a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group,
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group,
thereby delaying or slowing the decrease in memory function, cognition function, and/or learning function in the subject.

3. The use of claim 1 or 2, wherein the subject:

- does not have a neurological disorder or brain injury, or
- has normal memory function, cognition function, and/or learning function relative to the general population, or
- has reduced memory function, cognition function, and/or learning function relative to the general population.

4. The use of claim 3, wherein the reduced memory function, cognition function, and/or learning function is due to aging.

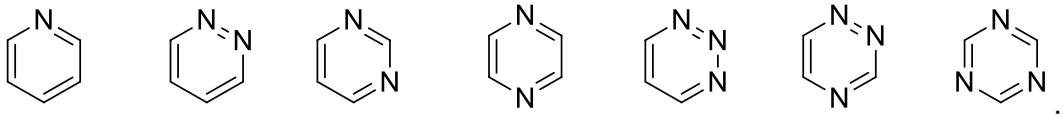
5. The use of any one of claims 1-4, wherein the 5-membered aromatic heterocyclic ring or the 5-membered aromatic heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:



,

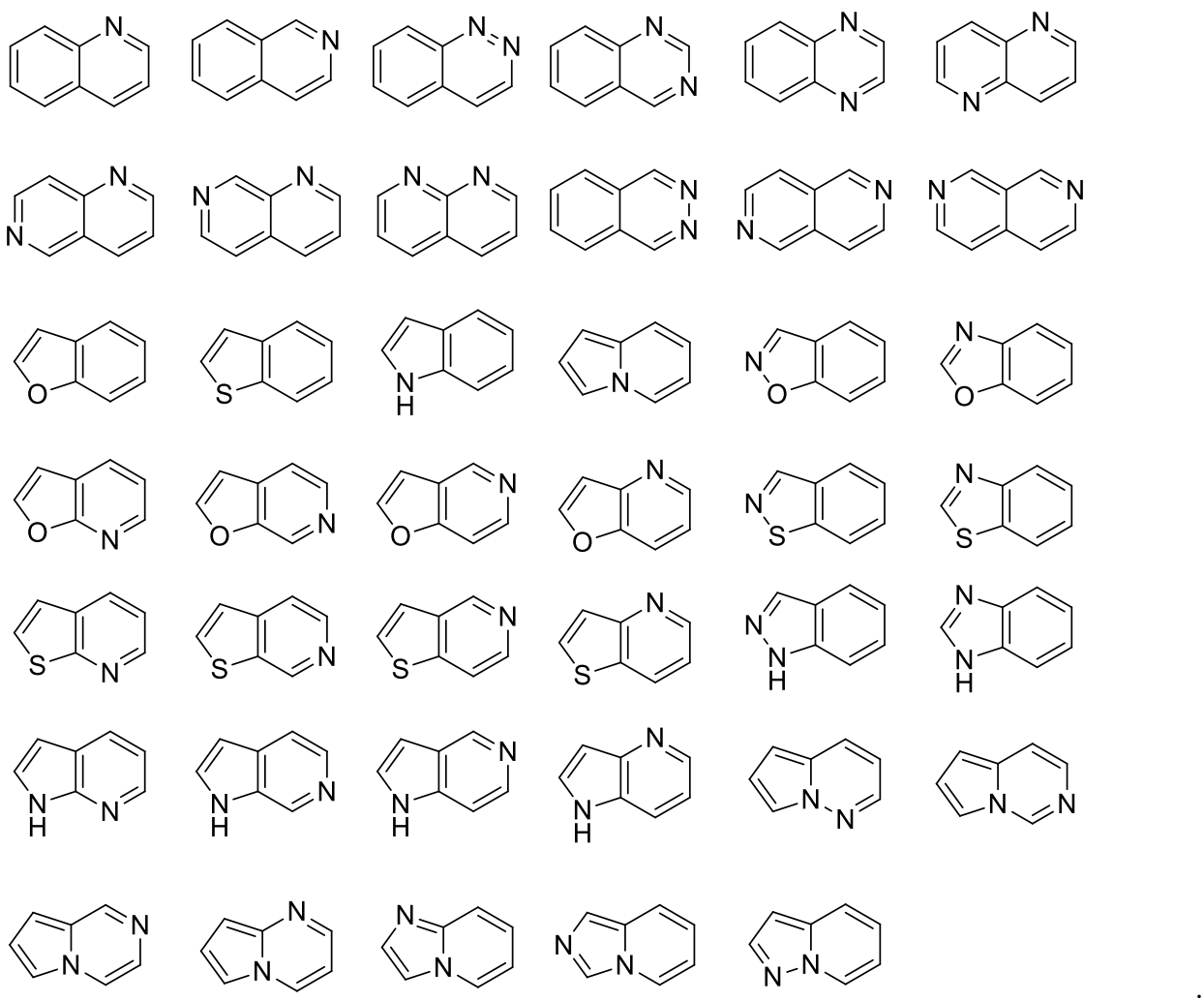
or

wherein the 6-membered aromatic heterocyclic ring or the 6-membered aromatic heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:

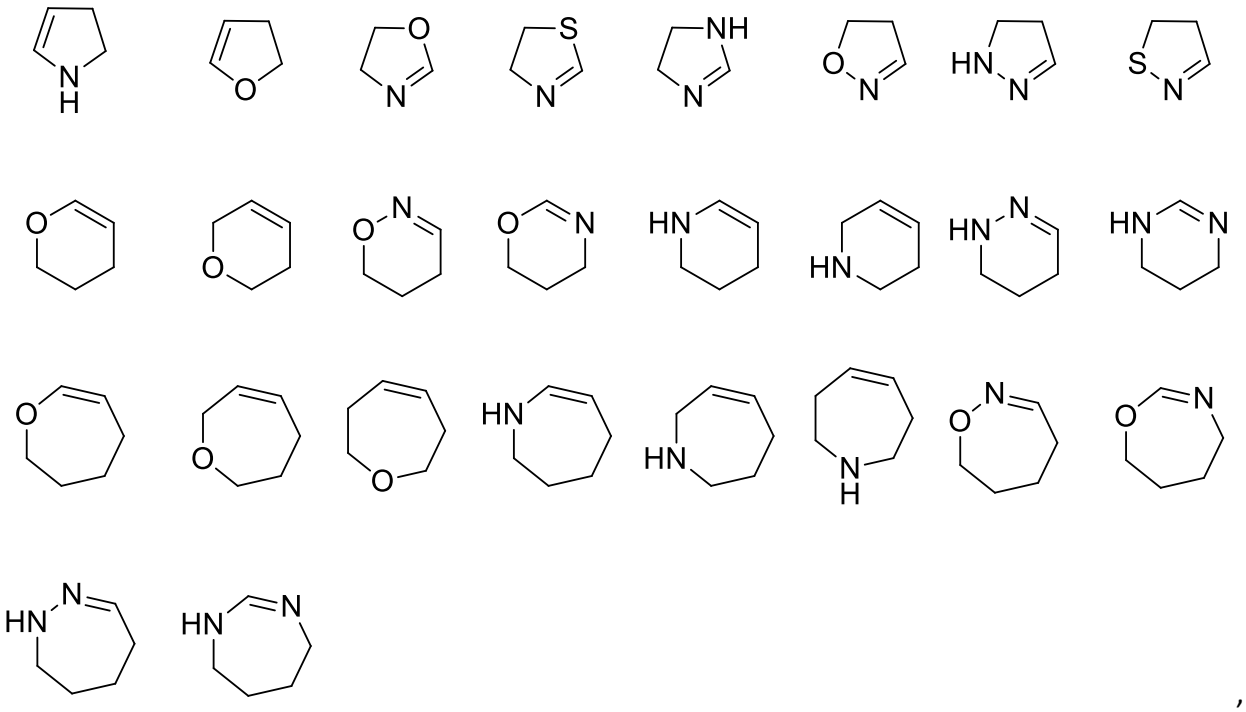


.

6. The use any one of claims 1-5, wherein the 8-10 membered condensed aromatic heterocyclic ring or the 8-10 membered condensed aromatic heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:

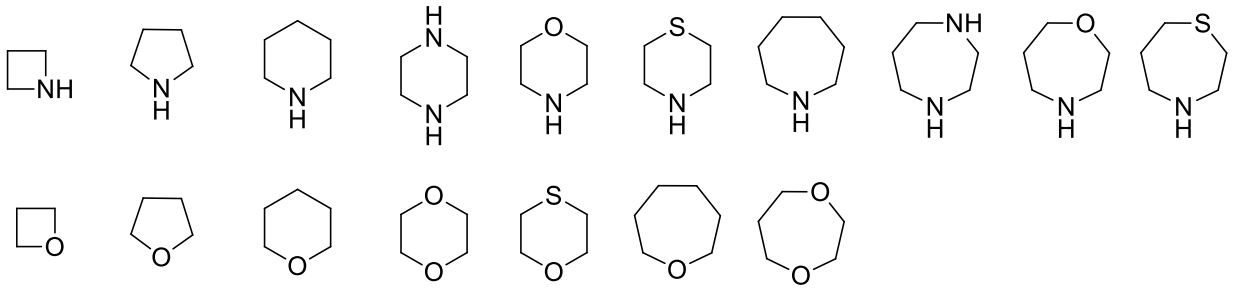


7. The use any one of claims 1-6, wherein the 5-7 membered unsaturated heterocyclic ring or 5-7 membered unsaturated heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:



or

the 4-7 membered saturated heterocyclic ring or the 4-7 membered saturated heterocyclic group in A, R^1, R^2, or R^3 is any one selected from the group:



8. The use of any one of claims 1-7, wherein the compound of Formula 1 is any compound selected from the following group:

(2S,5'R)-7-chloro-6-(5-ethyl-1,3,4-oxadiazol-2-yl)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(5-tetrahydropyran-4-yl-1,3,4-oxadiazol -2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-[5-(1-methyl-4-piperidyl)-1,3,4-oxadiaz ol-2-yl] spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5’R)-7-chloro-6-[5-(4-fluoro-1-methyl-4-piperidyl)-1,3,4-oxadiazol-2-yl]-3’,4-dimethoxy-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-3’,4-dimethoxy-6-[5-[(1S)-1-methoxyethyl]-1,3,4-oxadiazol-2-yl]-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-4-ethoxy-3’-methoxy-5’-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-4-(difluoromethoxy)-3’-methoxy-5’-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-3’,4-dimethoxy-6-[3-(1-methoxyethyl)-1,2,4-oxadiazol-5-yl]-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-6-[3-(1-hydroxy-1-methyl-ethyl)-1,2,4-oxadiazol-5-yl]-3’,4-dimethoxy-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-3’,4-dimethoxy-5’-methyl-6-(1H-pyrazol-5-yl) spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-3’,4-dimethoxy-6-[1-(2-methoxyethyl) pyrazol-3-yl]-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-6-(1,8-dioxa-2-azaspiro [4.5] dec-2-en-3-yl)-3’,4-dimethoxy-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

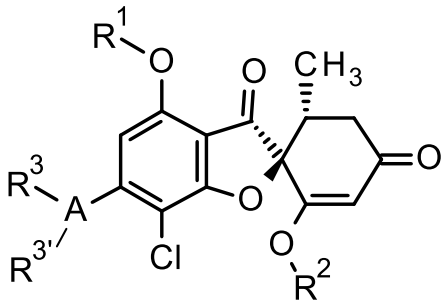
(2S,5’R)-7-chloro-3’,4-dimethoxy-5’-methyl-6-(8-methyl-1-oxa-2,8-diazaspiro [4.5] dec-2-en-3-yl) spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-3’,4-dimethoxy-6-(2-methoxypyrimidin-5-yl)-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione;

(2S,5’R)-7-chloro-3’,4-dimethoxy-6-(6-methoxy-3-pyridyl)-5’-methyl-spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione; or

(2S,5’R)-7-chloro-3’,4-dimethoxy-5’-methyl-6-(3-pyridyl) spiro [benzofuran-2,4’-cyclohex-2-ene]-1’,3-dione.

9. The use of any one of claims 1-8, wherein the compound of Formula 1 is a compound of Formula 1’ or a pharmacologically acceptable salt thereof:



(1')

wherein:

R^1 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X

R^2 is a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,

a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X, or

a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X.

A is a 5-membered aromatic heterocyclic ring,

a 6-membered aromatic heterocyclic ring,

an 8-10 membered condensed aromatic heterocyclic ring,

a 5-7 membered unsaturated heterocyclic ring,

a 4-7 membered saturated heterocyclic ring,

a benzene ring, or a single bond, wherein when it is a single bond, one or the other of R^3 and $R^{3'}$ is not present,

R^3 and $R^{3'}$ are each independently a hydrogen atom, a halogen atom, a cyano group, a hydroxy group,

a C1-C6 alkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxy group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C2-C6 alkynyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C3-C6 cycloalkyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an amino group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a C1-C6 alkoxycarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a carbamoyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a phenyl group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 5-7 membered unsaturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
an 8-10 membered condensed aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group X,
or
R^3 and $R^{3'}$ may form a 5-7 membered unsaturated heterocyclic ring, a 4-7 membered saturated heterocyclic ring, or a C3-C6 cycloalkyl ring as a ring that binds to each other and condenses

with A, and the ring is optionally substituted with the same or different one to two substituents selected from the substituent group X,
Substituent group X is a halogen atom, a cyano group, a hydroxy group, an oxo group, a C1-C6 alkyl group, a hydroxy C1-C6 alkyl group, a C1-C6 alkoxy C1-C6 alkyl group, a C1-C6 haloalkyl group, a C3-C6 cycloalkyl group, a C3-C6 halocycloalkyl group,
a phenyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxy group, a C1-C6 haloalkoxy group, a C3-C6 cycloalkoxy group, a C3-C6 halocycloalkoxy group,
a phenoxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 4-7 membered saturated heterocyclic oxy group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a C1-C6 alkoxycarbonyl group, a C3-C6 cycloalkoxycarbonyl group, a carboxy group, a C1-C6 alkylcarbonyl group, a C3-C6 cycloalkylcarbonyl group,
a phenylcarbonyl group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a carbamoyl group, a mono (C1-C6 alkyl) aminocarbonyl group, a di (C1-C6 alkyl) aminocarbonyl group, a mono (C1-C6 alkyl) aminosulfonyl group, a di (C1-C6 alkyl) aminosulfonyl group, an amino group, a mono (C1-C6 alkyl) amino group, a di (C1-C6 alkyl)

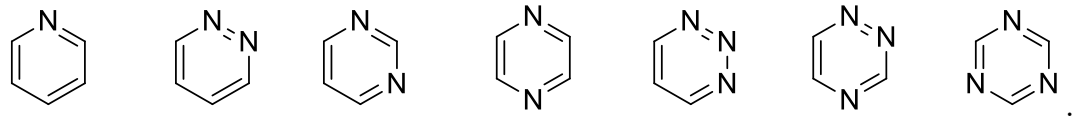
amino group, a C1-C6 alkoxycarbonylamino group, a mono (C1-C6 alkyl) aminocarbonylamino group, a di (C1-C6 alkyl) aminocarbonylamino group, a C1-C6 alkylcarbonylamino group, a phenylcarbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 5-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y,
a 6-membered aromatic heterocyclic carbonylamino group optionally substituted with the same or different one to two substituents selected from the substituent group Y, or
a C1-C6 alkylsulfonylamino group, and
substituent group Y is a C1-C6 alkyl group, a C1-C6 alkoxy group, a halogen atom, or a hydroxy group.

10. The use of claim 9, wherein R^1 is a methyl group, an ethyl group, or a hydroxyethyl group, or wherein R^2 is a methyl group.

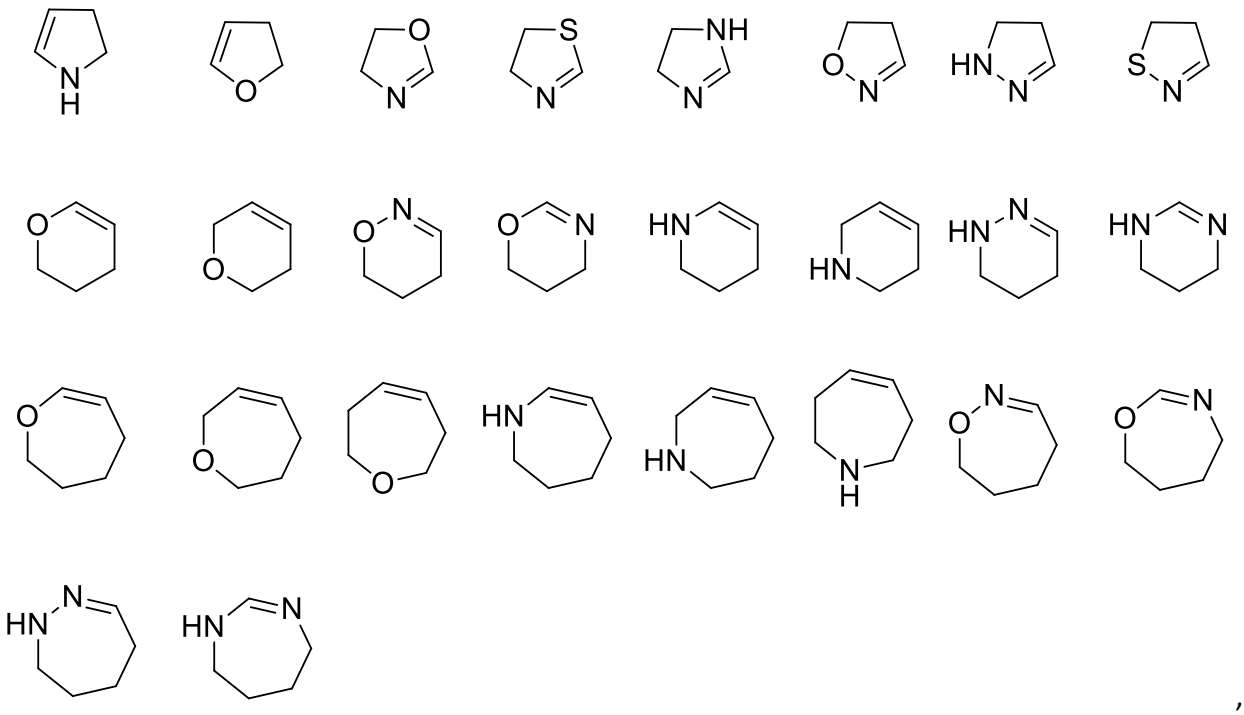
11. The use of any one of claims 9-10, wherein the 5-membered aromatic heterocyclic ring or the 5-membered aromatic heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:

0, or

wherein the 6-membered aromatic heterocyclic ring or the 6-membered aromatic heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:

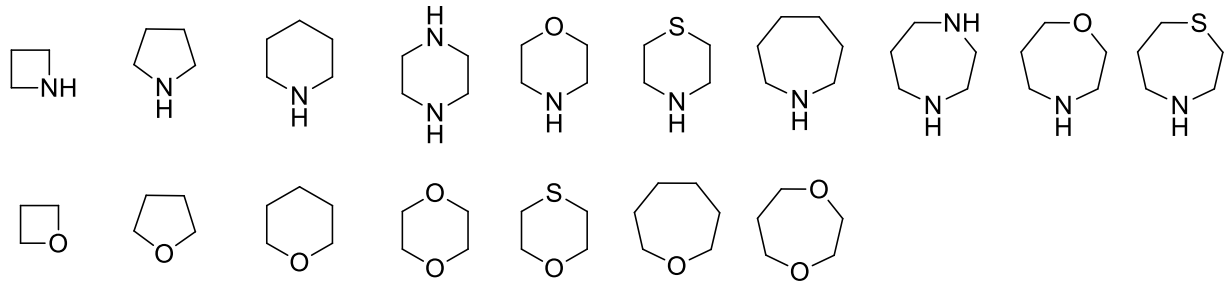


12. The use of any one of claims 9-11, wherein the 5-7 membered unsaturated heterocyclic ring or the 5-7 membered unsaturated heterocyclic group in A, R^3, or $R^{3'}$ is any one selected from the group:



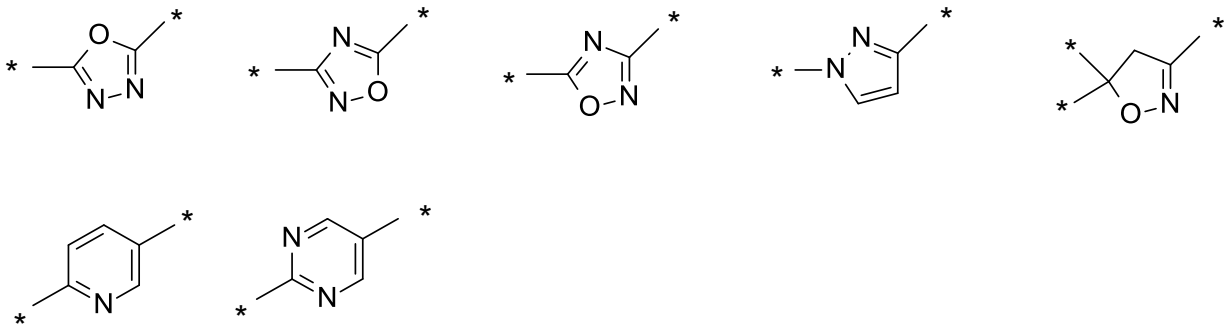
or

wherein the 4-7 membered saturated heterocyclic ring or the 4-7 membered saturated heterocyclic group in A, R^1, R^2, or R^3 is any one selected from the group:



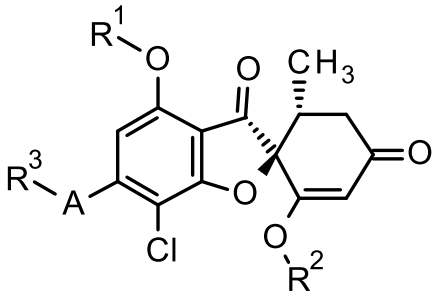
13. The use of any one of claims 8-12, wherein A is a 5-membered aromatic heterocyclic ring, R^3 is a methyl group, an ethyl group, a hydroxy C1-C3 alkyl group, or a methoxy C1-C3 alkyl group, and $R^{3'}$ is a hydrogen atom, or

wherein A is any ring selected from the following group, and in the case of two binding groups, $R^{3'}$ is not present:



wherein * indicates a binding group.

14. The use of any one of claims 9-10, wherein the compound of Formula 1 is a compound of a Formula 1'' or a pharmacologically acceptable salt thereof:

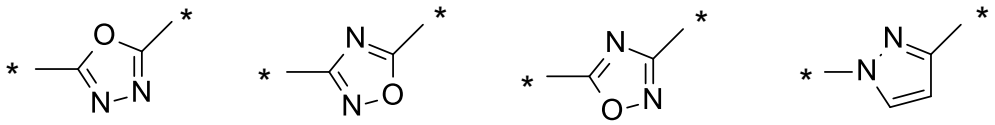


(1")

wherein R^1 is a methyl group or an ethyl group;

R^2 is a methyl group;

A is any ring selected from the following group:



* indicates a binding group; and

R^3 is a methyl group or an ethyl group.

15. The use of any one of claims 9-13, wherein the compound of Formula 1' is any compound selected from the following group:

(2S,5'R)-7-chloro-6-(2-hydroxyethoxy)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-6-(2-methoxyethoxy)-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(1-methylpyrazol-3-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-(1-ethylpyrazol-3-yl)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(3-methyl-1,2,4-oxadiazol-5-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(5-methyl)-1,2,4-oxadiazol-3-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-[5-(1-hydroxy-1-methyl-ethyl)-1,3,4-oxadiazol-2-yl]-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-[5-[(1S)-1-hydroxyethyl]-1,3,4-oxadiazol-2-yl]-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-[5-[(1R)-1-hydroxyethyl]-1,3,4-oxadiazol-2-yl]-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-ethoxy-6-[5-(1-hydroxy-1-methyl-ethyl)-1,3,4-oxadiazol-2-yl]-3'-methoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-ethoxy-6-[5-[(1S)-1-hydroxyethyl]-1,3,4-oxadiazol-2-yl]-3'-methoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-[3-(1-hydroxyethyl)-1,2,4-oxadiazol-5-yl]-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-(2-hydroxyethoxy)-3'-methoxy-5'-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-(2-hydroxyethoxy)-3'-methoxy-5'-methyl-6-(3-methyl-1,2,4-oxadiazol-5-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-(2-hydroxyethoxy)-3'-methoxy-5'-methyl-6-(5-methyl-1,2,4-oxadiazol-3-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-(5-ethyl-1,3,4-oxadiazol-2-yl)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(5-tetrahydropyran-4-yl-1,3,4-oxadiazol -2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-[5-(1-methyl-4-piperidyl)-1,3,4-oxadiaz ol-2-yl] spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-[5-(4-fluoro-1-methyl-4-piperidyl)-1,3,4-oxadiazol-2-yl]-3',4-dime thoxy-5'- methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-6-[5-[(1S)-1-methoxyethyl]-1,3,4-oxadiazol-2-yl]-5'- methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-ethoxy-3'-methoxy-5'-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-4-(difluoromethoxy)-3'-methoxy-5'-methyl-6-(5-methyl-1,3,4-oxadia zol-2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-6-[3-(1-methoxyethyl)-1,2,4-oxadiazol-5-yl]-5'-meth yl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-[3-(1-hydroxy-1-methyl-ethyl)-1,2,4-oxadiazol-5-yl]-3',4-dimethox y-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(1H-pyrazol-5-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-6-[1-(2-methoxyethyl) pyrazol-3-yl]-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-6-(1,8-dioxa-2-azaspiro [4.5] dec-2-en-3-yl)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(8-methyl-1-oxa-2,8-diazaspiro [4.5] dec-2-en-3-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-6-(2-methoxypyrimidin-5-yl)-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-6-(6-methoxy-3-pyridyl)-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione;

(2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(3-pyridyl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione; or

(2S,5'R)-7-chloro-3',4,6-trimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione.

16. The use of claim 15, wherein the compound is (2S,5'R)-7-chloro-6-(1-ethylpyrazol-3-yl)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione or a pharmacologically acceptable salt thereof.

17. The use of claim 15, wherein the compound is (2S,5'R)-7-chloro-3',4-dimethoxy-5'-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione or a pharmacologically acceptable salt thereof.

18. The use of claim 15, wherein the compound is (2S,5'R)-7-chloro-6-(5-ethyl-1,3,4-oxadiazol-2-yl)-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione or a pharmacologically acceptable salt thereof.

19. The use of claim 15, wherein the compound is (2S,5'R)-7-chloro-6-[3-(1-hydroxy-1-methyl-ethyl)-1,2,4-oxadiazol-5-yl]-3',4-dimethoxy-5'-methyl-spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione or a pharmacologically acceptable salt thereof.

20. The use of claim 15, wherein the compound is (2S,5'R)-7-chloro-4-ethoxy-3'-methoxy-5'-methyl-6-(5-methyl-1,3,4-oxadiazol-2-yl) spiro [benzofuran-2,4'-cyclohex-2-ene]-1',3-dione or a pharmacologically acceptable salt thereof.