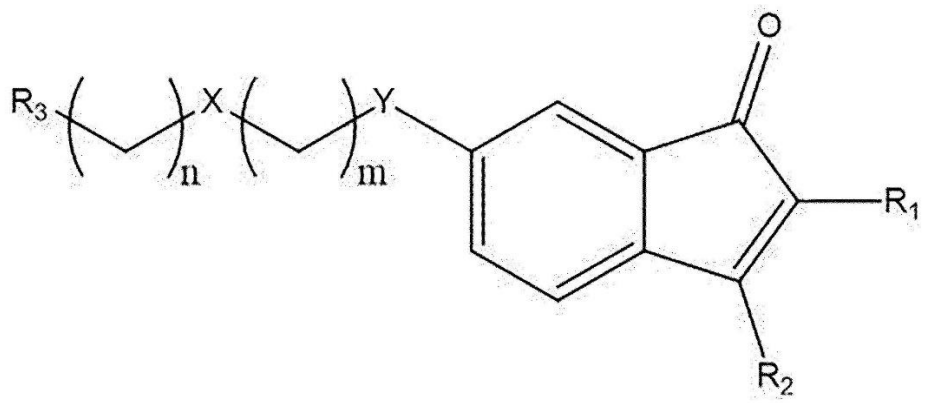
CLAIMS

1. A compound of Formula 1 below or an isomer or pharmaceutically acceptable salt thereof:

[Formula 1]



wherein, in Formula 1,

X is a direct bond or O;

Y is O or S;

n is an integer from 0 to 5;

m is an integer from 1 to 5;

R_1 is halogen, C_{1-6} alkyl, C_{6-10} aryl, -C_{1-6} alkyl-C_{6-10} aryl, or 5- or 6-membered heteroaryl, wherein the C_{1-6} alkyl, the C_{6-10} aryl, the -C_{1-6} alkyl-C_{6-10} aryl, and the 5- or 6-membered heteroaryl may each independently be unsubstituted or substituted with 1 to 4 halogens, hydroxy, CN, -NH_2, -CF_3, C_{1-6} alkyl, -C_{1-6} alkyl-CN, -O-C_{1-6} alkyl, -NH-C_{1-6} alkyl, or -N(C_{1-6} alkyl)$_2$;

R_2 is 5- or 6-membered heteroaryl, wherein the 5- or 6-membered heteroaryl may be unsubstituted or substituted with 1 to 4 halogens, -CF_3, or C_{1-6} alkyl;

R_3 is C_{6-10} aryl, 5- or 6-membered heteroaryl, or 5- to 10-membered heterocyclyl, wherein the C_{6-10} aryl, the 5- or 6-membered heteroaryl, and the 5- to 10-membered heterocyclyl may each independently be unsubstituted or substituted with 1 to 4 halogens, hydroxy, CN, -NH_2, -CF_3, C_{1-6} alkyl, -C_{1-6} alkyl-CN, -O-C_{1-6} alkyl, -NH-C_{1-6} alkyl, or -N(C_{1-6} alkyl)$_2$; and

the heteroaryl is an aromatic heterocycle containing 1 to 4 heteroatoms selected from N, O, and S, and the heterocyclyl is an aliphatic heterocycle containing 1 to 4 heteroatoms selected from N, O, and S.

2. The compound or the isomer or pharmaceutically acceptable salt thereof of claim 1, wherein R_1 is halogen, phenyl, pyridinyl, pyrimidinyl, or thiophenyl, wherein the phenyl, the pyridinyl, the pyrimidinyl, and the thiophenyl may each independently be unsubstituted or substituted with 1 to 4 halogens, hydroxy, CN, $-CF_3$, C_{1-6} alkyl, $-C_{1-6}$ alkyl-CN, or $-O-C_{1-6}$ alkyl.

3. The compound or the isomer or pharmaceutically acceptable salt thereof of claim 1 or 2, wherein R_2 is furanyl, thiophenyl, thiazolyl, or pyrazolyl, wherein the thiazolyl, the furanyl, the thiophenyl, and the pyrazolyl may each independently be unsubstituted or substituted with 1 to 4 halogens, $-CF_3$, or C_{1-6} alkyl.

4. The compound or the isomer or pharmaceutically acceptable salt thereof of any one of claims 1 to 3, wherein R_3 is phenyl, pyridinyl, morpholinyl, or benzodioxolyl, wherein the phenyl, the pyridinyl, the morpholinyl, and the benzodioxolyl may each independently be unsubstituted or substituted with 1 to 4 halogens, hydroxy, $-NH_2$, $-CF_3$, C_{1-6} alkyl, $-O-C_{1-6}$ alkyl, $-NH-C_{1-6}$ alkyl, or $-N(C_{1-6}\text{ alkyl})_2$.

5. The compound or the isomer or pharmaceutically acceptable salt thereof of any one of claims 1 to 4, wherein

R_1 is halogen, phenyl, pyridinyl, pyrimidinyl, or thiophenyl, wherein the phenyl, the pyridinyl, the pyrimidinyl, and the thiophenyl may each independently be unsubstituted or substituted with 1 to 4 halogens, hydroxy, CN, $-CF_3$, C_{1-6} alkyl, $-C_{1-6}$ alkyl-CN, or $-O-C_{1-6}$ alkyl,

R_2 is furanyl, thiophenyl, thiazolyl, or pyrazolyl, wherein the thiazolyl, the furanyl, the thiophenyl, and the pyrazolyl may each independently be unsubstituted or substituted with 1 to 4 halogens, $-CF_3$, or C_{1-6} alkyl, and

R_3 is phenyl, pyridinyl, morpholinyl, or benzodioxolyl, wherein the phenyl, the pyridinyl, the morpholinyl, and the benzodioxolyl may each independently be unsubstituted or substituted with 1 to 4 halogens, hydroxy, $-NH_2$, $-CF_3$, C_{1-6} alkyl, $-O-C_{1-6}$ alkyl, $-NH-C_{1-6}$ alkyl, or $-N(C_{1-6}\text{ alkyl})_2$.

6. The compound or the isomer or pharmaceutically acceptable salt thereof of any one of claims 1 to 5,

wherein the compound is any one selected from the group consisting of the following compounds:

(1) 3-(4-methylthiazol-5-yl)-6-(3-phenylpropoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(2) 2-(2-(3-(4-methylthiazol-5-yl)-1-oxo-6-(3-phenylpropoxy)-1H-inden-2-yl)phenyl)acetonitrile;

(3) 2-bromo-3-(4-methylthiazol-5-yl)-6-(3-phenylpropoxy)-1H-inden-1-one;

(4) 3-(5-methylthiazol-4-yl)-6-(3-morpholinopropoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(5) 2-bromo-3-(5-methylthiazol-4-yl)-6-(3-morpholinopropoxy)-1H-inden-1-one;

(6) 6-(3-phenylpropoxy)-2-(pyridin-3-yl)-3-(thiophen-2-yl)-1H-inden-1-one;

(7) 6-(3-phenylpropoxy)-3-(1H-pyrazol-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(8) 3-(5-methylthiazol-4-yl)-6-(3-phenylpropoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(9) 3-(furan-3-yl)-6-(3-phenylpropoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(10) 3-(4-methylthiazol-5-yl)-2-phenyl-6-(3-phenylpropoxy)-1H-inden-1-one;

(11) 3-(4-methylthiazol-5-yl)-6-(3-phenylpropoxy)-2-(pyrimidin-5-yl)-1H-inden-1-one;

(12) 3-(4-methylthiazol-5-yl)-6-(3-phenylpropoxy)-2-(thiophen-2-yl)-1H-inden-1-one;

(13) 3-(4-methylthiazol-5-yl)-2-(pyridin-3-yl)-6-(3-(pyridin-4-yl)propoxy)-1H-inden-1-one;

(14) 3-(4-methylthiazol-5-yl)-6-phenethoxy-2-(pyridin-3-yl)-1H-inden-1-one;

(15) 3-(4-methylthiazol-5-yl)-6-(4-phenylbutoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(16) 6-((benzyloxy)methoxy)-3-(4-methylthiazol-5-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(17) 3-(4-methylthiazol-5-yl)-6-(2-phenoxyethoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(18) 2-(4-methoxyphenyl)-3-(5-methylthiazol-4-yl)-6-phenethoxy-1H-inden-1-one;

(19) 2-(4-methoxyphenyl)-3-(5-methylthiazol-4-yl)-6-(4-phenylbutoxy)-1H-inden-1-one;

(20) 6-((benzyloxy)methoxy)-2-(4-methoxyphenyl)-3-(5-methylthiazol-4-yl)-1H-inden-1-one;

(21) 2-(4-methoxyphenyl)-3-(5-methylthiazol-4-yl)-6-(2-phenoxyethoxy)-1H-inden-1-one;

(22) 2-(4-fluorophenyl)-6-(2-(4-methoxyphenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-1H-inden-1-one;

(23) 6-(2-(3,4-dimethoxyphenoxy)ethoxy)-2-(4-fluorophenyl)-3-(5-methylthiazol-4-yl)-1H-inden-1-one;

(24) 6-(2-(benzo[*d*][1,3]dioxol-5-yloxy)ethoxy)-2-(4-fluorophenyl)-3-(5-methylthiazol-4-yl)-1H-inden-1-one;

(25) 2-(4-fluorophenyl)-3-(5-methylthiazol-4-yl)-6-(2-(pyridin-4-yloxy)ethoxy)-1H-inden-1-one;

(26) 6-(2-(3,4-dichlorophenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(pyrimidin-5-yl)-1H-inden-1-one;

(27) 6-(2-(3,4-difluorophenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(pyrimidin-5-yl)-1H-inden-1-one;

(28) 3-(5-methylthiazol-4-yl)-6-phenethoxy-2-(thiophen-2-yl)-1H-inden-1-one;

(29) 3-(5-methylthiazol-4-yl)-6-(4-phenylbutoxy)-2-(thiophen-2-yl)-1H-inden-1-one;

(30) 6-((benzyloxy)methoxy)-3-(5-methylthiazol-4-yl)-2-(thiophen-2-yl)-1H-inden-1-one;

(31) 3-(5-methylthiazol-4-yl)-6-(2-phenoxyethoxy)-2-(thiophen-2-yl)-1H-inden-1-one;

(32) 6-(2-(4-methoxyphenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(4-(trifluoromethyl)phenyl)-1H-inden-1-one;

(33) 6-(2-(3,4-dimethoxyphenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(4-(trifluoromethyl)phenyl)-1H-inden-1-one;

(34) 6-(2-(benzo[*d*][1,3]dioxol-5-yloxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(4-

(trifluoromethyl)phenyl)-1H-inden-1-one;

(35) 3-(5-methylthiazol-4-yl)-6-(2-(pyridin-4-yloxy)ethoxy)-2-(4-(trifluoromethyl)phenyl)-1H-inden-1-one;

(36) 6-(2-(3,4-dichlorophenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(thiophen-2-yl)-1H-inden-1-one;

(37) 6-(2-(3,4-difluorophenoxy)ethoxy)-3-(5-methylthiazol-4-yl)-2-(thiophen-2-yl)-1H-inden-1-one;

(38) 3-(furan-3-yl)-6-phenethoxy-2-(pyridin-3-yl)-1H-inden-1-one;

(39) 3-(furan-3-yl)-6-(4-phenylbutoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(40) 6-((benzyloxy)methoxy)-3-(furan-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(41) 3-(furan-3-yl)-6-(2-phenoxyethoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(42) 3-(furan-3-yl)-6-(2-(4-methoxyphenoxy)ethoxy)-2-(pyridin-3-yl)-1H-inden-1-one;

(43) 6-(2-(3,4-dimethoxyphenoxy)ethoxy)-3-(furan-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(44) 6-(2-(benzo[*d*][1,3]dioxol-5-yloxy)ethoxy)-3-(furan-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(45) 3-(furan-3-yl)-2-(pyridin-3-yl)-6-(2-(pyridin-4-yloxy)ethoxy)-1H-inden-1-one;

(46) 6-(2-(3,4-dichlorophenoxy)ethoxy)-3-(furan-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(47) 6-(2-(3,4-difluorophenoxy)ethoxy)-3-(furan-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(48) 6-(2-(4-(dimethylamino)phenoxy)ethoxy)-3-(furan-3-yl)-2-(pyridin-3-yl)-1H-inden-1-one;

(49) 3-(furan-3-yl)-6-(2-(4-isopropylphenoxy)ethoxy)-2-(pyridin-3-yl)-1H-inden-1-one; and

(50) 3-(furan-3-yl)-6-(((4-methoxybenzyl)oxy)methoxy)-2-(pyridin-3-yl)-1H-inden-1-one.

7. A compound or isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6 for use in therapy.

8. Use of a pharmaceutical composition in the manufacture of a medicament for preventing or treating a neurodegenerative brain disease, comprising, as an active ingredient, the compound or the isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6.

9. The use of the pharmaceutical composition of claim 8, wherein the pharmaceutical composition is to be administered to a subject selected from:

(1) subjects who have a higher level or a higher risk of amyloid-beta aggregation than normal individuals not having a neurodegenerative brain disease;

(2) subjects who have a higher level or a higher risk of tau protein aggregation than normal individuals not having a neurodegenerative brain disease;

(3) subjects who have a higher level or a higher risk of phosphorylation of tau protein than normal individuals not having a neurodegenerative brain disease; and

(4) subjects corresponding to one or more of (1) to (3).

10. The use of the pharmaceutical composition of claim 8 or 9, wherein the neurodegenerative brain disease is any one selected from the group consisting of dementia, Alzheimer's disease, preclinical Alzheimer's disease, Parkinson's disease, Huntington's disease, mild cognitive impairment, cerebral amyloid angiopathy, Down's syndrome, amyloid stroke, systemic amyloid disease, Dutch amyloidosis, Niemann-Pick disease, senile dementia, amyotrophic lateral sclerosis, spinocerebellar atrophy, Tourette's syndrome, Friedrich's ataxia, Machado-Joseph's disease, Lewy body dementia, dystonia, progressive supranuclear palsy, and frontotemporal dementia.

11. Use of a pharmaceutical composition in the manufacture of a medicament for inhibiting amyloid-beta aggregation, or disaggregating amyloid-beta aggregates, comprising, as an active ingredient, the compound or the isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6.

12. Use of a pharmaceutical composition in the manufacture of a medicament for inhibiting tau protein aggregation, disaggregating tau protein aggregates, or inhibiting

the phosphorylation of tau protein, comprising, as an active ingredient, the compound or the isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6.

13. A composition comprising the compound or the isomer or acceptable salt thereof according to any one of claims 1 to 6.

14. Use of a health functional food in the manufacture of a medicament for preventing or ameliorating a neurodegenerative brain disease, comprising, as an active ingredient, the compound or the isomer or sitologically acceptable salt thereof according to any one of claims 1 to 6.

15. Use of a health functional food in the manufacture of a medicament for inhibiting amyloid-beta aggregation, or disaggregating amyloid-beta aggregates, comprising, as an active ingredient, the compound or the isomer or sitologically acceptable salt thereof according to any one of claims 1 to 6.

16. Use of a health functional food in the manufacture of a medicament for inhibiting tau protein aggregation, disaggregating tau protein aggregates, or inhibiting the phosphorylation of tau protein, comprising, as an active ingredient, the compound or the isomer or sitologically acceptable salt thereof according to any one of claims 1 to 6.

17. Use of a compound or isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6 in the manufacture of a medicament for inhibiting amyloid-beta aggregation or disaggregating amyloid-beta aggregates.

18. Use of a compound or isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6 in the manufacture of a medicament for inhibiting tau protein aggregation, disaggregating tau protein aggregates, or inhibiting the phosphorylation of tau protein.

19. Use of a compound or the isomer or pharmaceutically acceptable salt thereof according to any one of claims 1 to 6 in the manufacture of a medicament for treating or preventing a neurodegenerative brain disease.