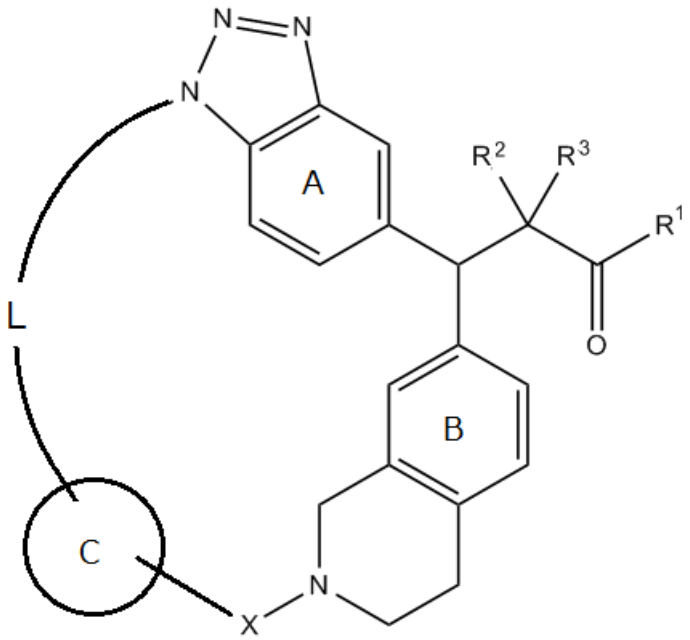
CLAIMS

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



(I)

wherein

R^1 is OH, ORy or NHRy;

Ry is an optionally substituted C_{1-6} alkyl group or an optionally substituted cyclic group;

R^2 and R^3, which may be the same or different, are a hydrogen atom or an optionally substituted C_{1-6} alkyl group, or R^2 and R^3 are joined together to form a C_{3-6} cycloalkyl group;

X is C(=O), SO_2 or $CR^{x1}R^{x2}$;

R^{x1} and R^{x2}, which may be the same or different, are a hydrogen atom or an optionally substituted C_{1-6} alkyl group;

ring A is a benzene ring which may have an additional substituent(s);

ring B is a benzene ring which may have an additional substituent(s);

ring C is an optionally substituted 5- or 6-membered aromatic ring which may contain a heteroatom(s); and

L is optionally substituted, saturated or unsaturated linear C_{4-8} alkylene optionally inserted by a heteroatom,

or a salt thereof.

2. The compound according to claim 1 or a salt thereof, wherein in formula (I),

L is $-(CR^4R^5)n-Y^1-(CR^6R^7)m-Y^2-*$

wherein * represents attachment to ring C;

n is an integer of 2 or more and 4 or less;

m is an integer of 1 or more and 4 or less;

R^4 and R^5 are the same as or different from each other, and are each a hydrogen atom, a halogen atom, OH, an optionally substituted C_{1-6} alkyl group or an

optionally substituted C_{1-6} alkoxy group, or R^4 and R^5 are joined together to form an optionally substituted C_{3-6} cycloalkyl group, and a plurality of R^4 or a plurality of R^5 may be the same as or different from each other, and the adjacent R^4 or R^5 may be joined together to form a double bond;

R^6 and R^7 are the same as or different from each other, and are each a hydrogen atom, a halogen atom, OH, an optionally substituted C_{1-6} alkyl group or an optionally substituted C_{1-6} alkoxy group, or R^6 and R^7 are joined together to form an optionally substituted C_{3-6} cycloalkyl group, and when m is 2 or more, a plurality of R^6 or a plurality of R^7 may be the same as or different from each other, and the adjacent R^6 or R^7 may be joined together to form a double bond;

Y^1 and Y^2, which may be the same or different, are a bond, an oxygen atom, a sulfur atom, SO, SO_2 or NR^8, provided that when Y^1 is a bond, m is 1 or 4; and

R^8 is a hydrogen atom or an optionally substituted C_{1-6} alkyl group, provided that when a plurality of R^8 is present, the plurality of R^8 may be the same as or different from each other.

3. The compound according to claim 1~~ or 2~~, or a salt thereof, wherein in formula (I),

L is selected from the group consisting of the following formulas:

$-CR^4R^5-CR^4R^5-CR^6R^7-CR^6R^7-CR^6R^7-CR^6R^7-*$;

$-CR^4R^5-CR^4R^5-CR^4R^5-CR^4R^5-CR^6R^7-*$;

$-CR^4R^5-CR^4R^5-CR^4R^5-CR^6R^7-O-*$;

$-CR^4R^5-CR^4R^5-CR^4R^5-O-CR^6R^7-*$; and

$-CR^4R^5-CR^4R^5-O-CR^6R^7-CR^6R^7-*$.

4. The compound according to ~~any one of claims 1 to 3~~claim 1, or a salt thereof, wherein in formula (I),

R^1 is OH or ORy;

Ry is a C_{1-6} alkyl group;

R^2 and R^3, which may be the same or different, are a hydrogen atom or a C_{1-3} alkyl group;

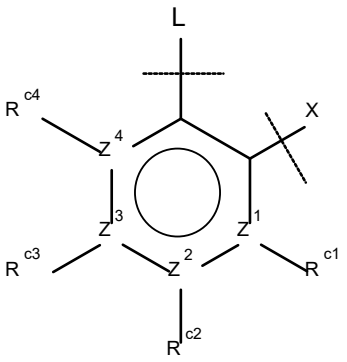
X is C(=O);

ring A is a benzene ring which may have an additional substituent(s) of a fluorine atom, a chlorine atom, a C_{1-3} alkyl group optionally substituted with 1 to 3 substituents (selected from a halogen atom and a C_{1-3} alkoxy group), or a C_{1-3} alkoxy

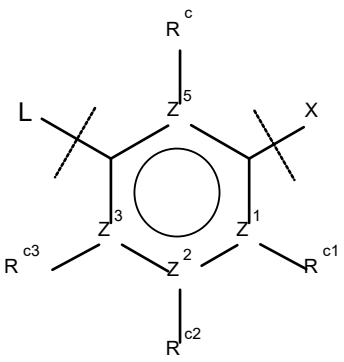
group optionally substituted with 1 to 3 substituents (selected from a halogen atom and a C_{1-3} alkoxy group);

ring B is a benzene ring which may have an additional substituent(s) of a fluorine atom, a chlorine atom, a cyano group, a C_{1-3} alkyl group optionally substituted with 1 to 3 substituents (selected from a halogen atom and a C_{1-3} alkoxy group), or a C_{1-3} alkoxy group optionally substituted with 1 to 3 substituents (selected from a halogen atom and a C_{1-3} alkoxy group); and

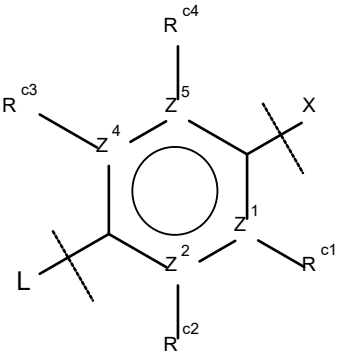
ring C is a group represented by the following formula:



(C-3)



(C-4)



(C-5)

wherein Z^1, Z^2, Z^3, Z^4 and Z^5 which may be the same or different, are a carbon atom or a nitrogen atom;

R^c is a hydrogen atom, a halogen atom, a nitro group, a cyano group, a hydroxy group, an optionally halogenated C_{1-6} alkyl group, an optionally halogenated C_{1-6} alkoxy group, or a C_{3-10} cycloalkyl group; and

R^{c1}, R^{c2}, R^{c3} and R^{c4}, which may be the same or different, are a hydrogen atom, a halogen atom, a nitro group, a cyano group, a hydroxy group, an optionally halogenated C_{1-6} alkyl group, an optionally halogenated C_{1-6} alkoxy group, or a C_{3-10} cycloalkyl group; or adjacent two of R^{c1}, R^{c2}, R^{c3} and R^{c4} may be joined together to form an optionally substituted ring, provided that when Z^1, Z^2, Z^3, Z^4 or Z^5 is a nitrogen atom, R^c, R^{c1}, R^{c2}, R^{c3} or R^{c4} is not present.

5. The compound according to ~~any one of claims 1 to 4~~claim 1, or a salt thereof, wherein in formula (I),

R^1 is OH;

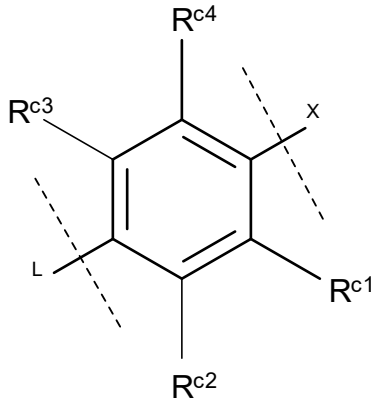
R^2 and R^3, which may be the same or different, are a hydrogen atom or a C_{1-3} alkyl group;

X is C(=O);

ring A is a benzene ring which may have an additional substituent(s) of a C_{1-3} alkyl group;

ring B is a benzene ring which does not have an additional substituent(s); and

ring C is a group represented by the following formula:



wherein

R^{c1} and R^{c4}, which may be the same or different, are a hydrogen atom, an optionally halogenated C_{1-6} alkyl group, an optionally halogenated C_{1-6} alkoxy group, a chlorine atom, or a fluorine atom, and R^{c2} and R^{c3} are each a hydrogen atom; and

L is $-CH_2-CH_2-CH_2-CH_2-CH_2-*$,

$-CH_2-CH_2-CH_2-CH_2-O-*$,

$-CH_2-CH_2-CH_2-O-CH_2-*$, or

$-CH_2-CH_2-O-CH_2-CH_2-*$.

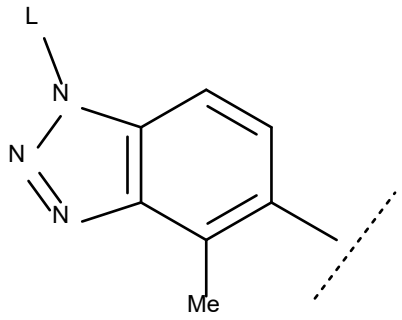
6. The compound according to ~~any one of claims 1 to 5~~claim 1, or a salt thereof, wherein in formula (I),

R^1 is OH;

R^2 and R^3, which may be the same or different, are a hydrogen atom or a methyl group;

X is C(=O);

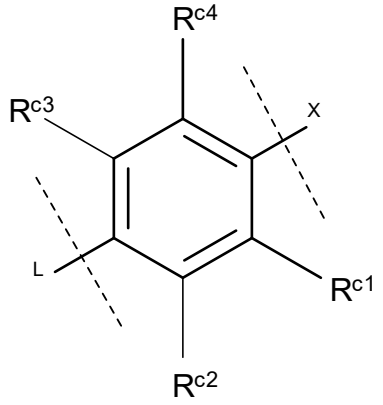
ring A is a substructure represented by the following formula:



;

ring B: a benzene ring which does not have an additional substituent;

ring C: a group represented by the following formula:



wherein

R^{c1} and R^{c4}, which may be the same or different, are a hydrogen atom, a chlorine atom, or a methyl group, and R^{c2} and R^{c3} are each a hydrogen atom; and

L is $-CH_2-CH_2-CH_2-CH_2-CH_2-*$,

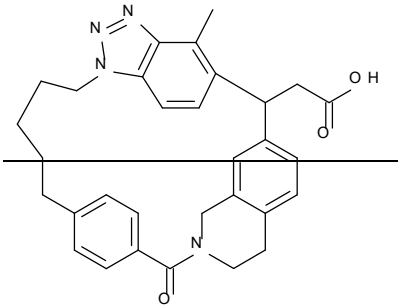
$-CH_2-CH_2-CH_2-CH_2-O-*$,

$-CH_2-CH_2-CH_2-O-CH_2-*$, or

-CH_2-CH_2-O-CH_2-CH_2-*.

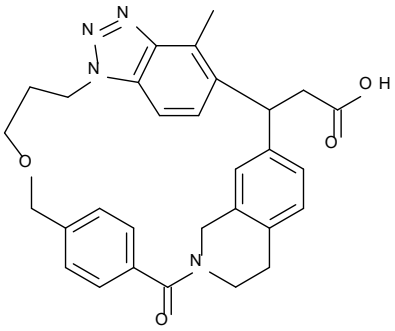
7. A compound ~~selected from the group consisting~~ of the following formula:

~~[32-methyl-20-oxo-8,9,10,21-tetraazahexacyclo[19.5.3.$2^{16,19}$.$1^{3,7}$.$0^{6,10}$.$0^{24,28}$]dotriaconta-1(26),3(32),4,6,8,16,18,24,27,30-decaen-2-yl]acetic acid:~~



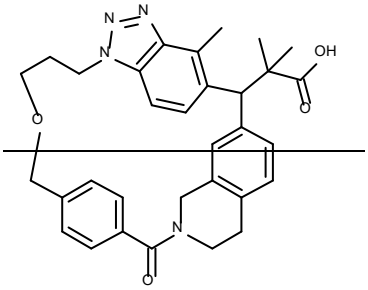
;

~~[32-methyl-20-oxo-14-oxa-8,9,10,21-tetraazahexacyclo[19.5.3.$2^{16,19}$.$1^{3,7}$.$0^{6,10}$.$0^{24,28}$]dotriaconta-1(26),3(32),4,6,8,16,18,24,27,30-decaen-2-yl]acetic acid:~~



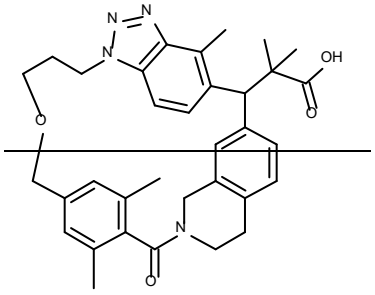
;

~~2-methyl-2-[32-methyl-20-oxo-14-oxa-8,9,10,21-tetraazahexacyclo[19.5.3.2^{16,19}.1^{3,7}.0^{6,10}.0^{24,28}]dotriaconta-1(27),3(32),4,6,8,16,18,24(28),25,30-decaen-2-yl]propionic acid:~~



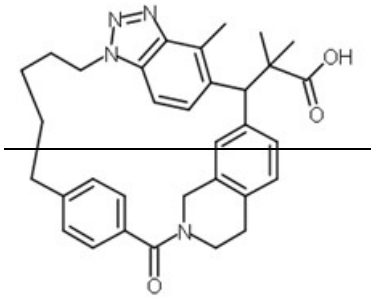
;

~~2-methyl-2-[18,30,32-trimethyl-20-oxo-14-oxa-8,9,10,21-tetraazahexacyclo[19.5.3.2^{16,19}.1^{3,7}.0^{6,10}.0^{24,28}]dotriaconta-1(27),3(32),4,6,8,16(31),17,19(30),24(28),25-decaen-2-yl]propionic acid:~~



;

~~2-methyl-2-[32-methyl-20-oxo-8,9,10,21-tetrazahexacyclo[19.5.3.2^{16,19}.1^{3,7}.0^{6,10}.0^{24,28}]dotriaconta-1(27),3(32),4,6,8,16(31),17,19(30),24(28),25-decaen-2-yl]propanoic acid~~



;

or a salt thereof.

8. A medicament comprising the compound according to ~~any one of claims 1 to 7~~claim 1 or a salt thereof.

9. The medicament according to claim 8, wherein the medicament is an NRF2 activator.

~~10. The medicament according to claim 8, wherein the medicament is a preventive or therapeutic agent for hepatic and bile duct disease, cardiovascular disease, lung disease, kidney disease, central nervous system disease, cancer, sickle cell disease, mitochondrial disease, or inflammatory disease.~~

~~11~~10. A pharmaceutical composition comprising the compound according to ~~any one of claims 1 to 7~~ claim 1 or a pharmaceutically acceptable salt thereof for use in prevention or treatment for hepatic and bile duct disease, cardiovascular disease, lung disease, kidney disease, central nervous system disease, cancer, sickle cell disease, mitochondrial disease, or inflammatory disease.

11. Use of the compound according to claim 1 or a salt thereof in the manufacture of a medicament for prevention or treatment of hepatic and bile duct disease, cardiovascular disease, lung disease, kidney disease, central nervous system disease, cancer, sickle cell disease, mitochondrial disease, or inflammatory disease.

12. The compound according to claim 1 or a salt thereof for use in~~A method of~~ activating NRF2 in a mammal~~ comprising administering the compound according to any one of claims 1 to 7 or a salt thereof to the mammal in an effective amount~~.

13. Use of the compound according to claim 1 or a salt thereof in the manufacture of a medicament for activating NRF2 in a mammal.

~~13. A method of preventing or treating hepatic and bile duct disease, cardiovascular disease, lung disease, kidney disease, central nervous system disease, cancer, sickle cell disease, mitochondrial disease, or inflammatory disease in a mammal, the method comprising administering the compound according to any one of claims 1 to 7 or a salt thereof to the mammal.~~

~~14. Use of the compound according to any one of claims 1 to 7 or a salt thereof for producing a preventive or therapeutic agent for hepatic and bile duct disease, cardiovascular disease, lung disease, kidney disease, central nervous system disease, cancer, sickle cell disease, mitochondrial disease, or inflammatory disease.~~

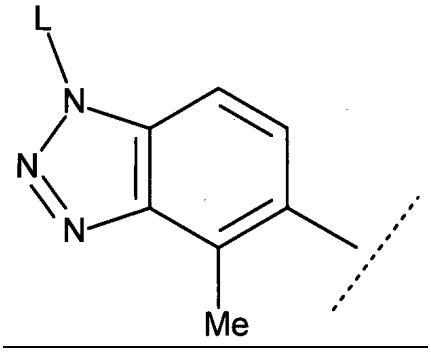
14. The compound according to claim 1 or a salt thereof, wherein in formula (I),

R^1 is OH;

R^2 and R^3, which may be the same or different, are a hydrogen atom or a methyl group;

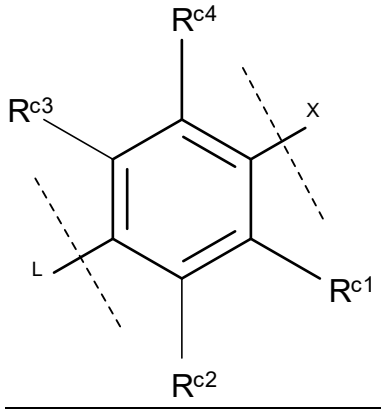
X is C(=O);

ring A is a substructure represented by the following formula:



ring B is a benzene ring which does not have an additional substituent; and

ring C is a group represented by the following formula:

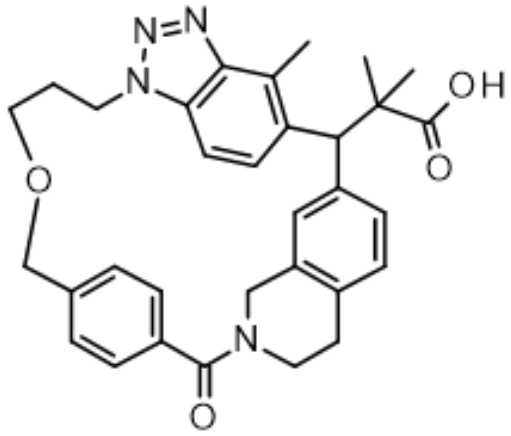


wherein

R^{c1} and R^{c4}, which may be the same or different, are a hydrogen atom or a methyl group, and R^{c2} and R^{c3} are each a hydrogen atom; and

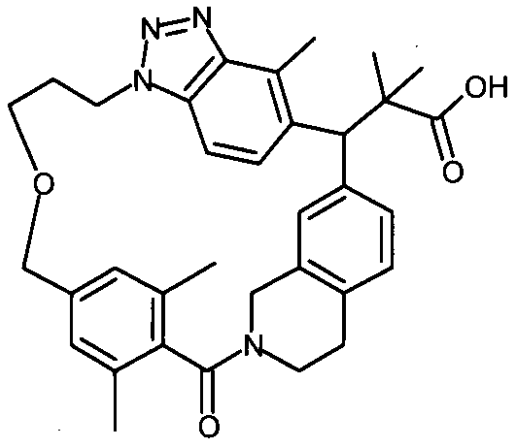
L is $-CH_2-CH_2-CH_2-O-CH_2-*$.

15. A compound of the following formula:



or a salt thereof.

16. A compound of the following formula:



or a salt thereof.