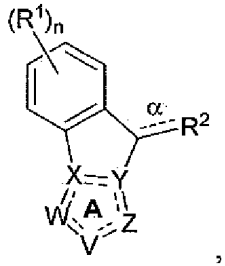
also be an important treatment strategy for patients with neurological or neuropsychiatric diseases or disorders such as depression. The compounds, compositions and methods herein help meet the current need for IDO1, IDO2 and TDO modulators.

**[0014]** In this invention, we describe novel structures related to imidazoisoindoles, with different electronic and heme binding properties, that can specifically inhibit IDO1, IDO2 or TDO, or that can exert combined inhibition of tryptophan degradation mediated by any of these enzymes.

**[0014a]** In one aspect, there is provided a compound of the formula,

[Chemical formula 41]



(I)

its tautomers or a pharmaceutically acceptable salt thereof, wherein

n is 0, 1, 2, 3, or 4;

bond α is a single or double bond

ring A is an aromatic ring wherein

i) V and X are N, W and Z are CH and Y is C; or

ii) V, Y and Z are N, W is CH and X is C; or

iii) V, W and Y are N, X is C and Z is CH; or

iv) V and W are N or NH, X and Y are C and Z is CH;

each $R^1$ is independently halogen, cyano, nitro, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, -OR, $-N(R)_2$, -SR, $-C(O)OR$, $-C(O)N(R)_2$, $-C(O)R$, $-S(O)R$, $-S(O)OR$, $-S(O)N(R)_2$, $-S(O)_2R$, $-S(O)_2OR$, $-S(O)_2N(R)_2$, $-OC(O)R$, $-OC(O)OR$, $-OC(O)N(R)_2$, $-N(R)C(O)R$, $-N(R)C(O)OR$, or $-N(R)C(O)N(R)_2$;

$R^2$ is $-C_{1-4}$alkyl-$R^A$ or $-C_{2-4}$alkenyl-$R^3$ when bond α is a single bond; and

$R^2$ is $=C(H)R^A$ when bond α is a double bond;

wherein

$R^A$ is -CN, $-C(O)R^3$, $-C(O)OR^3$, $-C(O)N(R^3)(R^C)$, $-C(OR^B)(R^3)(R^C)$, $-C(NHR^B)(R^3)(R^C)$, or $-C(=N\text{-}OR^C)R^3$, wherein

$R^B$ is hydrogen, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, -$C_{1-6}$alkyl-$R^{B1}$, -$C(O)R^3$, -$S(O)_2R^3$, -$C(O)(CH_2)_{1-4}COOR$, -$C(O)CH(NH_2)(R^D)$, -$S(O)_2OR^3$, -$S(O)_2N(R^3)_2$, -$CH_2$-$OP(O)_2(OR)_2$, or -$P(O)(OR^3)_2$, wherein

$R^{B1}$ is cyano, nitro, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, -OR, -$N(R)_2$, -SR, -C(O)OR, -$C(O)N(R)_2$, -C(O)R, -S(O)R, -S(O)OR, -$S(O)N(R)_2$, -$S(O)_2R$, -$S(O)_2OR$, -$S(O)_2N(R)_2$, -OC(O)R, -OC(O)OR, -$OC(O)N(R)_2$, -N(R)C(O)R, -N(R)C(O)OR, or -N(R)C(O)$N(R)_2$;

$R^D$ is hydrogen, methyl, -$CH(CH_3)_2$, -$CH_2CH(CH_3)_2$, -$CH(CH_3)(CH_2CH_3)$, benzyl, 4-hydroxybenzyl, -$CH_2$(3-indolyl), -$CH_2SH$, -$CH_2CH_2SCH_3$, -$CH_2OH$, -$CH(CH_3)OH$, -$(CH_2)_4$-$NH_2$, -$(CH_2)_3$-N(H)C(=NH)$NH_2$, -$CH_2$(4-imidazolyl), -$CH_2COOH$, -$CH_2CH_2COOH$, -$CH_2CONH_2$, or -$CH_2CH_2CONH_2$;

each $R^3$ is independently hydrogen, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, aryl$C_{1-6}$alkyl-, heteroaryl$C_{1-6}$ alkyl-, $C_{3-8}$cycloalkyl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkenyl$C_{1-6}$alkyl-, or (3-10 membered heterocyclyl)$C_{1-6}$alkyl-, wherein

the $C_{1-6}$alkyl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, $C_{3-8}$cycloalkyl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkenyl$C_{1-6}$alkyl-, and (3-10 membered heterocyclyl)$C_{1-6}$alkyl- are each optionally and independently substituted by one $=R^{32}$ group and each optionally substituted and independently by one, two, three, or four $R^{31}$ groups;

the aryl, heteroaryl, aryl$C_{1-6}$alkyl-, and heteroaryl$C_{1-6}$alkyl- groups, are each optionally substituted by one, two, three, or four $R^{31}$ groups;

wherein

each $R^{31}$ is independently halogen, cyano, nitro, $C_{1-6}$alkyl, -$C_{1-6}$alkyl-$R^{33}$, $C_{1-6}$haloalkyl, -OR, -$N(R)_2$, -SR, -C(O)OR, -$C(O)N(R)_2$, -C(O)R, -S(O)R, -S(O)OR, -$S(O)N(R)_2$, -$S(O)_2R$,

$-S(O)_2OR$, $-S(O)_2N(R)_2$, $-OC(O)R$, $-OC(O)OR$, $-OC(O)N(R)_2$, $-N(R)C(O)R$, $-N(R)C(O)OR$, or $-N(R)C(O)N(R)_2$, wherein

$R^{33}$ is cyano, $-OR$, $-N(R)_2$, $-SR$, $-C(O)OR$, $-C(O)N(R)_2$, $-C(O)R$, $-S(O)R$, $-S(O)OR$, $-S(O)N(R)_2$, $-S(O)_2R$, $-S(O)_2OR$, $-S(O)_2N(R)_2$, $-OC(O)R$, $-OC(O)OR$, $-OC(O)N(R)_2$, $-N(R)C(O)R$, $-N(R)C(O)OR$, or $-N(R)C(O)N(R)_2$;

$R^{32}$ is =O, =S, =N(R), =N(OR), $=C(R^{34})_2$, =(spiro-$C_{3-8}$cycloalkyl), or =(spiro-(3-10 membered heterocyclyl)), wherein

each $R^{34}$ is independently hydrogen, halogen, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, $C_{3-8}$cycloalkyl, or 3-10 membered heterocyclyl;

or both $R^{34}$ taken together with the atom to which they are both attached form a monocyclic $C_{3-8}$cycloalkyl or monocyclic 3-8 membered heterocyclyl;

$R^C$ is hydrogen or $C_{1-6}$alkyl;

and

each R is independently hydrogen or $R^{10}$, wherein

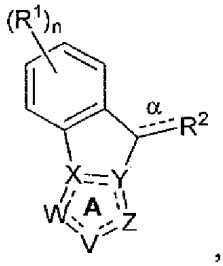
$R^{10}$ is $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, aryl$C_{1-6}$alkyl, heteroaryl$C_{1-6}$alkyl-, $C_{3-8}$ cycloalkyl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkenyl$C_{1-6}$alkyl-, or (3-10 membered heterocyclyl)$C_{1-6}$alkyl-, each $R^{10}$ optionally substituted by one, two, three, or four groups that are each independently halogen, cyano, nitro, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, $-OR^{11}$, $-N(R^{11})_2$, $-SR^{11}$, $-C(O)OR^{11}$, $-C(O)N(R^{11})_2$, $-C(O)R^{11}$, $-S(O)R^{11}$, $-S(O)OR^{11}$, $-S(O)N(R^{11})_2$, $-S(O)_2R^{11}$, $-S(O)_2OR^{11}$, $-S(O)_2N(R^{11})_2$, $-OC(O)R^{11}$, $-OC(O)OR^{11}$, $-OC(O)N(R^{11})_2$, $-N(R^{11})C(O)R^{11}$, $-N(R^{11})C(O)OR^{11}$, or $-N(R^{11})C(O)N(R^{11})_2$, wherein each $R^{11}$ is independently hydrogen or $C_{1-6}$alkyl.

**[0014b]** In one aspect, there is provided a pharmaceutical composition comprising a compound as described herein, its tautomers or a pharmaceutically acceptable salt thereof, or a compound as described herein, and a pharmaceutically acceptable diluent, excipient, or carrier.

**[0014c]** In one aspect, there is provided a pharmaceutical composition as described herein for treating immunosuppression in a subject in need thereof.

**[0014d]** In one aspect, there is provided a composition comprising a compound as described herein, its tautomers or a pharmaceutically acceptable salt thereof, or a compound as described herein and a pharmaceutically acceptable diluent, excipient, or carrier for inhibiting IDO in a cell.

**[0015]** In one aspect, the invention comprises compounds according to the formula (I) and its tautomers,



wherein

$R^1$, $R^2$, and n are each defined herein;

bond α is a simple or double bond

ring A is an aromatic ring wherein

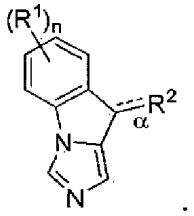
i) V and X are N, W and Z are CH and Y is C; or

ii) V, Y and Z are N, W is CH and X is C; or

iii) V, W and Y are N, X is C and Z is CH; or

iv) V and W are N or NH, X and Y are C and Z is CH;

**[0016]** In a most preferred embodiment, the invention comprises compounds of Formula (I) where V and X are nitrogen (N), W and Z are CH and Y is carbon (C), to yield compounds of Formula (II),



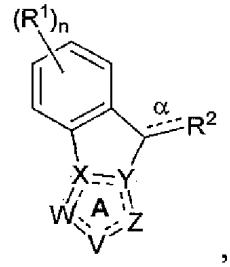
(II)

**We Claim:**

[Claim 1]

A compound of the formula,

[Chemical formula 41]



(I)

*its tautomers or a pharmaceutically acceptable salt thereof, wherein*

n is 0, 1, 2, 3, or 4;

bond α is a single or double bond

ring A is an aromatic ring wherein

i) V and X are N, W and Z are CH and Y is C; or

ii) V, Y and Z are N, W is CH and X is C; or

iii) V, W and Y are N, X is C and Z is CH; or

iv) V and W are N or NH, X and Y are C and Z is CH;

each $R^1$ is independently halogen, cyano, nitro, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, -OR, $-N(R)_2$, -SR, -C(O)OR, $-C(O)N(R)_2$, -C(O)R, -S(O)R, -S(O)OR, $-S(O)N(R)_2$, $-S(O)_2R$, $-S(O)_2OR$, $-S(O)_2N(R)_2$, -OC(O)R, -OC(O)OR, $-OC(O)N(R)_2$, -N(R)C(O)R, -N(R)C(O)OR, or $-N(R)C(O)N(R)_2$;

$R^2$ is $-C_{1-4}$alkyl-$R^A$ or $-C_{2-4}$alkenyl-$R^3$ when bond α is a single bond; and

$R^2$ is $=C(H)R^A$ when bond α is a double bond;

wherein

$R^A$ is -CN, $-C(O)R^3$, $-C(O)OR^3$, $-C(O)N(R^3)(R^C)$, $-C(OR^B)(R^3)(R^C)$, $-C(NHR^B)(R^3)(R^C)$, or $-C(=N-OR^C)R^3$, wherein

$R^B$ is hydrogen, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, $-C_{1-6}$alkyl-$R^{B1}$, $-C(O)R^3$, $-S(O)_2R^3$, $-C(O)(CH_2)_{1-4}COOR$, $-C(O)CH(NH_2)(R^D)$, $-S(O)_2OR^3$, $-S(O)_2N(R^3)_2$, $-CH_2-OP(O)_2(OR)_2$, or $-P(O)(OR^3)_2$, wherein

$R^{B1}$ is cyano, nitro, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, -OR, $-N(R)_2$, -SR, -C(O)OR, $-C(O)N(R)_2$, -C(O)R, -S(O)R, -S(O)OR, $-S(O)N(R)_2$, $-S(O)_2R$, $-S(O)_2OR$, $-S(O)_2N(R)_2$, -OC(O)R,

-OC(O)OR, -OC(O)N(R)$_2$, -N(R)C(O)R, -N(R)C(O)OR, or -N(R)C(O)N(R)$_2$;

$R^D$ is hydrogen, methyl, -CH(CH$_3$)$_2$, -CH$_2$CH(CH$_3$)$_2$, -CH(CH$_3$)(CH$_2$CH$_3$), benzyl, 4-hydroxybenzyl, -CH$_2$(3-indolyl), -CH$_2$SH, -CH$_2$CH$_2$SCH$_3$, -CH$_2$OH, -CH(CH$_3$)OH, -(CH$_2$)$_4$-NH$_2$, -(CH$_2$)$_3$-N(H)C(=NH)NH$_2$, -CH$_2$(4-imidazolyl), -CH$_2$COOH, -CH$_2$CH$_2$COOH, -CH$_2$CONH$_2$, or -CH$_2$CH$_2$CONH$_2$;

each $R^3$ is independently hydrogen, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, aryl$C_{1-6}$alkyl-, heteroaryl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkyl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkenyl$C_{1-6}$alkyl-, or (3-10 membered heterocyclyl)$C_{1-6}$alkyl-,

wherein

the $C_{1-6}$alkyl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, $C_{3-8}$cycloalkyl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkenyl$C_{1-6}$alkyl-, and (3-10 membered heterocyclyl)$C_{1-6}$alkyl- are each optionally and independently substituted by one =$R^{32}$ group and each optionally substituted and independently by one, two, three, or four $R^{31}$ groups;

the aryl, heteroaryl, aryl$C_{1-6}$alkyl-, and heteroaryl$C_{1-6}$alkyl- groups, are each optionally substituted by one, two, three, or four $R^{31}$ groups;

wherein

each $R^{31}$ is independently halogen, cyano, nitro, $C_{1-6}$alkyl, -$C_{1-6}$alkyl-$R^{33}$, $C_{1-6}$haloalkyl, -OR, -N(R)$_2$, -SR, -C(O)OR, -C(O)N(R)$_2$, -C(O)R, -S(O)R, -S(O)OR, -S(O)N(R)$_2$, -S(O)$_2$R, -S(O)$_2$OR, -S(O)$_2$N(R)$_2$, -OC(O)R, -OC(O)OR, -OC(O)N(R)$_2$, -N(R)C(O)R, -N(R)C(O)OR, or -N(R)C(O)N(R)$_2$, wherein

$R^{33}$ is cyano, -OR, -N(R)$_2$, -SR, -C(O)OR, -C(O)N(R)$_2$, -C(O)R, -S(O)R, -S(O)OR, -S(O)N(R)$_2$, -S(O)$_2$R,

$-S(O)_2OR$, $-S(O)_2N(R)_2$, -OC(O)R, -OC(O)OR, $-OC(O)N(R)_2$, -N(R)C(O)R, -N(R)C(O)OR, or $-N(R)C(O)N(R)_2$;

$R^{32}$ is =O, =S, =N(R), =N(OR), $=C(R^{34})_2$, =(spiro-$C_{3-8}$cycloalkyl), or =(spiro-(3-10 membered heterocyclyl)), wherein

each $R^{34}$ is independently hydrogen, halogen, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, $C_{3-8}$cycloalkyl, or 3-10 membered heterocyclyl;

or both $R^{34}$ taken together with the atom to which they are both attached form a monocyclic $C_{3-8}$cycloalkyl or monocyclic 3-8 membered heterocyclyl;

$R^C$ is hydrogen or $C_{1-6}$alkyl;

and

each R is independently hydrogen or $R^{10}$, wherein

$R^{10}$ is $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, aryl$C_{1-6}$alkyl, heteroaryl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkyl$C_{1-6}$alkyl-, $C_{3-8}$cycloalkenyl$C_{1-6}$alkyl-, or (3-10 membered heterocyclyl)$C_{1-6}$alkyl-, each $R^{10}$ optionally substituted by one, two, three, or four groups that are each independently halogen, cyano, nitro, $C_{1-6}$alkyl, $C_{1-6}$haloalkyl, $-OR^{11}$, $-N(R^{11})_2$, $-SR^{11}$, $-C(O)OR^{11}$, $-C(O)N(R^{11})_2$, $-C(O)R^{11}$, $-S(O)R^{11}$, $-S(O)OR^{11}$, $-S(O)N(R^{11})_2$, $-S(O)_2R^{11}$, $-S(O)_2OR^{11}$, $-S(O)_2N(R^{11})_2$, $-OC(O)R^{11}$, $-OC(O)OR^{11}$, $-OC(O)N(R^{11})_2$, $-N(R^{11})C(O)R^{11}$, $-N(R^{11})C(O)OR^{11}$, or $-N(R^{11})C(O)N(R^{11})_2$, wherein each $R^{11}$ is independently hydrogen or $C_{1-6}$alkyl.

[Claim 2]

The compound of claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein bond α is a single bond.

[Claim 3]

The compound of claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein V and X are N, W and Z are CH and Y is C.

[Claim 4]

The compound of claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein V, Y and Z are N, W is CH and X is C.

[Claim 5]

The compound of claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein V, W and Y are N, X is C and Z is CH.

[Claim 6]

The compound of claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein V and W are N or NH, X and Y are C and Z is CH.

[Claim 7]

The compound of claim 1, 2, 3, 4, 5 or 6, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^2$ is -$C_{1-4}$alkyl-$R^A$.

[Claim 8]

The compound of claim 1, 2, 3, 4, 5 or 6, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^2$ is -$CH_2$-$R^A$, -$CH_2CH_2$-$R^A$, -C(H)($CH_3$)$CH_2$-$R^A$, or -C(H)=C(H)$R^3$.

[Claim 9]

The compound of claim 8, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^2$ is -$CH_2$-$R^A$.

[Claim 10]

The compound of any one of claims 1 - 9, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^A$ is -C(O)$R^3$ or -C($OR^B$)($R^3$)($R^C$).

[Claim 11]

The compound of any one of claims 1 - 9, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^A$ is -C($NHR^B$)($R^3$)($R^C$), or -C(=N-$OR^C$)$R^3$.

[Claim 12]

The compound of any one of claims 1 - 9, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^A$ is -C($NHR^B$)($R^3$)($R^C$), wherein $R^B$ is hydrogen, $C_{1-6}$alkyl, or -C(O)$C_{1-6}$alkyl.

[Claim 13]

The compound of any one of claims 1 - 9, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^A$ is -C($OR^B$)($R^3$)($R^C$).

[Claim 14]

The compound of any one of claims 1 - 9, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^A$ is -CH(OH)($R^3$).

[Claim 15]

The compound of any one of claims 1 - 14, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is hydrogen.

[Claim 16]

The compound of any one of claims 1 - 14, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, or $C_{3-8}$cycloalkyl$C_{1-6}$alkyl-, wherein

the $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, 3-10 membered heterocyclyl, and $C_{3-8}$cycloalkyl$C_{1-6}$ alkyl-, are each optionally and independently substituted by one $=R^{32}$ group and each optionally and independently substituted by one or two $R^{31}$ groups; and

the aryl and heteroaryl groups, are each optionally substituted by one or two $R^{31}$ groups.

[Claim 17]

The compound of any one of claims 1 - 14, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is phenyl, a five or six membered heteroaryl, monocyclic $C_{5-8}$cycloalkyl, monocyclic $C_{5-8}$cycloalkenyl, a five or six membered monocyclic heterocyclyl, or (monocyclic $C_{5-8}$cycloalkyl)$C_{1-6}$ alkyl-, wherein

the $C_{5-8}$cycloalkyl, $C_{5-8}$cycloalkenyl, 5 - 6 membered heterocyclyl, and $C_{5-8}$cycloalkyl$C_{1-6}$ alkyl-, are each optionally and independently substituted by one $=R^{32}$ group and each optionally and independently substituted by one or two $R^{31}$ groups; and

the phenyl and heteroaryl groups, are each optionally substituted by one or two $R^{31}$ groups.

[Claim 18]

The compound of any one of claims 1 - 14, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is phenyl or a five or six membered heteroaryl, each optionally substituted by one or two $R^{31}$ groups.

[Claim 19]

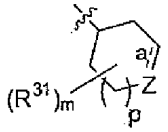
The compound of any one of claims 1 - 14, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is monocyclic $C_{5-8}$cycloalkyl, monocyclic $C_{5-8}$cycloalkenyl, a five or six membered monocyclic heterocyclyl, or (monocyclic $C_{5-}$

$_8$cycloalkyl)$C_{1-6}$alkyl-, each optionally substituted by one $=R^{32}$ group and one or two $R^{31}$ groups.

[Claim 20]

The compound of any one of claims 1 - 14, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is

[Chemical formula 42]




, wherein

bond a is a single bond or a double bond;

m is 0, 1, or 2;

p is 0 or 1; and

when bond "a" is a single bond, then Z is $-C(R^{36})_2-$, $-C(=R^{32})-$, $-N(R^{35})-$, or -O-, wherein

$R^{35}$ is hydrogen, $C_{1-6}$alkyl, $-C(O)R$, $-S(O)_2R$, $-C(O)OR$, $-C(O)N(R)_2$, $-S(O)_2OR$, or $-S(O)_2N(R)_2$; and

when bond a is a double bond, then Z is $-C(R^{36})=$ or -N=;

each $R^{36}$ is independently hydrogen or $R^{31}$.

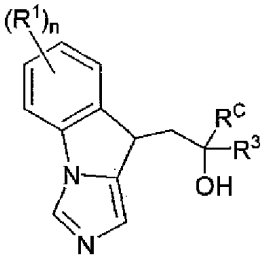
[Claim 21]

The compound of claim 20, its tautomers or a pharmaceutically acceptable salt thereof, wherein bond a is a single bond; and Z is $-N(R^{35})-$ or -O-.

[Claim 22]

The compound of claim 1 of the formula,

[Chemical formula 43]

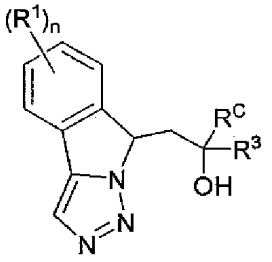



, its tautomers or a pharmaceutically acceptable salt thereof.

[Claim 23]

The compound of claim 1 of the formula,

[Chemical formula 44]

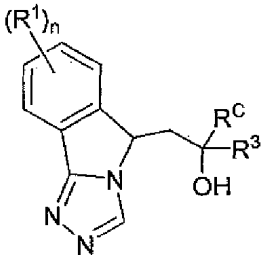


, its tautomers or a pharmaceutically acceptable salt thereof.

[Claim 24]

The compound of claim 1 of the formula,

[Chemical formula 45]

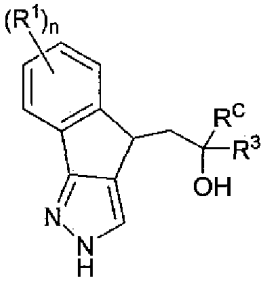


, its tautomers or a pharmaceutically acceptable salt thereof.

[Claim 25]

The compound of claim 1 of the formula,

[Chemical formula 46]



, its tautomers or a pharmaceutically acceptable salt thereof.

[Claim 26]

The compound of claim 22-25, its tautomers or a pharmaceutically acceptable salt thereof, wherein

$R^C$ is hydrogen and

$R^3$ is aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, or 3-10 membered heterocyclyl, wherein

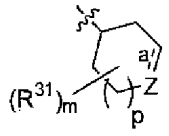
the $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, and 3-10 membered heterocyclyl are each optionally substituted by one $=R^{32}$ group and one, two, three, or four $R^{31}$ groups; and

the aryl and heteroaryl are each optionally substituted by one, two, three, or four $R^{31}$ groups.

[Claim 27]

The compound of any one of claims 22 - 25, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is

[Chemical formula 47]




, wherein

bond a is a single bond or a double bond;

m is 0, 1, or 2;

p is 0 or 1; and

when bond "a" is a single bond, then Z is $-C(R^{36})_2-$, $-C(=R^{32})-$, $-N(R^{35})-$, or -O-, wherein

$R^{35}$ is hydrogen, $C_{1-6}$alkyl, -C(O)R, $-S(O)_2R$, -C(O)OR, $-C(O)N(R)_2$, $-S(O)_2OR$, or $-S(O)_2N(R)_2$; and

when bond a is a double bond, then Z is $-C(R^{36})=$ or -N=;

each $R^{36}$ is independently hydrogen or $R^{31}$.

[Claim 28]

The compound according to claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein

$R^2$ is $=C(H)R^A$ when bond α is a double bond;

$R^A$ is $-C(O)R^3$ or $-C(OR^B)(R^3)(R^C)$;

$R^B$ is hydrogen, $C_{1-4}$alkyl, or $C_{1-4}$haloalkyl; and.

$R^C$ is hydrogen or $C_{1-4}$alkyl.

[Claim 29]

The compound according to claim 1, its tautomers or a pharmaceutically acceptable salt thereof, wherein

α is a single bond and $R^2$ is -$C_{1-4}$alkyl-$R^A$ or -$C_{2-4}$alkenyl-$R^3$;

$R^A$ is -$C(O)R^3$, -$C(OR^B)(R^3)(R^C)$, or -$C(NHR^B)(R^3)(R^C)$, or -$C(=N\text{-}OR^C)R^3$;

$R^B$ is hydrogen, $C_{1-4}$alkyl, or $C_{1-4}$haloalkyl; and.

$R^C$ is hydrogen or $C_{1-4}$alkyl.

[Claim 30]

The compound according to claim 22, 28, or 29, its tautomers or a pharmaceutically acceptable salt thereof, wherein

$R^3$ is aryl, heteroaryl, $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, or 3-10 membered heterocyclyl, wherein the $C_{3-8}$cycloalkyl, $C_{3-8}$cycloalkenyl, and 3-10 membered heterocyclyl are each optionally substituted by one $=R^{32}$ group and one, two, three, or four $R^{31}$ groups; and

the aryl and heteroaryl are each optionally substituted by one, two, three, or four $R^{31}$ groups

[Claim 31]

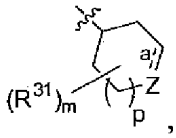
The compound according to claim 22, 28, or 29, its tautomers or a pharmaceutically acceptable salt thereof, wherein $R^3$ is phenyl, cyclopentyl, cyclohexyl, cyclohex-1-en-1-yl, cyclohex-3-en-1-yl, furan-2-yl, furan-3-yl, tetrahydropyran-3-yl, tetrahydropyran-4-yl, piperidin-3-yl, piperidin-4-yl, imidazol-2-yl, imidazol-4-yl, thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, each optionally substituted by one or two $R^{31}$ groups, and wherein the cyclopentyl, cyclohexyl, cyclohexenyl, andy piperidinyl groups are each optionally substituted by one $=R^{32}$ group.

[Claim 32]

The compound according to claim 22, 28, or 29, its tautomers or a pharmaceutically acceptable salt thereof, wherein

$R^3$ is

[Chemical formula 10]




, wherein bond a is a single bond or a double bond; m is 0, 1, or 2; p is 0 or 1; and wherein

when bond a is a single bond, then Z is -C($R^{36}$)$_2$-, -C(=$R^{32}$)-, -N($R^{35}$)-, or -O-, wherein each $R^{36}$ is independently hydrogen or $R^{31}$; and

$R^{35}$ is hydrogen, $C_{1-6}$alkyl, -C(O)R, -S(O)$_2$R, -C(O)OR, -C(O)N(R)$_2$, -S(O)$_2$OR, or -S(O)$_2$N(R)$_2$;

and when bond a is a double bond, then Z is -C($R^{36}$)= or -N=.

[Claim 33]

The compound according to claim 32, its tautomers or a pharmaceutically acceptable salt thereof, wherein bond a is a single bond; and Z is -C($R^{36}$)$_2$.

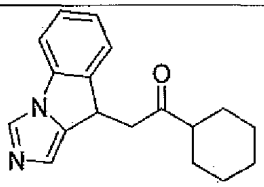
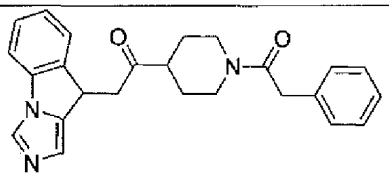
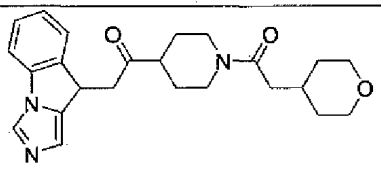
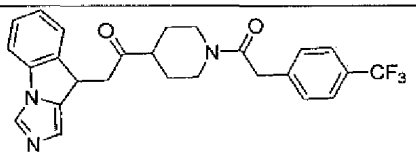
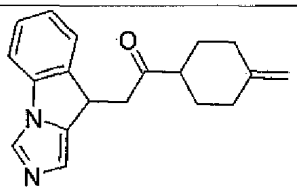
[Claim 34]

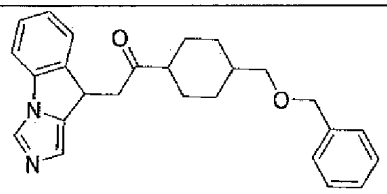
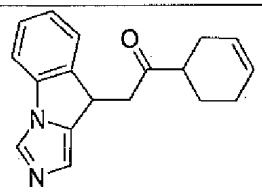
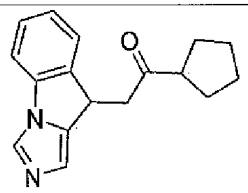
The compound according to any of claims 28 – 32, its tautomers or a pharmaceutically acceptable salt thereof, in which V and X are N, W and Z are CH and Y is C.

[Claim 35]

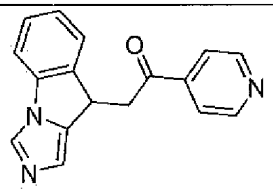
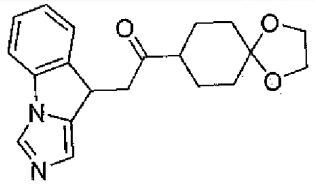
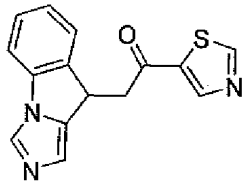
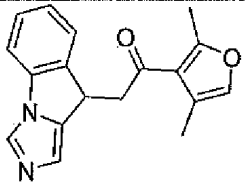
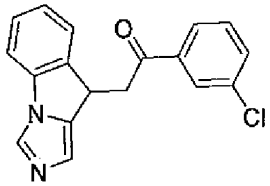
A compound that is

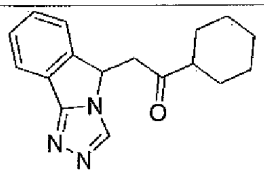
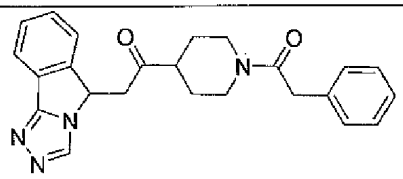
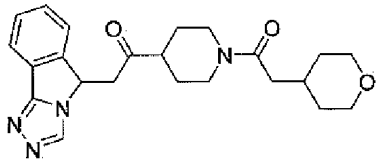
[Chemical formula 48]

| | | |
|---|---|---|
| **27** |  | 1-cyclohexyl-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |
| **28** |  | 1-(4-(2-(9H-imidazo[1,5-a]indol-9-yl)acetyl)piperidin-1-yl)-2-phenylethan-1-one, |
| **29** |  | 1-(4-(2-(9H-imidazo[1,5-a]indol-9-yl)acetyl)piperidin-1-yl)-2-(tetrahydro-2H-pyran-4-yl)ethan-1-one, |
| **30** |  | 1-(4-(2-(9H-imidazo[1,5-a]indol-9-yl)acetyl)piperidin-1-yl)-2-(4-(trifluoromethyl)phenyl)ethan-1-one, |
| **31** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(4-methylenecyclohexyl)ethan-1-one, |

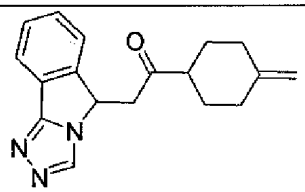
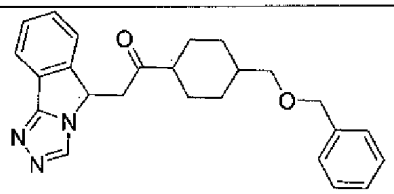
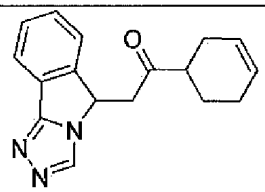
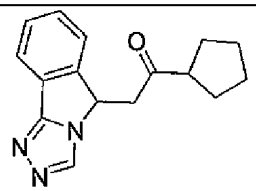
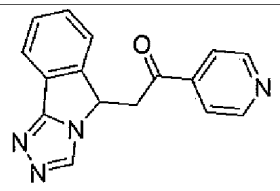
| | | |
|---|---|---|
| **32** |  | 1-(4-((benzyloxy)methyl)cyclohexyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |
| **33** |  | 1-(cyclohex-3-en-1-yl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |
| **34** |  | 1-cyclopentyl-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |

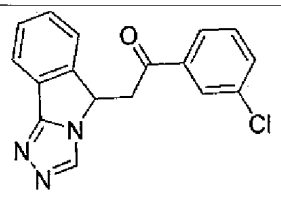
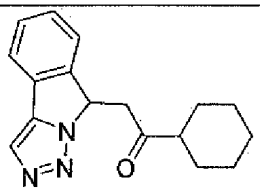
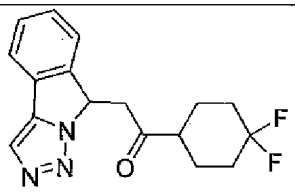
[Chemical formula 49]

| | | |
|---|---|---|
| **35** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(pyridin-4-yl)ethan-1-one, |
| **36** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(1,4-dioxaspiro[4.5]decan-8-yl)ethan-1-one, |
| **37** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(thiazol-5-yl)ethan-1-one, |
| **38** |  | 1-(2,4-dimethylfuran-3-yl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |
| **39** |  | 1-(3-chlorophenyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |

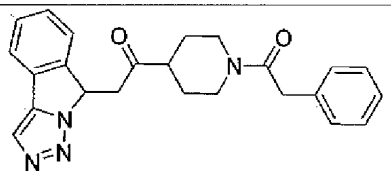
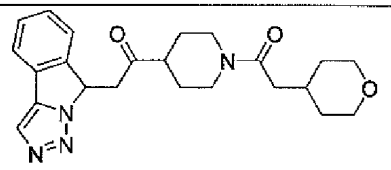
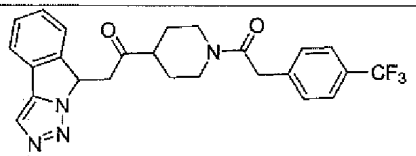
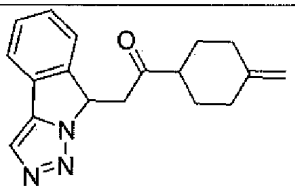
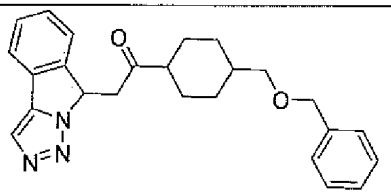
| | | |
|---|---|---|
| **43** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-cyclohexylethan-1-one, |
| **44** |  | 1-(4-(2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)acetyl)piperidin-1-yl)-2-phenylethan-1-one, |
| **45** |  | 1-(4-(2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)acetyl)piperidin-1-yl)-2-(tetrahydro-2H-pyran-4-yl)ethan-1-one, |

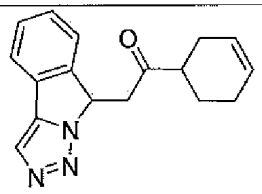
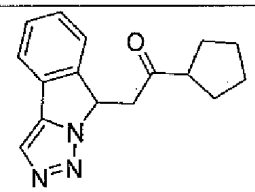
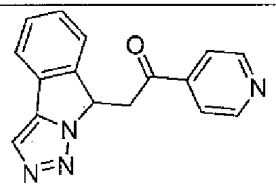
[Chemical formula 50]

| | | |
|---|---|---|
| **46** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(4-methylenecyclohexyl)ethan-1-one, |
| **47** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(4-((benzyloxy)methyl)cyclohexyl)ethan-1-one, |
| **48** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(cyclohex-3-en-1-yl)ethan-1-one, |
| **49** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-cyclopentylethan-1-one, |
| **50** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(pyridin-4-yl)ethan-1-one, |

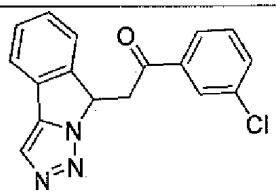
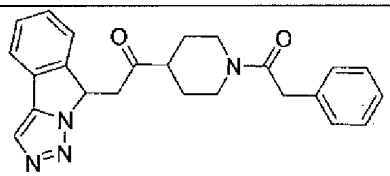
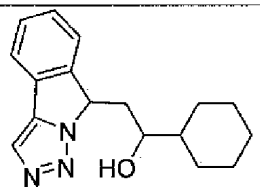
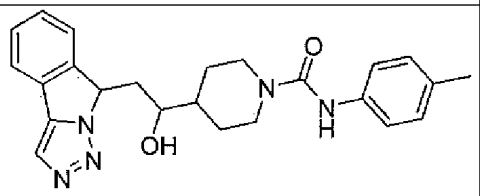
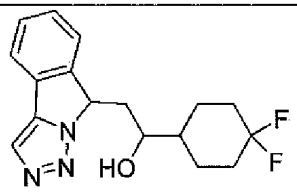
| | | |
|---|---|---|
| **51** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(3-chlorophenyl)ethan-1-one, |
| **53** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-cyclohexylethan-1-one, |
| **54** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(4,4-difluorocyclohexyl)ethan-1-one, |

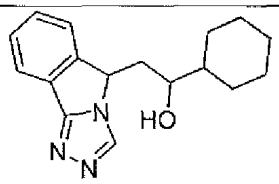
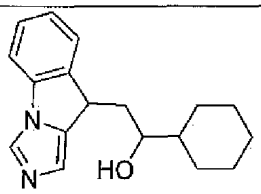
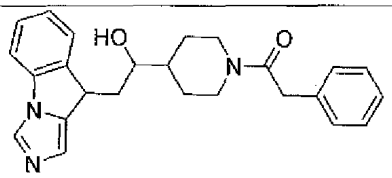
[Chemical formula 51]

| | | |
|---|---|---|
| **55** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)acetyl)piperidin-1-yl)-2-phenylethan-1-one, |
| **56** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)acetyl)piperidin-1-yl)-2-(tetrahydro-2H-pyran-4-yl)ethan-1-one, |
| **57** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)acetyl)piperidin-1-yl)-2-(4-(trifluoromethyl)phenyl)ethan-1-one, |
| **58** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(4-methylenecyclohexyl)ethan-1-one, |
| **59** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(4-((benzyloxy)methyl)cyclohexyl)ethan-1-one, |

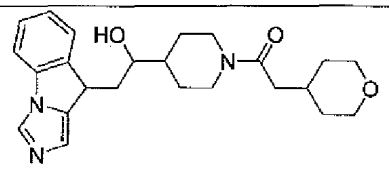
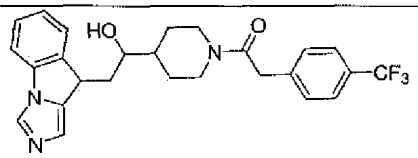
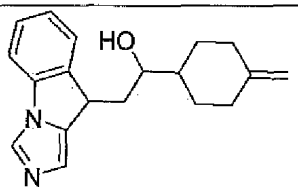
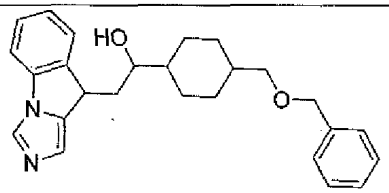
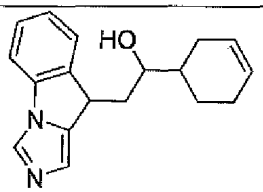
| | | |
|---|---|---|
| **60** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(cyclohex-3-en-1-yl)ethan-1-one, |
| **61** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-cyclopentylethan-1-one, |
| **62** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(pyridin-4-yl)ethan-1-one, |

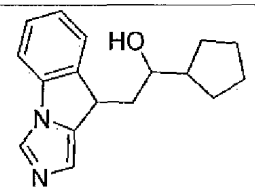
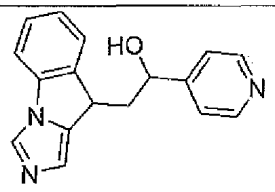
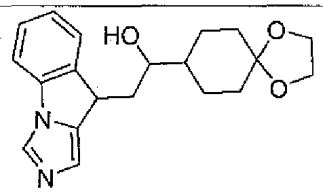
[Chemical formula 52]

| | | |
|---|---|---|
| **63** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(3-chlorophenyl)ethan-1-one, |
| **64** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)acetyl)piperidin-1-yl)-2-phenylethan-1-one, |
| **66** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-cyclohexylethan-1-ol, |
| **67** |  | 4-(2-(8*H*-[1,2,3]triazolo[5,1-*a*]isoindol-8-yl)-1-hydroxyethyl)-*N*-(*p*-tolyl)piperidine-1-carboxamide, |
| **68** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(4,4-difluorocyclohexyl)ethan-1-ol, |

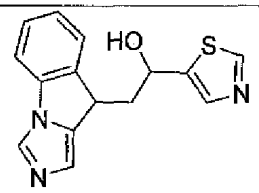
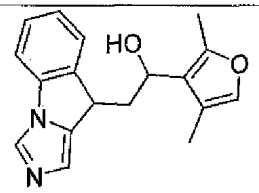
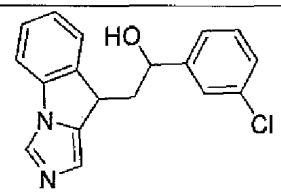
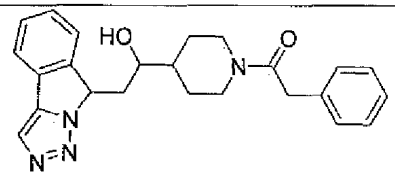
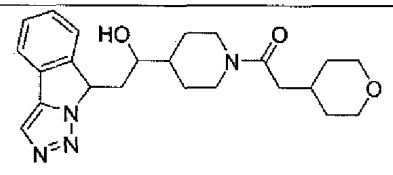
| | | |
|---|---|---|
| 69 |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-cyclohexylethan-1-ol, |
| 70 |  | 1-cyclohexyl-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |
| 71 |  | 1-(4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidin-1-yl)-2-phenylethan-1-one, |

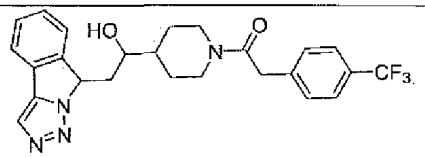
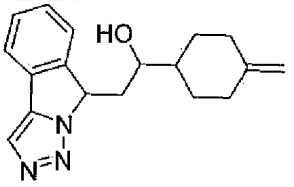
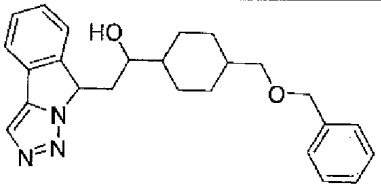
[Chemical formula 53]

| | | |
|---|---|---|
| 72 |  | 1-(4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidin-1-yl)-2-(tetrahydro-2H-pyran-4-yl)ethan-1-one, |
| 73 |  | 1-(4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidin-1-yl)-2-(4-(trifluoromethyl)phenyl)ethan-1-one, |
| 74 |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(4-methylenecyclohexyl)ethan-1-ol, |
| 75 |  | 1-(4-((benzyloxy)methyl)cyclohexyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |
| 76 |  | 1-(cyclohex-3-en-1-yl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |

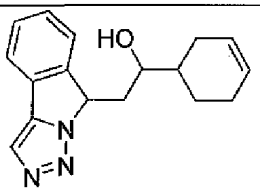
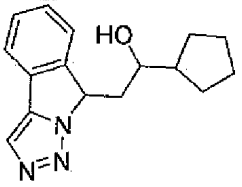
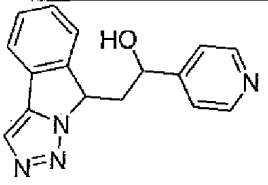
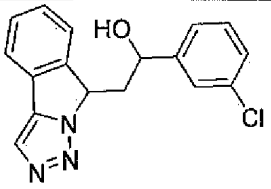
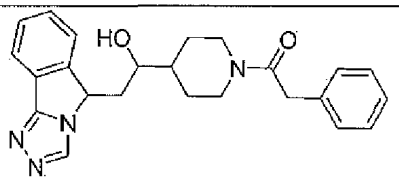
| | | |
|---|---|---|
| **77** |  | 1-cyclopentyl-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |
| **78** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(pyridin-4-yl)ethan-1-ol, |
| **79** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(1,4-dioxaspiro[4.5]decan-8-yl)ethan-1-ol, |

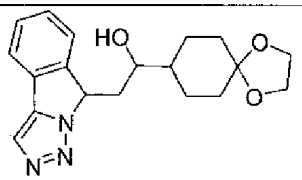
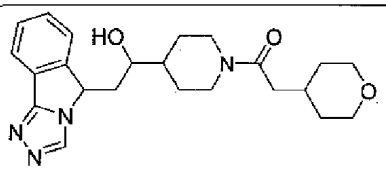
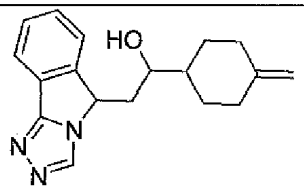
[Chemical formula 54]

| | | |
|---|---|---|
| **80** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(thiazol-5-yl)ethan-1-ol, |
| **81** |  | 1-(2,4-dimethylfuran-3-yl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |
| **82** |  | 1-(3-chlorophenyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |
| **83** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-hydroxyethyl)piperidin-1-yl)-2-phenylethan-1-one, |
| **84** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-hydroxyethyl)piperidin-1-yl)-2-(tetrahydro-2H-pyran-4-yl)ethan-1-one, |

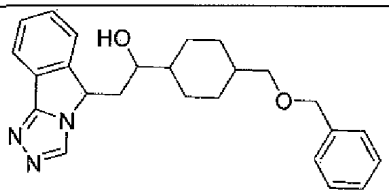
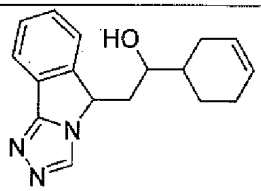
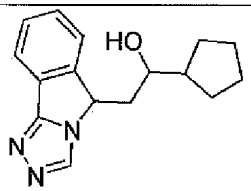
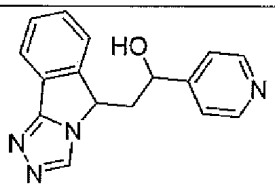
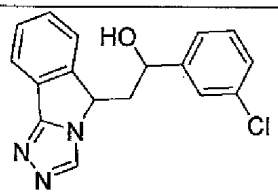
| | | |
|---|---|---|
| **85** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-hydroxyethyl)piperidin-1-yl)-2-(4-(trifluoromethyl)phenyl)ethan-1-one, |
| **86** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(4-methylenecyclohexyl)ethan-1-ol, |
| **87** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(4-((benzyloxy)methyl)cyclohexyl)ethan-1-ol, |

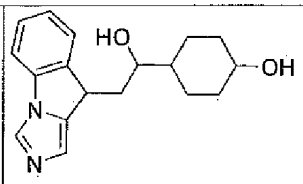
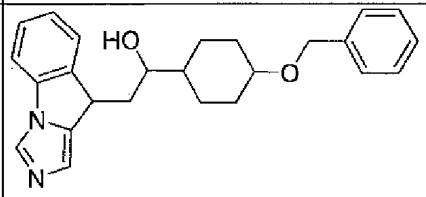
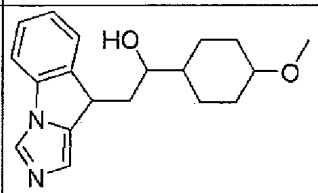
[Chemical formula 55]

| | | |
|---|---|---|
| **88** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(cyclohex-3-en-1-yl)ethan-1-ol, |
| **89** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-cyclopentylethan-1-ol, |
| **90** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(pyridin-4-yl)ethan-1-ol, |
| **91** |  | 2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-(3-chlorophenyl)ethan-1-ol, |
| **92** |  | 1-(4-(2-(8H-[1,2,3]triazolo[5,1-a]isoindol-8-yl)-1-hydroxyethyl)piperidin-1-yl)-2-phenylethan-1-one, |

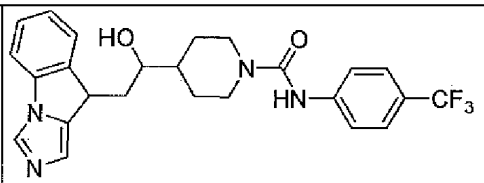
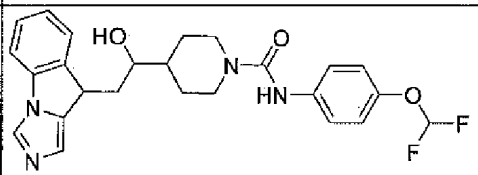
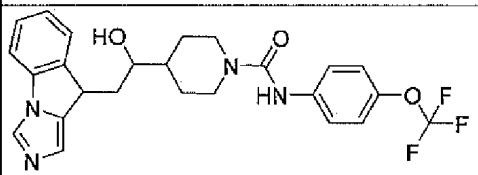
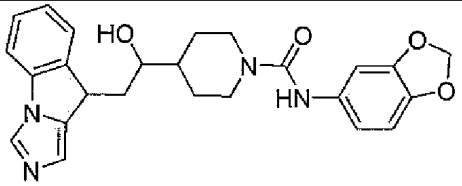
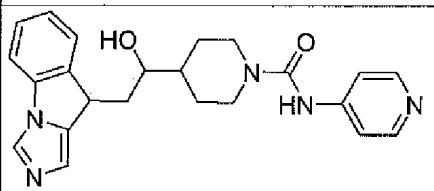
| | | |
|---|---|---|
| **93** |  | 1-(4-(2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-hydroxyethyl)piperidin-1-yl)-2-phenylethan-1-one, |
| **94** |  | 1-(4-(2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-hydroxyethyl)piperidin-1-yl)-2-(tetrahydro-2H-pyran-4-yl)ethan-1-one, |
| **95** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(4-methylenecyclohexyl)ethan-1-ol, |

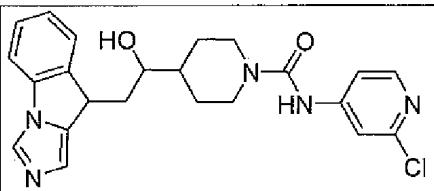
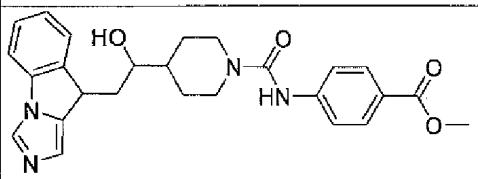
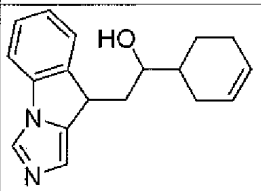
[Chemical formula 56]

| | | |
|---|---|---|
| **96** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(4-((benzyloxy)methyl)cyclohexyl)ethan-1-ol, |
| **97** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(cyclohex-3-en-1-yl)ethan-1-ol, |
| **98** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-cyclopentylethan-1-ol, |
| **99** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(pyridin-4-yl)ethan-1-ol, |
| **100** |  | 2-(5H-[1,2,4]triazolo[3,4-a]isoindol-5-yl)-1-(3-chlorophenyl)ethan-1-ol, |

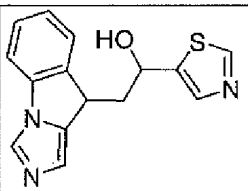
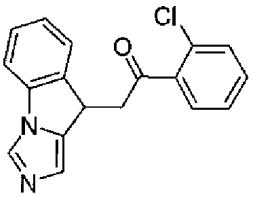
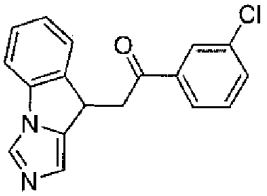
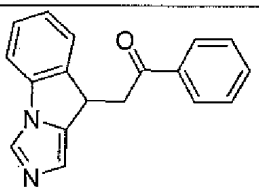
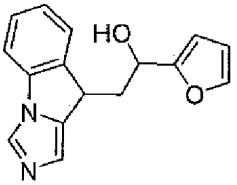
| | | |
|---|---|---|
| **102** |  | 4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)cyclohexan-1-ol, |
| **103** |  | 1-(4-(benzyloxy)cyclohexyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |
| **104** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(4-methoxycyclohexyl)ethan-1-ol, |

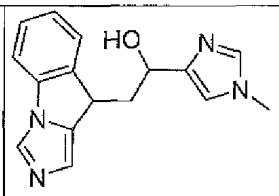
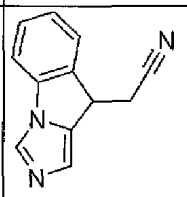
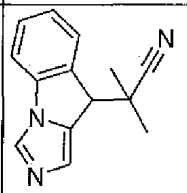
[Chemical formula 57]

| | | |
|---|---|---|
| **105** |  | 4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)-N-(4-(trifluoromethyl)phenyl)piperidine-1-carboxamide, |
| **106** |  | N-(4-(difluoromethoxy)phenyl)-4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidine-1-carboxamide, |
| **107** |  | 4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)-N-(4-(trifluoromethoxy)phenyl)piperidine-1-carboxamide, |
| **108** |  | N-(benzo[d][1,3]dioxol-5-yl)-4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidine-1-carboxamide, |
| **109** |  | 4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)-N-(pyridin-4-yl)piperidine-1-carboxamide, |

| | | |
|---|---|---|
| **110** |  | N-(2-chloropyridin-4-yl)-4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidine-1-carboxamide, |
| **111** |  | methyl 4-(4-(1-hydroxy-2-(9H-imidazo[1,5-a]indol-9-yl)ethyl)piperidine-1-carboxamido)benzoate, |
| **112** |  | 1-(cyclohex-3-en-1-yl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |

[Chemical formula 58]

| | | |
|---|---|---|
| **113** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(thiazol-5-yl)ethan-1-ol, |
| **114** |  | 1-(2-chlorophenyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |
| **115** |  | 1-(3-chlorophenyl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-one, |
| **116** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-phenylethan-1-one, |
| **117** |  | 1-(furan-2-yl)-2-(9H-imidazo[1,5-a]indol-9-yl)ethan-1-ol, |

| | | |
|---|---|---|
| **118** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-1-(1-methyl-1H-imidazol-4-yl)ethan-1-ol, |
| **119** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)acetonitrile, or |
| **120** |  | 2-(9H-imidazo[1,5-a]indol-9-yl)-2-methylpropanenitrile. |

[Claim 36]

A pharmaceutical composition comprising a compound according to any one of claims 1 - 34, its tautomers or a pharmaceutically acceptable salt thereof, or a compound of claim 35, and a pharmaceutically acceptable diluent, excipient, or carrier.

[Claim 37]

A pharmaceutical composition according to claim 36 for treating immunosuppression in a subject in need thereof.

[Claim 38]

The pharmaceutical composition of claim 37, wherein the immunosuppression is associated with an infectious disease, or cancer.

[Claim 39]

The pharmaceutical composition of claim 38, wherein the infectious disease is a viral infection selected from the group consisting of: influenza, hepatitis C virus (HCV), human papilloma virus (HPV), cytomegalovirus (CMV), Epstein-Barr virus (EBV), poliovirus, varicella zoster virus, coxsackie virus, human immunodeficiency virus (HIV).

[Claim 40]

A composition comprising a compound according to any one of claims 1-34, its tautomers or a pharmaceutically acceptable salt thereof, or a compound of claim 35 and a pharmaceutically acceptable diluent, excipient, or carrier for inhibiting IDO in a cell.