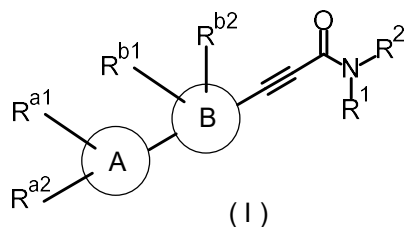


Claims

[Claim 1]

A compound of formula (I) or a salt thereof:



(wherein,

Ring A is phenyl which may be optionally fused with 5-membered heterocyclyl, 6-membered heteroaryl containing one or two nitrogen atoms, pyrazolyl or 6-membered saturated or partially unsaturated heterocyclyl,

Ring B is phenyl which may be optionally fused with phenyl or 6-membered heteroaryl containing one or two nitrogen atoms, 6-membered heteroaryl containing one or two nitrogen atoms, pyrazolyl or imidazolyl,

R^{a1} and R^{a2} are independently H, C_{1-6} alkyl, $-O-C_{1-6}$ alkyl, $-O-C_{1-6}$ alkylene- C_{2-6} alkenyl, $-O-C_{1-6}$ alkylene- C_{2-6} alkynyl, halogen, halogeno- C_{1-6} alkyl, $-O$ -halogeno- C_{1-6} alkyl or $-OH$,

R^{b1} and R^{b2} are independently H, C_{1-6} alkyl, $-O-C_{1-6}$ alkyl, halogeno- C_{1-6} alkyl, $-O$ -halogeno- C_{1-6} alkyl, halogen, $-C_{1-6}$ alkylene- OH , $-C_{1-6}$ alkylene- NR^cR^d , $-C(=O)-NR^cR^d$, $-NR^cR^d$, $-CN$ or $-OH$,

R^c and R^d are independently H, C_{1-6} alkyl, C_{3-8} cycloalkyl, $-C(=O)-C_{1-6}$ alkyl, or $-S(=O)_2-C_{1-6}$ alkyl,

or, R^c and R^d may be optionally linked to each other to form 4- to 7-membered saturated heterocyclyl together with the nitrogen atom to which R^c and R^d are attached, wherein the heterocyclyl may be optionally substituted with one or two R^e ,

R^e is C_{1-6} alkyl, $-O-C_{1-6}$ alkyl or halogen,

R^1 is H, optionally substituted C_{1-6} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted 4- to 7-membered saturated heterocyclyl, optionally substituted phenyl or optionally substituted heteroaryl,

R^2 is C_{1-6} alkyl which is substituted with one or two R^3 , C_{3-8} cycloalkyl which is substituted with one or two R^4 , 4- to 7- membered saturated heterocyclyl which is substituted with one or two R^5 , or phenyl which is substituted with one or two R^6 ,

or, R^1 and R^2 are linked to each other to form 4- to 7-membered saturated heterocyclyl together with the nitrogen atom to which R^1 and R^2 are attached, wherein the heterocyclyl may be optionally fused with phenyl, and the heterocyclyl and/or the fused phenyl may be optionally substituted with one to three R^7 ,

each R^3 is independently -OH, -O- C_{1-6} alkyl, -C(=O)-NH₂, -C(=O)-NH- C_{1-6} alkyl, -C(=O)-N(C_{1-6} alkyl)₂, -NH₂, -NH- C_{1-6} alkyl, -N(C_{1-6} alkyl)₂, -NH-C(=O)- C_{1-6} alkyl, -NH-S(=O)₂- C_{1-6} alkyl, -NH-S(=O)₂- C_{1-6} alkylene-OH, -NH-S(=O)₂- C_{1-6} alkylene-C(=O)-OH, -S(=O)₂-NH₂, -S(=O)₂- C_{1-6} alkyl or -S(=O)(=NH)- C_{1-6} alkyl,

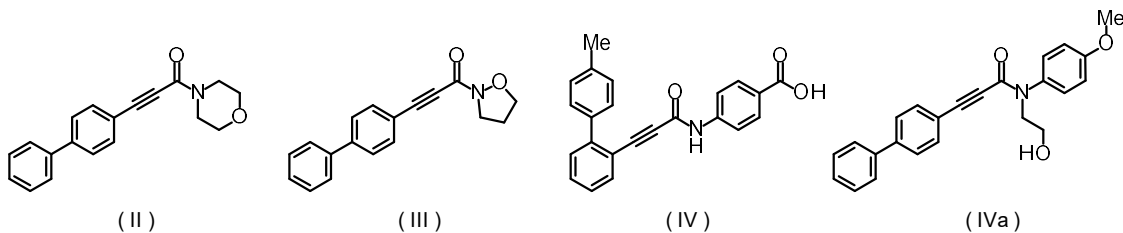
each R^4 is independently -OH, -O- C_{1-6} alkyl, -C(=O)-NH₂, -C(=O)-NH- C_{1-6} alkyl, -C(=O)-N(C_{1-6} alkyl)₂, -NH₂, -NH- C_{1-6} alkyl, -N(C_{1-6} alkyl)₂, -NH-C(=O)- C_{1-6} alkyl, -NH-S(=O)₂- C_{1-6} alkyl, -S(=O)₂-NH₂, -S(=O)₂- C_{1-6} alkyl or -S(=O)(=NH)- C_{1-6} alkyl,

each R^5 is independently -OH, oxo or imino,

each R^6 is independently -C(=O)-OH, -S(=O)₂-NH₂, -S(=O)₂- C_{1-6} alkyl, -S(=O)(=NH)- C_{1-6} alkyl or -NH-S(=O)₂- C_{1-6} alkyl, and

each R^7 is independently C_{1-6} alkyl, - C_{1-6} alkylene-OH, - C_{1-6} alkylene-C(=O)-OH, C_{3-8} cycloalkyl, -OH, -O- C_{1-6} alkyl, -NH₂, -NH- C_{1-6} alkyl, -N(C_{1-6} alkyl)₂, -NH-C(=O)- C_{1-6} alkyl, -NH-S(=O)₂- C_{1-6} alkyl, -S(=O)₂- C_{1-6} alkyl, -S(=O)(=NH)- C_{1-6} alkyl, -C(=O)-OH, -C(=O)-NH₂, -C(=O)-NH- C_{1-6} alkyl, -C(=O)-N(C_{1-6} alkyl)₂, oxo, imino or 4- to 7-membered saturated heterocyclyl which may be optionally substituted with one or two oxo,

provided that the compound of formula (I) is not the compound of formula (II), (III), (IV) or (IVa)).



[Claim 2]

The compound or a salt thereof according to claim 1,
wherein,

Ring B is phenyl, 6-membered heteroaryl containing one or two nitrogen atoms or pyrazolyl,

R^{a1} and R^{a2} are independently H, C₁₋₆ alkyl, halogen, halogeno-C₁₋₆ alkyl or -O-halogeno-C₁₋₆ alkyl,

R^{b1} and R^{b2} are independently H, halogeno-C₁₋₆ alkyl or -C₁₋₆ alkylene-NR^cR^d,

R^c and R^d are independently H or C₁₋₆ alkyl,

or, R^c and R^d may be optionally linked to each other to form 4- to 7-membered saturated heterocyclyl together with the nitrogen atom to which R^c and R^d are attached, wherein the heterocyclyl may be optionally substituted with one or two R^e,

R¹ is H, C₁₋₆ alkyl, C₃₋₈ cycloalkyl, 4- to 7-membered saturated heterocyclyl, optionally substituted phenyl or optionally substituted heteroaryl,

R² is C₁₋₆ alkyl which is substituted with one or two R³, C₃₋₈ cycloalkyl which is substituted with one or two R⁴, 4- to 7-membered saturated heterocyclyl which is substituted with one or two R⁵, or phenyl which is substituted with one or two R⁶,

or, R¹ and R² are linked to each other to form 4- to 7-membered saturated heterocyclyl together with the nitrogen atom to which R¹ and R² are attached, wherein the heterocyclyl may be optionally fused with phenyl, and the heterocyclyl and/or the fused phenyl may be optionally substituted with one or two R⁷,

each R³ is independently -OH, -C(=O)-NH₂, -NH-C(=O)-C₁₋₆ alkyl, -NH-S(=O)₂-C₁₋₆ alkyl or -S(=O)₂-NH₂,

each R⁴ is independently -OH, -C(=O)-NH₂, -NH-C(=O)-C₁₋₆ alkyl, -NH-S(=O)₂-C₁₋₆ alkyl or -S(=O)₂-NH₂,

each R⁵ is independently -OH or oxo,

each R⁶ is independently -C(=O)-OH or -S(=O)₂-NH₂, and

each R⁷ is independently C₁₋₆ alkyl, -C₁₋₆ alkylene-OH, -C₁₋₆ alkylene-C(=O)-OH, C₃₋₈ cycloalkyl, -OH, -NH₂, -C(=O)-OH, -C(=O)-NH₂, oxo, imino or 4- to 7-membered saturated heterocyclyl which may be optionally substituted with one or two oxo.

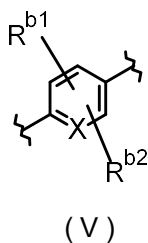
[Claim 3]

The compound or a salt thereof according to claim 2,

wherein,

Ring A is phenyl, 6-membered heteroaryl containing one or two nitrogen atoms, pyrazolyl or 6-membered saturated or partially unsaturated heterocyclyl,

Ring B is the formula (V):



X is CH or N,

R^1 is H, C_{1-6} alkyl, C_{3-8} cycloalkyl, 4- to 7-membered saturated heterocyclyl, phenyl or optionally substituted heteroaryl,

R^2 is C_{1-6} alkyl which is substituted with one or two R^3 , C_{3-8} cycloalkyl which is substituted with one or two R^4 , or 4- to 7-membered saturated heterocyclyl which is substituted with one or two R^5 ,

or, R^1 and R^2 are linked to each other to form 4- to 7-membered saturated heterocyclyl together with the nitrogen atom to which R^1 and R^2 are attached, wherein the heterocyclyl may be optionally substituted with one or two R^7 ,

R^4 is -OH,

provided that at least one of R^{a1} , R^{a2} , R^{b1} or R^{b2} are not H.

[Claim 4]

The compound or a salt thereof according to claim 3,

wherein,

R^{b1} is H,

R^{b2} is halogeno- C_{1-6} alkyl, and

R^1 and R^2 are linked to each other to form 4- to 7-membered saturated heterocyclyl together with the nitrogen atom to which R^1 and R^2 are attached, wherein the heterocyclyl may be optionally substituted with one or two R^7 .

[Claim 5]

The compound or a salt thereof according to claim 3,

wherein,

Ring A is phenyl,

R^{a1} , R^{a2} and R^{b1} are H,

R^{b2} is halogeno- C_{1-6} alkyl,

R¹ is H,

R² is C₁₋₆ alkyl which is substituted by one or two R³,

or, R¹ and R² are linked to each other to form azetidiny, pyrrolidiny, piperidiny or thiomorpholinyl together with the nitrogen atom to which R¹ and R² are attached, wherein the azetidiny, pyrrolidiny, piperidiny or thiomorpholinyl may be optionally substituted with one or two R⁷,

each R³ is independently -OH or -C(=O)-NH₂, and

each R⁷ is independently -C₁₋₆ alkylene-OH, -OH, -C(=O)-NH₂, oxo or imino.

[Claim 6]

The compound or a salt thereof according to claim 1, wherein the compound is a compound selected from the following group of:

N²-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}-L-serinamide,

1-[(3*R*,4*R*)-3,4-dihydroxypyrrolidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one,

1-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}piperidine-4-carboxamide,

1-[(3*R*,4*S*)-3,4-dihydroxypyrrolidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one,

1-[3,3-bis(hydroxymethyl)azetidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one,

N-[(2*R*)-2,3-dihydroxypropyl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynamide,

N-[(2*S*)-2,3-dihydroxypropyl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynamide,

1-[(3*S*,4*S*)-3,4-dihydroxypyrrolidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one,

(3*R*)-1-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}pyrrolidine-3-carboxamide,

1-[(3*R*,4*S*)-3,4-dihydroxypyrrolidin-1-yl]-3-[6-phenyl-5-(trifluoromethyl)pyridin-3-yl]prop-2-yn-1-one,

1-imino-4-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}-1λ⁶-thiomorpholin-1-one, and

1-[(3R,4S)-3,4-Dihydroxypyrrolidin-1-yl]-3-[2-methoxy-2'-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one.

[Claim 7]

A pharmaceutical composition comprising the compound or a salt thereof according to claim 6, and one or more pharmaceutically acceptable excipients.

[Claim 8]

A STING inhibitor comprising the compound or a salt thereof according to claim 6.

[Claim 9]

The compound or a salt thereof according to claim 6, or the pharmaceutical composition according to claim 7, for use in treatment of an autoimmune disease, a neurodegenerative disease, a type I interferonopathy and/or other STING-mediated disease.

[Claim 10]

The compound or a salt thereof according to claim 6, wherein the compound is N^2 -{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}-L-serinamide.

[Claim 11]

The compound or a salt thereof according to claim 6, wherein the compound is 1-[(3R,4R)-3,4-dihydroxypyrrolidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one.

[Claim 12]

The compound or a salt thereof according to claim 6, wherein the compound is 1-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}piperidine-4-carboxamide.

[Claim 13]

The compound or a salt thereof according to claim 6, wherein the compound is 1-

[(3*R*,4*S*)-3,4-dihydroxypyrrolidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one.

[Claim 14]

The compound or a salt thereof according to claim 6, wherein the compound is 1-[3,3-bis(hydroxymethyl)azetidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one.

[Claim 15]

The compound or a salt thereof according to claim 6, wherein the compound is *N*-[(2*R*)-2,3-dihydroxypropyl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynamide.

[Claim 16]

The compound or a salt thereof according to claim 6, wherein the compound is *N*-[(2*S*)-2,3-dihydroxypropyl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynamide.

[Claim 17]

The compound or a salt thereof according to claim 6, wherein the compound is 1-[(3*S*,4*S*)-3,4-dihydroxypyrrolidin-1-yl]-3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one.

[Claim 18]

The compound or a salt thereof according to claim 6, wherein the compound is (3*R*)-1-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}pyrrolidine-3-carboxamide.

[Claim 19]

The compound or a salt thereof according to claim 6, wherein the compound is 1-[(3*R*,4*S*)-3,4-dihydroxypyrrolidin-1-yl]-3-[6-phenyl-5-(trifluoromethyl)pyridin-3-yl]prop-2-yn-1-one.

[Claim 20]

The compound or a salt thereof according to claim 6, wherein the compound is 1-

imino-4-{3-[2-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-ynoyl}-1 λ ⁶-thiomorpholin-1-one.

[Claim 21]

The compound or a salt thereof according to claim 6, wherein the compound is 1-[(3*R*,4*S*)-3,4-Dihydroxypyrrolidin-1-yl]-3-[2-methoxy-2'-(trifluoromethyl)[1,1'-biphenyl]-4-yl]prop-2-yn-1-one.

[Claim 22]

The compound or a salt thereof according to claim 13, wherein the compound is crystalline and has an X-ray powder diffraction spectrum comprising angles 2 θ (°): 4.0, 8.0, 12.0, 12.7, 15.1, 16.7, 18.1, 18.9, 19.6, 22.2.

[Claim 23]

The compound or a salt thereof according to claim 12, wherein the compound is crystalline and has an X-ray powder diffraction spectrum comprising angles 2 θ (°): 5.7, 7.7, 13.4, 14.2, 15.4, 16.0, 16.6, 18.3, 23.7, 25.7.

[Claim 24]

The compound or a salt thereof according to claim 20, wherein the compound is crystalline and has an X-ray powder diffraction spectrum comprising angles 2 θ (°): 4.2, 12.5, 14.4, 14.9, 16.7, 17.1, 18.6, 19.7, 22.0, 25.4.