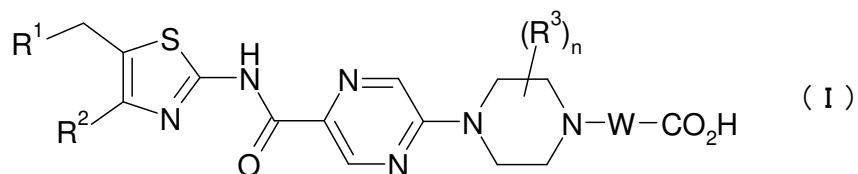


Claims

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



wherein

R^1 is cyclic amino optionally substituted with 1 to 5 of a substituent G and/or an oxo substituent, or R^1 is $-N(-R^{11})(-R^{12})$,

R^{11} is C_{1-6} alkyl,

R^{12} is C_{1-6} alkyl optionally substituted with 1 to 3 substituents selected from the group consisting of

$-OH$,

$-O-C_{1-6}$ alkyl optionally substituted with at least one group selected from the group consisting of $-OH$, $-O-(C_{1-6}$ alkyl), $-CN$, $-SO_2-(C_{1-6}$ alkyl), and halogen,

C_{3-8} cycloalkyl,

$-O-(C_{3-8}$ cycloalkyl),

halogen,

$-CN$, and

a saturated hetero ring,

R^2 is phenyl optionally substituted with 1 to 5 substituents G, thienyl optionally substituted with 1 to 3 substituents G, pyridyl optionally substituted with 1 to 3 substituents G, or benzothienyl optionally substituted with 1 to 5 substituents G, and

each substituent G is a substituent selected from the group consisting of:

C₁₋₆ alkyl optionally substituted with at least one group selected from the group consisting of -OH, -O-(C₁₋₆ alkyl), -CN, -SO₂-(C₁₋₆ alkyl), and halogen,

-OH,

-O-C₁₋₆ alkyl optionally substituted with at least one group selected from the group consisting of -OH, -O-(C₁₋₆ alkyl), -CN, -SO₂-(C₁₋₆ alkyl), and halogen,

C₃₋₈ cycloalkyl,

-O-(C₃₋₈ cycloalkyl),

halogen,

-CN,

-SO₂-(C₁₋₆ alkyl),

-CO₂-(C₁₋₆ alkyl),

-COOH,

-CO-N(C₁₋₆ alkyl)₂,

-CO-NH(C₁₋₆ alkyl),

-CONH₂,

-CO-(C₁₋₆ alkyl),

-SO₂-N(C₁₋₆ alkyl)₂,

-SO₂-NH(C₁₋₆ alkyl),

-SO₂NH₂,

-N(C₁₋₆ alkyl)₂,

-NH(C₁₋₆ alkyl),

-NH₂,

a saturated hetero ring, and

-O-saturated hetero ring.

each R^3 if present is, independently, C_{1-6} alkyl,

W is C_{1-6} alkylene, and

n is an integer of 0 to 4.

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

R^1 is pyrrolidin-1-yl or piperidin-1-yl, each substituted with 1 to 2 substituents selected from the group consisting of C_{1-6} alkyl and halogeno- C_{1-6} alkyl, or wherein R^1 is -N(- R^{11})(- R^{12}),

R^{11} is C_{1-6} alkyl, and

R^{12} is C_{1-6} alkyl optionally substituted with one group selected from the group consisting of C_{3-8} cycloalkyl and -O-(C_{1-6} alkyl),

R^2 is

phenyl optionally substituted with 1 to 3 groups selected from the group consisting of C_{1-6} alkyl, halogeno- C_{1-6} alkyl, -O-(C_{1-6} alkyl), -O-(halogeno- C_{1-6} alkyl), halogen, C_{3-8} cycloalkyl, and -CN;

thienyl optionally substituted with 1 to 3 groups selected from the group consisting of C_{1-6} alkyl, halogeno- C_{1-6} alkyl, -O-(C_{1-6} alkyl), C_{3-8} cycloalkyl, and halogen;

pyridyl optionally substituted with 1 to 3 groups selected from the group consisting of C_{1-6} alkyl, halogeno- C_{1-6} alkyl, -O-(C_{1-6} alkyl), C_{3-8} cycloalkyl, and halogen; or

benzothienyl,

W is C_{1-3} alkylene, and

n is 0 or 1.

3. The compound or a salt thereof according to claim 2, wherein

R^2 is phenyl di-substituted with trifluoromethyl and fluoro, thienyl mono-substituted with trifluoromethyl or chloro, or pyridyl di-substituted with trifluoromethyl and methoxy, and

W is methylene or ethylene.

4. The compound or a salt thereof according to claim 2, wherein

R^1 is pyrrolidin-1-yl or piperidin-1-yl, each substituted with 1 to 2 substituents selected from the group consisting of C_{1-6} alkyl and halogeno- C_{1-6} alkyl,

R^2 is thienyl optionally substituted with 1 or 2 substituents selected from the group consisting of halogeno- C_{1-6} alkyl and halogen, or wherein R^2 is phenyl optionally substituted with 1 or 2 substituents selected from the group consisting of halogeno- C_{1-6} alkyl and halogen, and

W is methylene or ethylene.

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

3-[(2S)-4-(5-{[4-(4-chlorothiophen-2-yl)-5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl)-2-methylpiperazin-1-yl]propanoic acid,

3-[(3R)-4-{5-[(4-[3-fluoro-5-(trifluoromethyl)phenyl]-5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl)carbamoyl]pyrazin-2-yl}-3-methylpiperazin-1-yl]propanoic acid,

[(3R)-4-{5-[(4-[3-fluoro-5-(trifluoromethyl)phenyl]-5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl)carbamoyl]pyrazin-2-yl}-3-methylpiperazin-1-yl]acetic acid,

3-(4-{5-[(4-[3-fluoro-5-(trifluoromethyl)phenyl]-5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl)carbamoyl]pyrazin-2-yl}piperazin-1-yl)propanoic acid,

3-[(2R)-4-(5-{[4-(4-chlorothiophen-2-yl)-5-{[(2R)-2-ethylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl)-2-methylpiperazin-1-yl]propanoic acid,

3-[(3R)-3-methyl-4-{5-[(5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-4-[4-(trifluoromethyl)thiophen-2-yl]-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl]piperazin-1-yl]propanoic acid,

3-(4-{5-[(5-{[(2R,5R)-2,5-dimethylpyrrolidin-1-yl]methyl}-4-[3-fluoro-5-(trifluoromethyl)phenyl]-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl]piperazin-1-yl)propanoic acid, and

3-{(2R)-4-[5-({5-[(diethylamino)methyl]-4-[3-fluoro-5-(trifluoromethyl)phenyl]-1,3-thiazol-2-yl}carbamoyl)pyrazin-2-yl]-2-methylpiperazin-1-yl}propanoic acid.

6. A pharmaceutical composition, comprising:

the compound or a salt thereof according to claim 1; and

a pharmaceutically acceptable excipient.

7. An effective amount of the compound or a salt thereof according to claim 1 for use in the treatment of a bladder/urinary tract disease associated with bladder contractions via a muscarinic M_3 receptor, wherein the compound or salt thereof is to be administered to a subject in need thereof.

8. Use of an effective amount of the compound or a salt thereof according to claim 1 in the manufacture of a medicament for the treatment of a bladder/urinary tract disease associated with bladder contractions via a muscarinic M_3 receptor, wherein the medicament is to be administered to a subject in need thereof.

9. The use according to claim 8, wherein the bladder/urinary tract disease associated with bladder contractions via a muscarinic M₃ receptor is voiding dysfunction or urine storage dysfunction in underactive bladder, hypotonic bladder, acontractile bladder, detrusor underactivity, or neurogenic bladder.
10. The compound or a salt thereof according to claim 5, wherein the compound is 3-[(2S)-4-(5-{[4-(4-chlorothiophen-2-yl)-5-{{(2R)-2-methylpyrrolidin-1-yl}methyl})-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl)-2-methylpiperazin-1-yl]propanoic acid.
11. The compound or a salt thereof according to claim 5, wherein the compound is 3-[(3R)-4-{5-[(4-[3-fluoro-5-(trifluoromethyl)phenyl]-5-{{(2R)-2-methylpyrrolidin-1-yl}methyl})-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl]-3-methylpiperazin-1-yl]propanoic acid.
12. The compound or a salt thereof according to claim 5, wherein the compound is [(3R)-4-{5-[(4-[3-fluoro-5-(trifluoromethyl)phenyl]-5-{{(2R)-2-methylpyrrolidin-1-yl}methyl})-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl]-3-methylpiperazin-1-yl]acetic acid.
13. The compound or a salt thereof according to claim 5, wherein the compound is 3-(4-{5-[(4-[3-fluoro-5-(trifluoromethyl)phenyl]-5-{{(2R)-2-methylpyrrolidin-1-yl}methyl})-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl)piperazin-1-yl)propanoic acid.

14. The compound or a salt thereof according to claim 5, wherein the compound is 3-[(2R)-4-(5-{[4-(4-chlorothiophen-2-yl)-5-{[(2R)-2-ethylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl)-2-methylpiperazin-1-yl]propanoic acid.
15. The compound or a salt thereof according to claim 5, wherein the compound is 3-[(3R)-3-methyl-4-{5-[(5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-4-[4-(trifluoromethyl) thiophen-2-yl]-1,3-thiazol-2-yl)carbamoyl]pyrazin-2-yl}piperazin-1-yl]propanoic acid.
16. The compound or a salt thereof according to claim 5, wherein the compound is 3-(4-{5-[(5-{[(2R,5R)-2,5-dimethylpyrrolidin-1-yl]methyl}-4-[3-fluoro-5-(trifluoromethyl)phenyl]-1,3-thiazol-2-yl)carbamoyl]pyrazin-2-yl}piperazin-1-yl)propanoic acid.
17. The compound or a salt thereof according to claim 5, wherein the compound is 3-{(2R)-4-[5-({5-[(diethylamino)methyl]-4-[3-fluoro-5-(trifluoromethyl)phenyl]-1,3-thiazol-2-yl}carbamoyl)pyrazin-2-yl]-2-methylpiperazin-1-yl}propanoic acid.
18. 3-[(2S)-4-(5-{[4-(4-chlorothiophen-2-yl)-5-{[(2R)-2-methylpyrrolidin-1-yl]methyl}-1,3-thiazol-2-yl]carbamoyl}pyrazin-2-yl)-2-methylpiperazin-1-yl]propanoic acid dimaleate.
19. A crystal of the compound according to claim 18, having peaks at 2θ (°) of 5.7, 6.6, 10.5, 12.0, 13.3, 15.8, 16.6, 17.3, 19.0, and 26.2 measured by powder X-ray diffraction.
20. A pharmaceutical composition comprising:
 - the crystal according to claim 19, and
 - a pharmaceutically acceptable excipient.

21. A pharmaceutical composition for preventing or treating bladder/urinary tract diseases associated with bladder contractions via a muscarinic M₃ receptor, comprising the crystal according to claim 19.

22. The pharmaceutical composition according to claim 21, wherein the bladder/urinary tract diseases associated with bladder contractions via a muscarinic M₃ receptor are voiding dysfunction or urine storage dysfunction in underactive bladder, hypotonic bladder, acontractile bladder, detrusor underactivity, or neurogenic bladder.