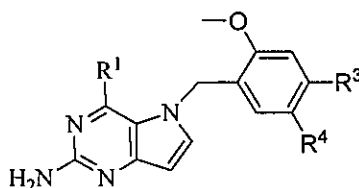


Claims

1. A compound having the structure of Formula (I), or a pharmaceutical salt thereof:



Formula (I)

wherein:

R^1 is $-NHR^6$ or $-NHCHR^6R^9$;

R^3 is H, $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$ or tetrazolyl;

R^4 is H, $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$ or tetrazolyl;

where, when R^3 is H, then R^4 is $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$ or tetrazolyl;
or when R^4 is H, then R^3 is $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$ or tetrazolyl;

L_1 is $-(CH_2)_m$;

L_2 is $-(CH_2)_m$;

$L_7 = -(CH_2)_m(CHR^{11}CH_2)_m(CH_2)_n$;

R^6 is $-C_3-C_6$ alkyl;

R^7 is $-C_1-C_3$ alkyl;

R^9 is L_1OH ;

each R^{11} is independently selected from $-OH$;

R^{12} is

a) an unsubstituted tetrazolyl;

b) a tetrazolyl substituted with $-L_1C(=O)OH$;

or

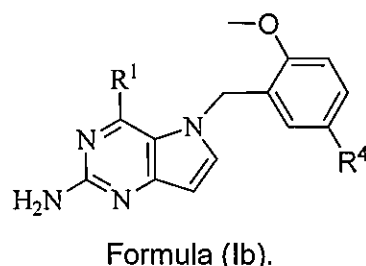
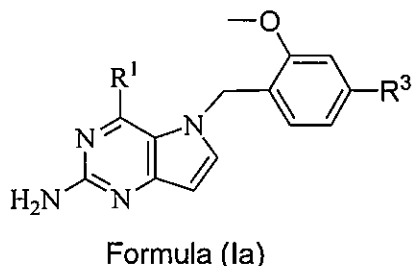
c) a 5-6 membered heterocycloalkyl having 1 to 2 heteroatoms independently selected from N and O substituted with $-C(=O)OH$;

each m is independently selected from 1, 2, 3, and 4,

and

each n is independently selected from 0, 1, 2, 3, and 4.

2. The compound or the pharmaceutical salt of claim 1, wherein the compound of Formula (I) is a compound of Formula (Ia) or Formula (Ib):



3. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

R^1 is $-NHR^6$ or $-NHCHR^6R^9$;

R^3 is H, $-OL_2C(=O)OH$ or tetrazolyl;

R^4 is H, $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, -

$CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$ or tetrazolyl;

where, when R^3 is H, then R^4 is $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, -

$P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, -

$C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$ or tetrazolyl;

or when R^4 is H, then R^3 is $-OL_2C(=O)OH$ or tetrazolyl;

L_1 is $-(CH_2)_m$;

L_2 is $-(CH_2)_m$;

$L_7 = -(CH_2)_m(CHR^{11}CH_2)_m(CH_2)_n$;

R^6 is $-C_3$ - C_6 alkyl;

R^7 is $-C_1$ - C_3 alkyl; methyl

R^9 is L_1OH ;

each R^{11} is independently selected from $-OH$;

R^{12} is

a) an unsubstituted tetrazolyl;

b) a tetrazolyl substituted with $-L_1C(=O)OH$;

or

c) a 5-6 membered heterocycloalkyl having 1 to 2 heteroatoms independently selected from N and O substituted with $-C(=O)OH$;

each m is independently selected from 1, 2, 3, and 4,

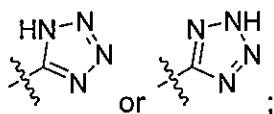
and

each n is independently selected from 0, 1, 2, 3, and 4.

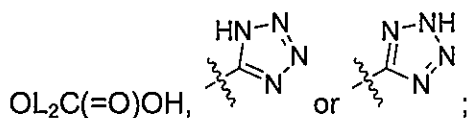
4. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

R^1 is $-NHR^6$ or $-NHCHR^6R^9$;

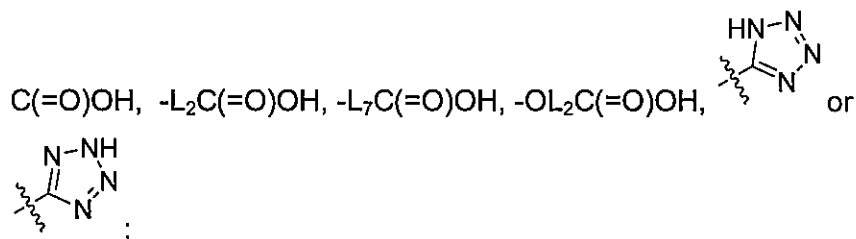
R^3 is H, $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$,



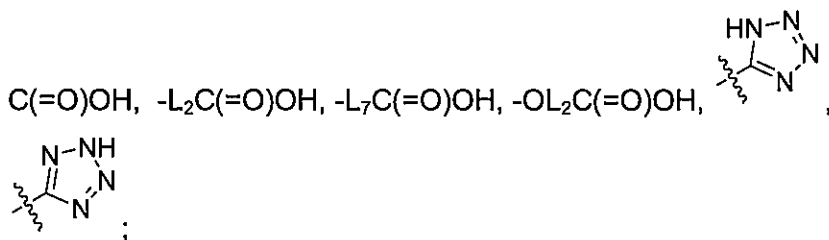
R^4 is H, $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$,



where, when R^3 is H, then R^4 is $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$,



or when R^4 is H, then R^3 is $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$, $-OL_2C(=O)OH$,



L_1 is $-(CH_2)_m$;

L_2 is $-(CH_2)_m$;

$L_7 = -(CH_2)_m(CHR^{11}CH_2)_m(CH_2)_n$;

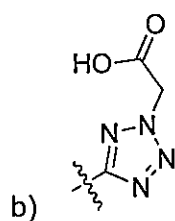
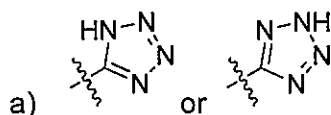
R^6 is $-C_3-C_6$ alkyl;

R^7 is $-C_1-C_3$ alkyl;

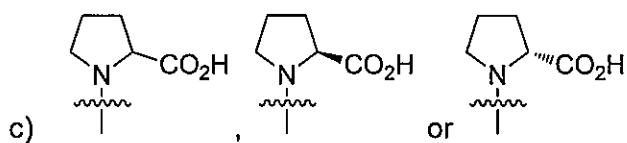
R^9 is L_1OH ;

each R^{11} is independently selected from $-OH$;

R^{12} is



or

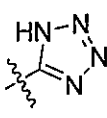
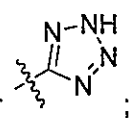


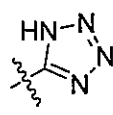
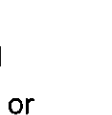
each m is independently selected from 1, 2, 3, and 4,

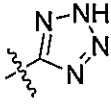
and

each n is independently selected from 0, 1, 2, 3, and 4.

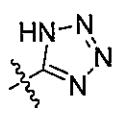
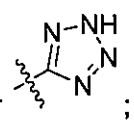
5. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

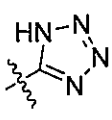
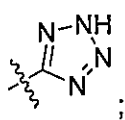
 R^1 is $-NHR^6$ or $-NHCHR^6R^9$; R^3 is H, $-OL_2C(=O)OH$,  or ; R^4 is H, $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, $-P(=O)OH(OR^7)$, $-CF_2R^{12}$, -

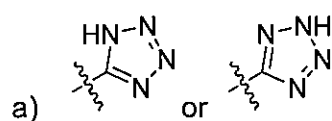
$CF_2C(=O)OH$, $-CH=CHC(=O)OH$, $-C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$,  or  ;

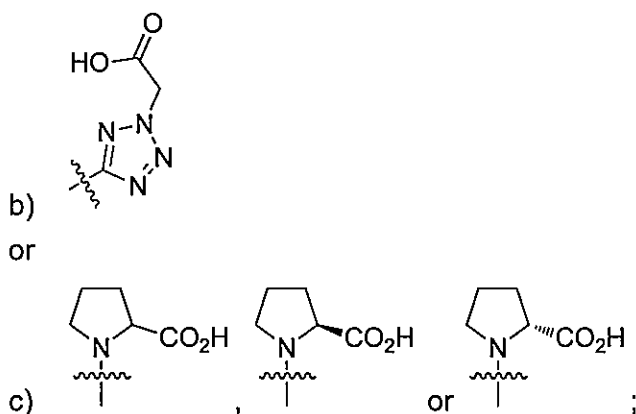
 ;

where, when R^3 is H, then R^4 is $-L_2R^{12}$, $-OL_2R^{12}$, $-C(CH_3)_2R^{12}$, $-P(=O)(OH)_2$, - $P(=O)OH(OR^7)$, $-CF_2R^{12}$, $-CF_2C(=O)OH$, $-CH=CHC(=O)OH$, -

$C(=O)OH$, $-L_2C(=O)OH$, $-L_7C(=O)OH$,  or  ;

or when R^4 is H, then R^3 is $-OL_2C(=O)OH$,  ,  ;

 L_1 is $-(CH_2)_m$; L_2 is $-(CH_2)_m$; $L_7 = -(CH_2)_m(CHR^{11}CH_2)_m(CH_2)_n$; R^6 is $-C_3$ - C_6 alkyl; R^7 is $-C_1$ - C_3 alkyl; R^9 is L_1OH ;each R^{11} is independently selected from $-OH$; R^{12} is



each m is independently selected from 1, 2, 3, and 4,

and

each n is independently selected from 0, 1, 2, 3, and 4.

6. The compound or the pharmaceutical salt of any one of claims 1 to 5, wherein:

L_1 is $-\text{CH}_2-$;

L_2 is $-\text{CH}_2-$ or $-\text{CH}_2\text{CH}_2-$;

$L_7 = -(\text{CH}_2)_2(\text{CHR}^{11}\text{CH}_2)_2-$;

R^6 is $-\text{C}_4\text{alkyl}$ or $-\text{C}_5\text{alkyl}$;

R^7 is methyl, ethyl or propyl,

and

R^{11} is OH.

7. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

R^1 is $-\text{NHR}^6$;

R^3 is H;

R^4 is $-\text{L}_2\text{R}^{12}$;

L_2 is $-(\text{CH}_2)_m-$;

R^6 is $-\text{C}_3\text{-C}_6\text{alkyl}$;

R^{12} is

a) an unsubstituted tetrazolyl;

b) a tetrazolyl substituted with $-\text{L}_1\text{C}(=\text{O})\text{OH}$;

or

c) a 5-6 membered heterocycloalkyl having 1 to 2 heteroatoms independently selected from N and O substituted with $-\text{C}(=\text{O})\text{OH}$,

and

each m is independently selected from 1, 2, 3, and 4.

8. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

R^1 is $-\text{NHR}^6$;

R^3 is H;

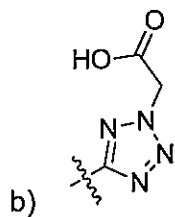
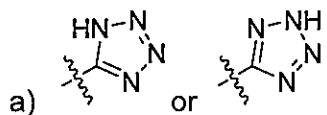
R^4 is $-L_2R^{12}$;

L_2 is $-\text{CH}_2-$ or $-\text{CH}_2\text{CH}_2-$;

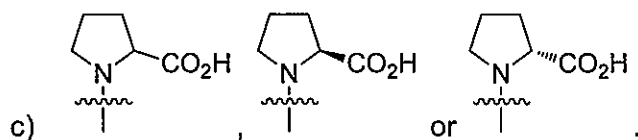
R^6 is $-\text{C}_5\text{alkyl}$;

and

R^{12} is



or



9. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

R^1 is $-\text{NHR}^6$;

R^3 is H;

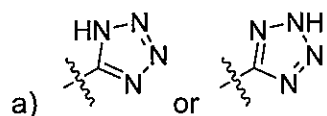
R^4 is $-L_2R^{12}$;

L_2 is $-\text{CH}_2-$ or $-\text{CH}_2\text{CH}_2-$;

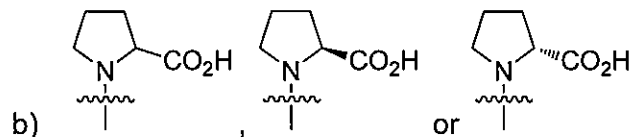
R^6 is $-\text{C}_5\text{alkyl}$;

and

R^{12} is



or



10. The compound or the pharmaceutical salt of claim 1 or claim 2, wherein:

R^1 is $-\text{NHR}^6$;

R^3 is H;

R^4 is $-L_2\text{C}(=\text{O})\text{OH}$;

L_2 is $-\text{CH}_2-$ or $-\text{CH}_2\text{CH}_2-$;

and

R⁶ is -C₅alkyl.

11. The compound or the pharmaceutical salt of claim 1, wherein the compound is selected from:

5-(5-((1H-tetrazol-5-yl)methoxy)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 5-(5-((1H-tetrazol-5-yl)methyl)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 (S)-2-((5-(5-((1H-tetrazol-5-yl)methyl)-2-methoxybenzyl)-2-amino-5H-pyrrolo[3,2-d]pyrimidin-4-yl)amino)hexan-1-ol;
 (S)-2-((5-(5-((1H-tetrazol-5-yl)methyl)-2-methoxybenzyl)-2-amino-5H-pyrrolo[3,2-d]pyrimidin-4-yl)amino)pentan-1-ol;
 5-(5-(2-(1H-tetrazol-5-yl)ethyl)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 N4-hexyl-5-(2-methoxy-5-(1H-tetrazol-5-yl)benzyl)-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 (S)-2-((2-amino-5-(2-methoxy-5-(1H-tetrazol-5-yl)benzyl)-5H-pyrrolo[3,2-d]pyrimidin-4-yl)amino)hexan-1-ol;
 2-(5-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxybenzyl)-2H-tetrazol-2-yl)acetic acid;
 5-(2-methoxy-4-(1H-tetrazol-5-yl)benzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 5-(2-methoxy-5-(1H-tetrazol-5-yl)benzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 5-(5-(2-(1H-tetrazol-5-yl)propan-2-yl)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 (S)-2-((5-(5-(2-(1H-tetrazol-5-yl)propan-2-yl)-2-methoxybenzyl)-2-amino-5H-pyrrolo[3,2-d]pyrimidin-4-yl)amino)hexan-1-ol;
 5-(5-(difluoro(1H-tetrazol-5-yl)methyl)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 2-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)-2,2-difluoroacetic acid;
 (3R,5R)-7-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)-3,5-dihydroxyheptanoic acid;
 2-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)acetic acid;
 (S)-2-(3-((2-amino-4-((1-hydroxyhexan-2-yl)amino)-5H-pyrrolo[3,2-d]pyrimidin-5-

yl)methyl)-4-methoxyphenyl)acetic acid;
 3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxybenzoic acid;
 (3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)phosphonic acid;
 methyl hydrogen (3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)phosphonate;
 (E)-3-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)acrylic acid;
 3-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)propanoic acid;
 (S)-3-(3-((2-amino-4-((1-hydroxyhexan-2-yl)amino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)propanoic acid;
 (S)-1-(4-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-3-methoxybenzyl)pyrrolidine-2-carboxylic acid ;
 (R)-1-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxybenzyl)pyrrolidine-2-carboxylic acid, and
 2-(4-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-3-methoxyphenoxy)acetic acid.

12. The compound or the pharmaceutical salt of claim 1, wherein the compound is selected from:

2-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxyphenyl)acetic acid ;
 3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxybenzoic acid ;
 5-(5-((1H-tetrazol-5-yl)methyl)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 5-(5-(2-(1H-tetrazol-5-yl)ethyl)-2-methoxybenzyl)-N4-pentyl-5H-pyrrolo[3,2-d]pyrimidine-2,4-diamine;
 (S)-1-(4-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-3-methoxybenzyl)pyrrolidine-2-carboxylic acid , and
 (R)-1-(3-((2-amino-4-(pentylamino)-5H-pyrrolo[3,2-d]pyrimidin-5-yl)methyl)-4-methoxybenzyl)pyrrolidine-2-carboxylic acid.

13. A pharmaceutical composition comprising a therapeutically effective amount of a compound or a pharmaceutical salt of any one of claims 1-12 and a pharmaceutically acceptable carrier.

14. Use of a compound or the pharmaceutical salt of any one of claims 1-12 in the manufacture of a medicament for treating a disease or disorder associated with TLR7 activity, wherein the disease or disorder is an infectious disease, a viral infectious disease, an inflammatory disease, a respiratory disease, a dermatological disease, an autoimmune disease, a cell-proliferative disease or cancer.
15. The use of claim 14, wherein the disease or disorder is asthma, chronic obstructive pulmonary disease (COPD), adult respiratory distress syndrome (ARDS), ulcerative colitis, Crohn's disease, bronchitis, dermatitis, actinic keratosis, basal cell carcinoma, bladder cancer, allergic rhinitis, psoriasis, scleroderma, urticaria, rheumatoid arthritis, multiple sclerosis, cancer, breast cancer, HIV, hepatitis, hepatitis C or lupus.
16. The use of claim 14, wherein the disease or disorder is hepatitis B, hepatitis C, colorectal cancer or hepatocellular carcinoma.
17. A compound or the pharmaceutical salt of any one of claims 1-12 for use in treating a disease associated with TLR7 receptor activity, wherein the disease is an infectious disease, a viral infectious disease, an inflammatory disease, a respiratory disease, a dermatological disease, an autoimmune disease, a cell-proliferative disease or cancer.
18. The compound or the pharmaceutical salt of claim 17, wherein the disease is asthma, chronic obstructive pulmonary disease (COPD), adult respiratory distress syndrome (ARDS), ulcerative colitis, Crohn's disease, bronchitis, dermatitis, actinic keratosis, basal cell carcinoma, bladder cancer, allergic rhinitis, psoriasis, scleroderma, urticaria, rheumatoid arthritis, multiple sclerosis, cancer, breast cancer, HIV, hepatitis, hepatitis C or lupus.
19. The compound or the pharmaceutical salt of claim 17, wherein the disease is hepatitis B, hepatitis C, colorectal cancer or hepatocellular carcinoma.