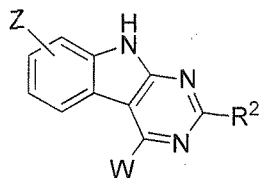
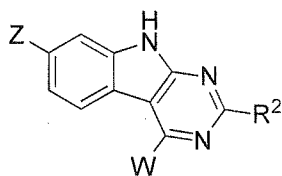


CLAIMS

1. A compound of general formula I or II



I



II

or a salt thereof,

wherein:

Z is

- 1) $-P(O)(OR^1)(OR^1)$,
- 2) $-C(O)OR^1$,
- 3) $-C(O)NHR^1$,
- 4) $-C(O)N(R^1)R^1$,
- 5) $-C(O)R^1$,
- 6) $-CN$,
- 7) $-SR^1$,
- 8) $-S(O)_2NH_2$,
- 9) $-S(O)_2NHR^1$,
- 10) $-S(O)_2N(R^1)R^1$,
- 11) $-S(O)R^1$,
- 12) $-S(O)_2R^1$,
- 13) $-L$,
- 14) $-benzyl$ optionally substituted with 1, 2 or 3 R^A or R^1 substituents,
- 15) $-L-heteroaryl$ optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 16) $-L-heterocyclyl$ optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heterocyclyl groups,
- 17) $-L-aryl$ optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 18) $-heteroaryl$ optionally substituted with one or more R^A or R^1 substituents, or
- 19) $-aryl$ optionally substituted with one or more R^A or R^1 substituents,

and wherein each substituent is optionally attached to the L group if it is not already present, and wherein, when (R^1) and R^1 are attached to a nitrogen atom, optionally they join together with the nitrogen atom to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the is substituted with one or more R^1 or R^A ;

W is

- 1) $-OR^1$, wherein R^1 is $-C_{1-6}$ alkyl, $-C_{2-6}$ alkenyl, $-C_{2-6}$ alkynyl, $-C_{3-7}$ cycloalkyl, $-C_{3-7}$ cycloalkenyl, $-C_{1-5}$ perfluorinated, -heterocyclyl, -aryl, -heteroaryl, -benzyl, or 5-[(3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d]imidazol-4-yl]pentanoyl, wherein the alkyl, the alkenyl, the alkynyl, the cycloalkenyl, the perfluorinated alkyl, the heterocyclyl, the aryl, the heteroaryl and the benzyl groups are each independently optionally substituted with 1, 2 or 3 R^A or R^1 substituents;
- 2) $-L-OH$,
- 3) $-L-OR^1$,
- 4) $-SR^1$,
- 5) $-CN$,
- 6) $-P(O)(OR^1)(OR^1)$,
- 7) $-NHR^1$,
- 8) $-N(R^1)R^1$,
- 9) $-L-NH_2$,
- 10) $-L-NHR^1$,
- 11) $-L-N(R^1)R^1$,
- 12) $-L-SR^1$,
- 13) $-L-S(O)R^1$,
- 14) $-L-S(O)_2R^1$,
- 15) $-L-P(O)(OR^1)(OR^1)$,
- 16) $-C(O)OR^1$,
- 17) $-C(O)NH_2$,
- 18) $-C(O)NHR^1$,
- 19) $-C(O)N(R^1)R^1$,
- 20) $-NHC(O)R^1$,
- 21) $-NR^1C(O)R^1$,
- 22) $-NHC(O)OR^1$,
- 23) $-NR^1C(O)OR^1$,

- 24) $-\text{OC}(\text{O})\text{NH}_2$,
- 25) $-\text{OC}(\text{O})\text{NHR}^1$,
- 26) $-\text{OC}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 27) $-\text{OC}(\text{O})\text{R}^1$,
- 28) $-\text{C}(\text{O})\text{R}^1$,
- 29) $-\text{NHC}(\text{O})\text{NH}_2$,
- 30) $-\text{NHC}(\text{O})\text{NHR}^1$,
- 31) $-\text{NHC}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 32) $-\text{NR}^1\text{C}(\text{O})\text{NH}_2$,
- 33) $-\text{NR}^1\text{C}(\text{O})\text{NHR}^1$,
- 34) $-\text{NR}^1\text{C}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 35) $-\text{NHS}(\text{O})_2\text{R}^1$,
- 36) $-\text{NR}^1\text{S}(\text{O})_2\text{R}^1$,
- 37) $-\text{S}(\text{O})_2\text{NH}_2$,
- 38) $-\text{S}(\text{O})_2\text{NHR}^1$,
- 39) $-\text{S}(\text{O})_2\text{N}(\text{R}^1)\text{R}^1$,
- 40) $-\text{S}(\text{O})\text{R}^1$,
- 41) $-\text{S}(\text{O})_2\text{R}^1$,
- 42) $-\text{OS}(\text{O})_2\text{R}^1$,
- 43) $-\text{S}(\text{O})_2\text{OR}^1$,
- 44) -benzyl optionally substituted with 1, 2 or 3 R^A or R^1 substituents,
- 45) -L-heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 46) -L-heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heterocyclyl groups,
- 47) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 48) $-\text{L}-\text{NR}^1(\text{R}^1)$,
- 49) $-(\text{L})_2\text{NR}^1$,
- 50) $-\text{L}(\text{N}(\text{R}^1)-\text{L})_n - \text{N}(\text{R}^1)\text{R}^1$,
- 51) $-\text{L}(\text{N}(\text{R}^1)-\text{L})_n$ - heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 52) $-\text{L}(\text{N}(\text{R}^1)-\text{L})_n$ - heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,

- 53) -L-(N(R¹)-L)_n – aryl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and aryl groups,
- 54) -O-L-N(R¹)R¹,
- 55) -O-L- heteroaryl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and heteroaryl groups,
- 56) -O-L- heterocyclyl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and heterocyclyl groups,
- 57) -O-L- aryl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and aryl groups,
- 58) -(O-L)₂-NR¹,
- 59) -O-L-(N(R¹)-L)_n – N(R¹)R¹,
- 60) -O-L-(N(R¹)-L)_n – heteroaryl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and heteroaryl groups,
- 61) -O-L-(N(R¹)-L)_n – heterocyclyl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and heterocyclyl groups,
- 62) -O-L-(N(R¹)-L)_n- aryl optionally substituted with one or more R^A or R¹ substituents,
- 63) -S-L- heteroaryl optionally substituted with one or more R^A or R¹ substituents,
- 64) -S-L- heterocyclyl optionally substituted with one or more R^A or R¹ substituents,
- 65) -S-L- aryl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and aryl groups,
- 66) -(S-L)₂ NR¹,
- 67) -S-L-(N(R¹)-L)_n – N(R¹)R¹,
- 68) -S-L-(N(R¹)-L)_n – heteroaryl optionally substituted with one or more R^A substituents,
- 69) -S-L-(N(R¹)-L)_n – heterocyclyl optionally substituted with one or more R^A substituents,
- 70) -S-L-(N(R¹)-L)_n – aryl optionally substituted with one or more R^A substituents,
- 71) -NR¹(R¹),
- 72) -(N(R¹)-L)_n – N(R¹)R¹,
- 73) -(N(R¹)-L)₂ -NR¹,
- 74) -(N(R¹)-L)_n – N(R¹)R^A,
- 75) -(N(R¹)-L)_n – heteroaryl optionally substituted with one or more R^A or R¹ substituents,
- 76) -(N(R¹)-L)_n – heterocyclyl optionally substituted with one or more R^A or R¹ substituents,

77) $-(N(R^1)-L)_n$ – aryl optionally substituted with one or more R^A or R^1 substituents,

78) -heteroaryl optionally substituted with one or more R^A substituents, or

79) -aryl optionally substituted with one or more R^A substituents,

and wherein each substituent is optionally attached to the L group if it is not already present,

and wherein when two R^1 substituents are present on the same nitrogen atom, then each R^1 substituent is independently selected from the list of R^1 values described thereafter,

and wherein n is an integer equal to either 0, 1, 2, 3, 4, or 5,

and wherein, when (R^1) and R^1 are attached to a nitrogen atom, optionally they join together with the nitrogen atom to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A ;

L is

- 1) $-C_{1-6}$ alkyl,
- 2) $-C_{2-6}$ alkenyl,
- 3) $-C_{2-6}$ alkynyl,
- 4) $-C_{3-7}$ cycloalkyl,
- 5) $-C_{3-7}$ cycloalkenyl,
- 6) heterocyclyl,
- 7) $-C_{1-6}$ alkyl- $-C_{3-7}$ cycloalkyl,
- 8) $-C_{1-6}$ alkyl-heterocyclyl,
- 9) aryl, or
- 10) heteroaryl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkyl, the cycloalkenyl, the heterocyclyl, the aryl and the heteroaryl groups are each independently optionally substituted with one or two R^A substituent;

R^1 is

- 1) $-H$,
- 2) $-C_{1-6}$ alkyl,
- 3) $-C_{2-6}$ alkenyl,
- 4) $-C_{2-6}$ alkynyl,
- 5) $-C_{3-7}$ cycloalkyl,
- 6) $-C_{3-7}$ cycloalkenyl,
- 7) $-C_{1-5}$ perfluorinated,
- 8) -heterocyclyl,

9) -aryl,

10) -heteroaryl,

11) -benzyl, or

12) 5-[(3a*S*,4*S*,6a*R*)-2-oxohexahydro-1*H*-thieno[3,4-*d*]imidazol-4-yl]pentanoyl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkenyl, the perfluorinated alkyl, the heterocyclyl, the aryl, the heteroaryl and the benzyl groups are each independently optionally substituted with 1, 2 or 3 R^A or R^1 substituents;

R^2 is

1) -H,

2) -C₁₋₆ alkyl,

3) -SR¹,

4) -C(O)R¹,

5) -S(O)R¹,

6) -S(O)₂R¹,

7) -benzyl optionally substituted with 1, 2 or 3 R^A or R^1 substituents,

8) -L-heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heteroaryl groups,

9) -L-heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heterocyclyl groups,

10) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the aryl groups,

11) -heteroaryl optionally substituted with one or more R^A or R^1 substituents, or

12) -aryl optionally substituted with one or more R^A or R^1 substituents,

and wherein each substituent is optionally attached to the L group if it is not already present;

R^A is

1) -halogen,

2) -CF₃,

3) -OH,

4) -OR¹,

5) -L-OH,

6) -L-OR¹,

7) -OCF₃,

8) -SH,

9) -SR¹,

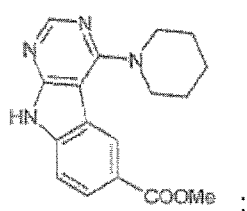
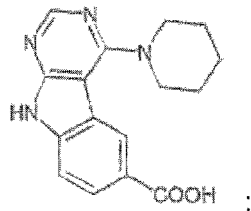
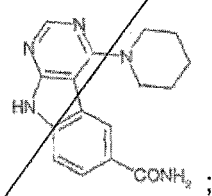
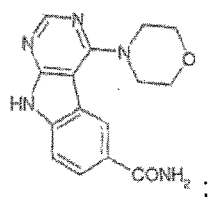
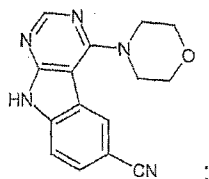
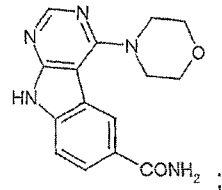
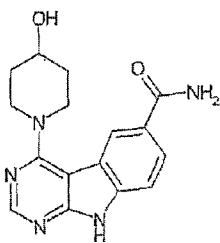
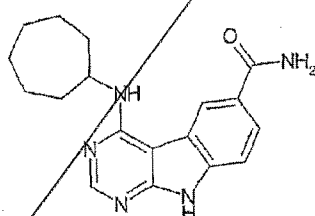
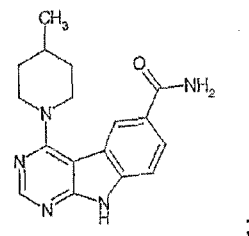
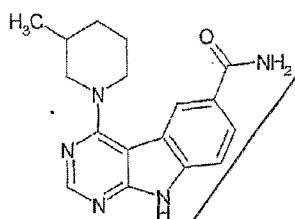
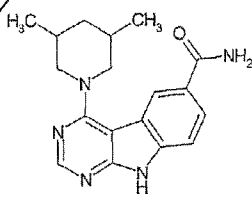
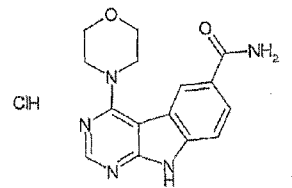
- 10) -CN,
- 11) -NO₂,
- 12) -NH₂,
- 13) -NHR¹,
- 14) -NR¹R¹,
- 15) -L-NH₂,
- 16) -L-NHR¹,
- 17) -L-SR¹,
- 18) -L-S(O)R¹,
- 19) -L-S(O)₂R¹,
- 20) -C(O)OH,
- 21) -C(O)OR¹,
- 22) -C(O)NH₂,
- 23) -C(O)NHR¹,
- 24) -C(O)N(R¹)R¹,
- 25) -NHC(O)R¹,
- 26) -NR¹C(O)R¹,
- 27) -NHC(O)OR¹,
- 28) -NR¹C(O)OR¹,
- 29) -OC(O)NH₂,
- 30) -OC(O)NHR¹,
- 31) -OC(O)N(R¹)R¹,
- 32) -OC(O)R¹,
- 33) -C(O)R¹,
- 34) -NHC(O)NH₂,
- 35) -NHC(O)NHR¹,
- 36) -NHC(O)N(R¹)R¹,
- 37) -NR¹C(O)NH₂,
- 38) -NR¹C(O)NHR¹,
- 39) -NR¹C(O)N(R¹)R¹,
- 40) -NHS(O)₂R¹,
- 41) -NR¹S(O)₂R¹,
- 42) -S(O)₂NH₂,
- 43) -S(O)₂NHR¹,

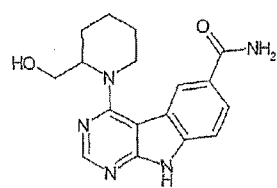
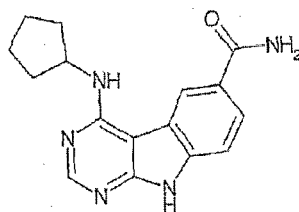
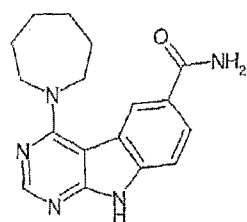
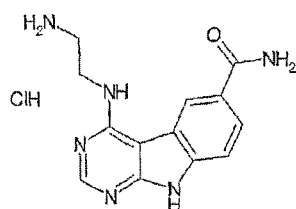
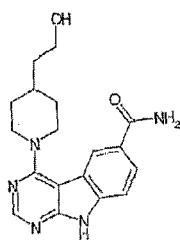
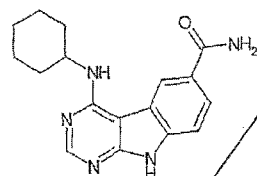
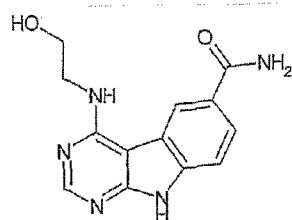
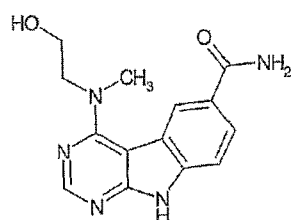
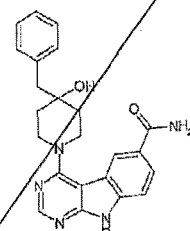
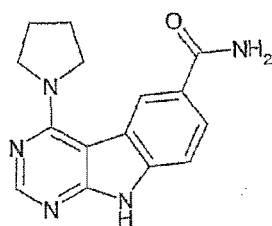
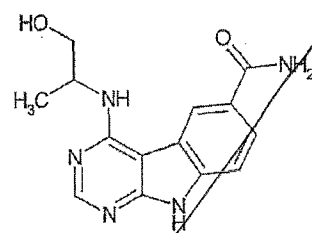
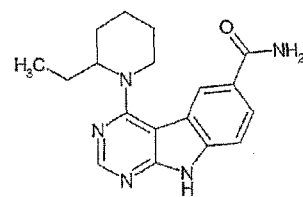
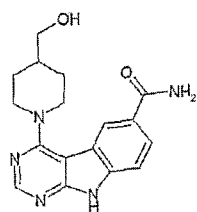
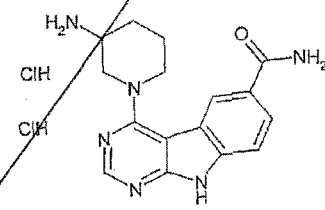
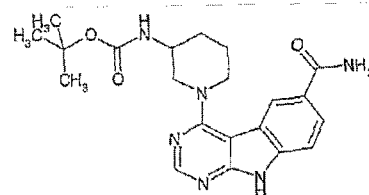
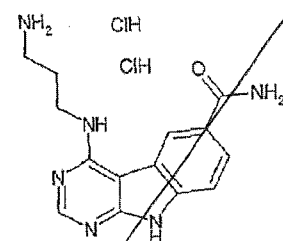
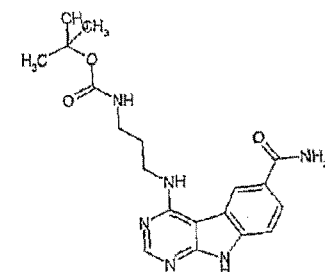
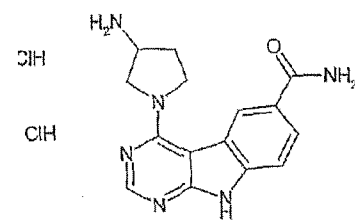
44) $-S(O)_2N(R^1)R^1$,45) $-S(O)R^1$,46) $-S(O)_2R^1$,47) $-OS(O)_2R^1$,48) $-S(O)_2OR^1$,

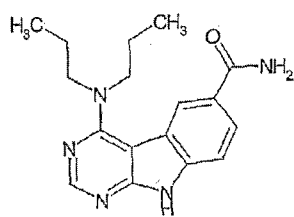
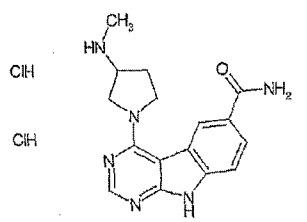
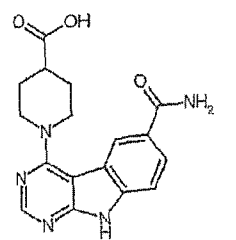
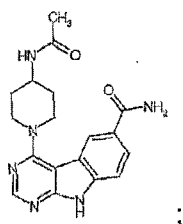
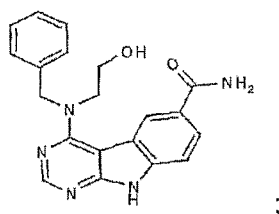
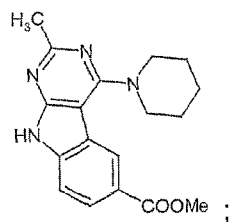
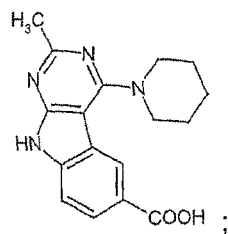
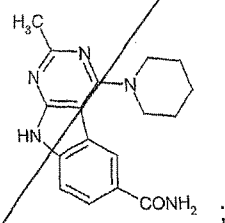
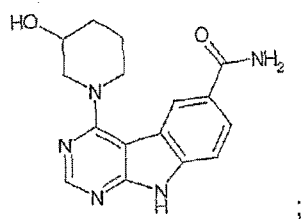
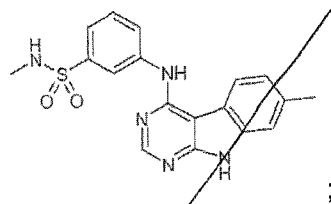
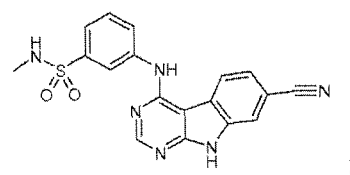
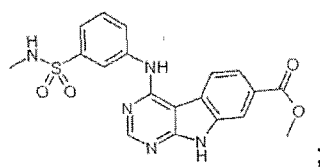
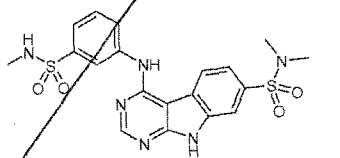
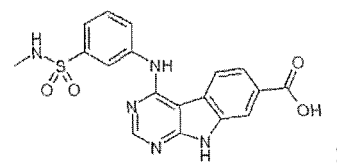
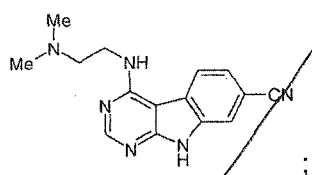
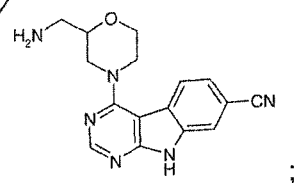
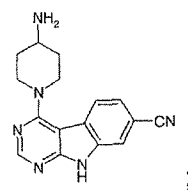
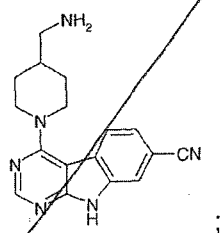
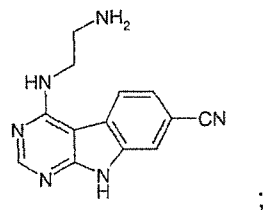
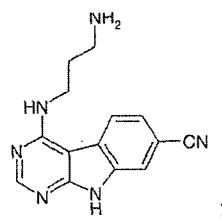
49) -benzyl,

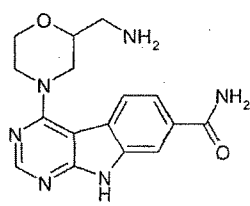
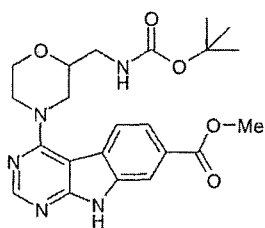
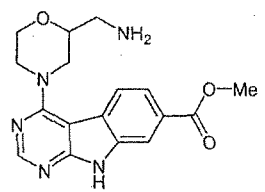
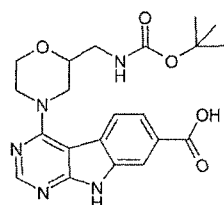
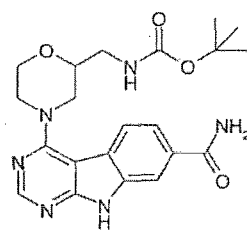
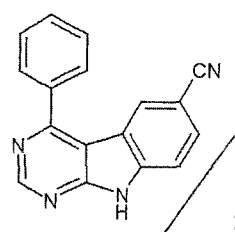
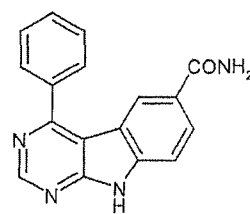
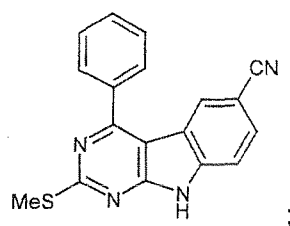
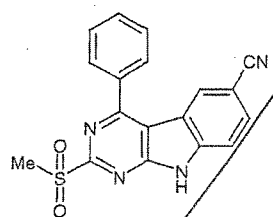
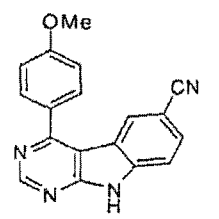
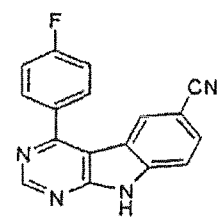
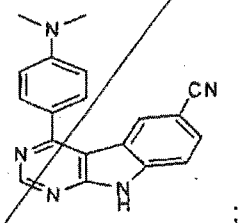
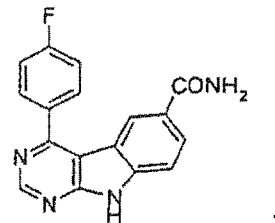
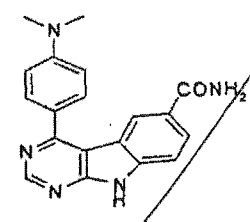
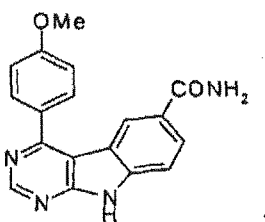
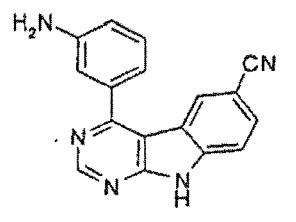
50) $-N_3$, or51) $-C(-N=N-)(CF_3)$,

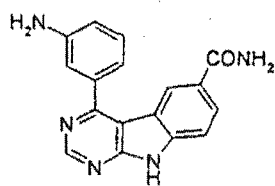
and wherein the benzyl group is optionally substituted with 1, 2 or 3 R^A or R^1 substituents provided that the compound of Formula (I) is other than



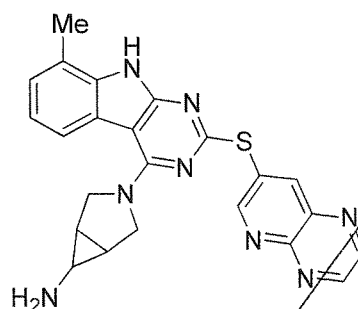




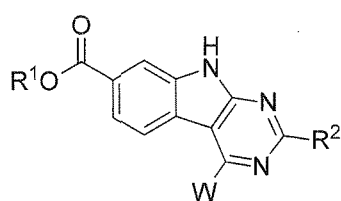




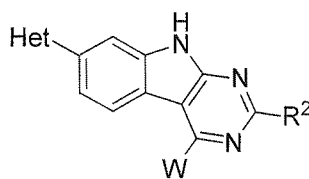
and



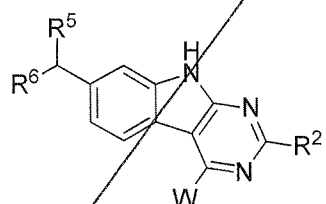
2. A compound according to claim 1, wherein the compound is of formula IIA, IIB or IIC



IIA



IIB



IIC

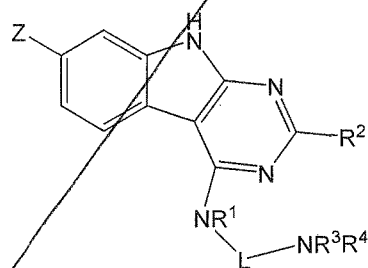
or

or a salt thereof

wherein Het is a 3 to 7-membered heterocycle, optionally substituted with one or more R^1 or R^A , and R^5 and R^6 are the same or different and are each independently L, or they join together with C to form a 5 to 7-membered ring which optionally includes one or more heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

3. A compound according to claim 2, wherein the ring is a 5-membered ring, and the heteroatom is N.

4. A compound according to claim 1, wherein the compound is of formula



or a salt thereof,

wherein R^3 and R^4 are the same or different and are each independently H, or R^1 , or R^3 and R^4 join together with N to which they are attached to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

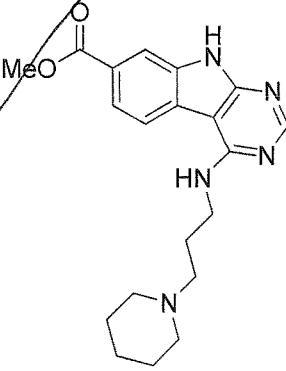
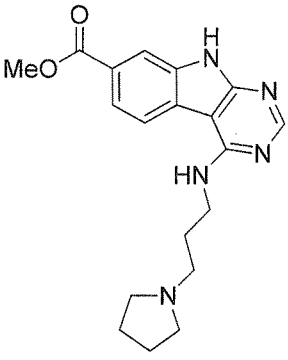
5. A compound according to claim 1, wherein:

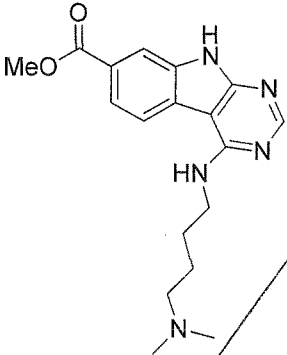
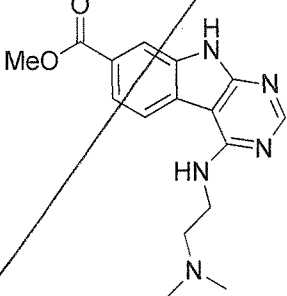
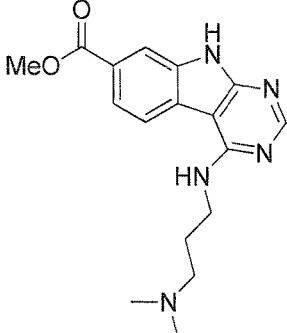
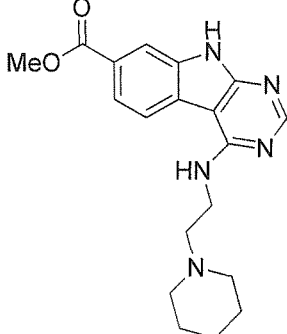
Z is CO_2Me or 2-methyl-2H-tetrazol-5-yl;

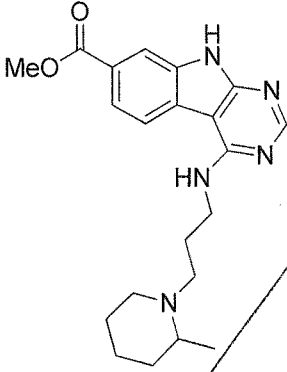
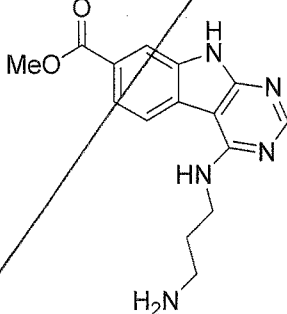
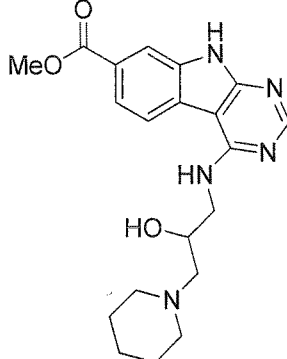
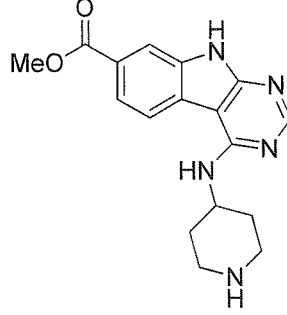
R^2 is benzyl or H; and

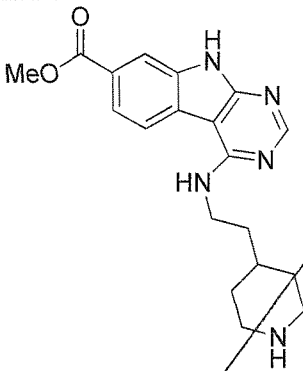
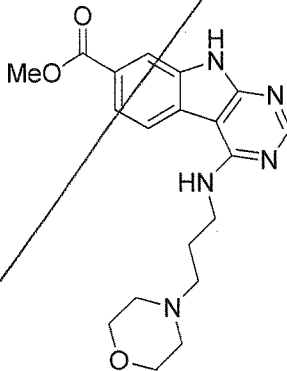
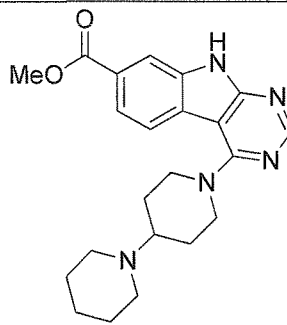
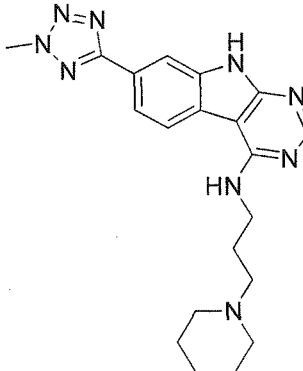
W is $\text{NH-L-N}(R^1)R^1$ wherein L is C_{2-4} alkyl or C_{3-7} cycloalkyl and R^1 and (R^1) is C_{1-4} alkyl or H; or (R^1) and R^1 join together with the nitrogen atom to which they are attached to form a 3 to 7-membered ring, which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

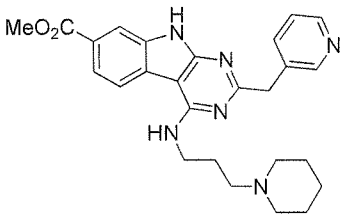
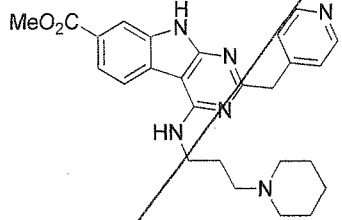
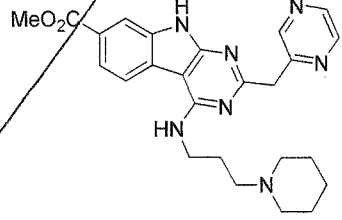
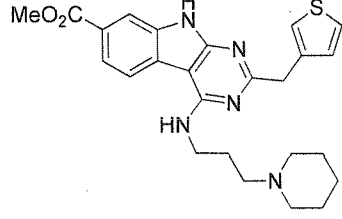
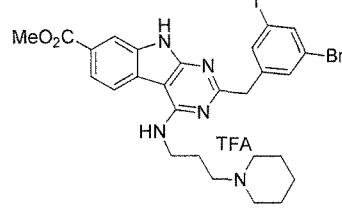
6. A compound according to claim 1 which is:

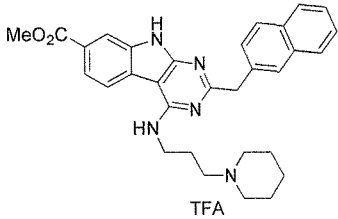
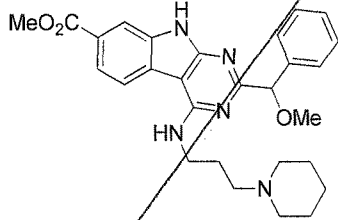
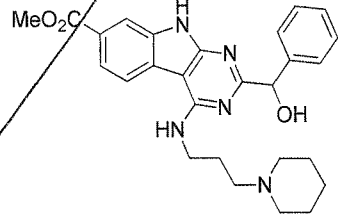
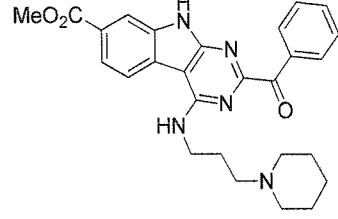
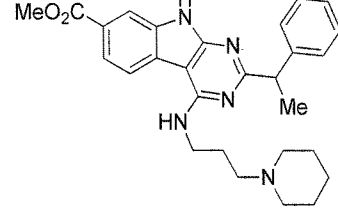
Compound number	Structure
1	
2	

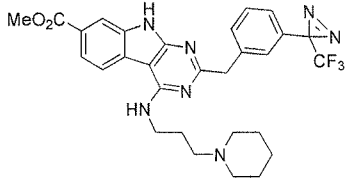
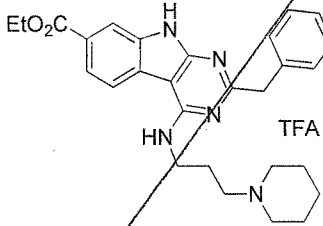
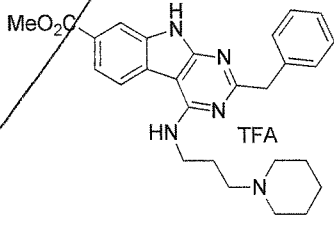
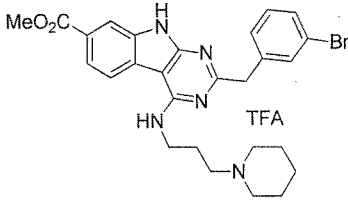
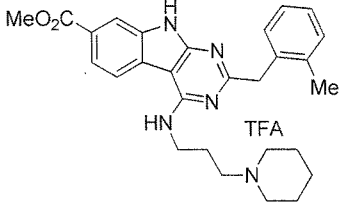
Compound number	Structure
3	 <chem>COc1ccc2c(c1)c3c(c2)c[nH]3NCCCN(C)C</chem>
4	 <chem>COc1ccc2c(c1)c3c(c2)c[nH]3NCCCN(C)C</chem>
5	 <chem>COc1ccc2c(c1)c3c(c2)c[nH]3NCCCN(C)C</chem>
6	 <chem>COc1ccc2c(c1)c3c(c2)c[nH]3NCCN4CCCCC4</chem>

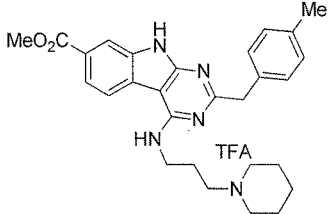
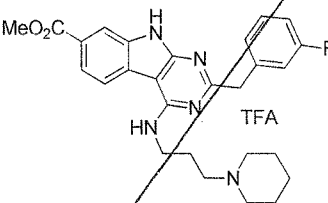
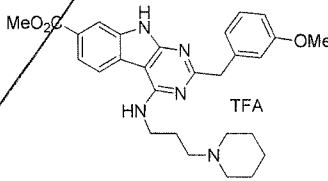
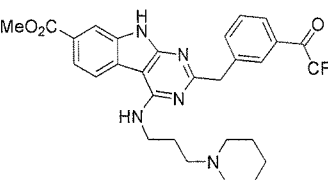
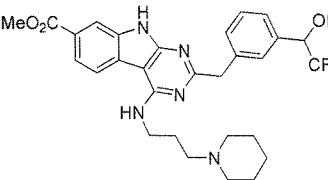
Compound number	Structure
7	 <chem>CN1CCCC1CCNC2=NC3=C(NC2=NC=C3)c4ccc(cc4)C(=O)OC</chem>
8	 <chem>NCCNC2=NC3=C(NC2=NC=C3)c4ccc(cc4)C(=O)OC</chem>
9	 <chem>OC(C)CNc2nc3ccccc3n2C(=O)OC</chem>
10	 <chem>CN1CCNCC1Nc2nc3ccccc3n2C(=O)OC</chem>

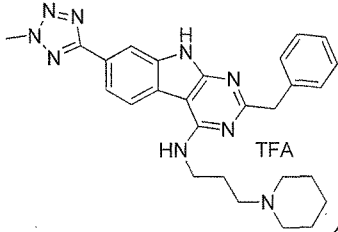
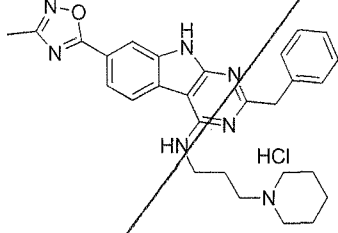
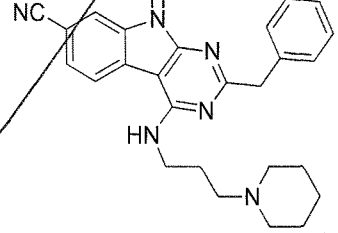
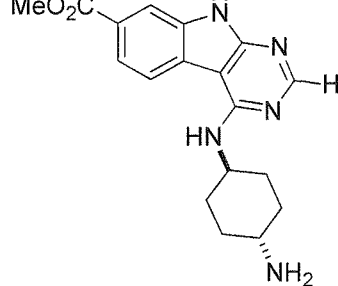
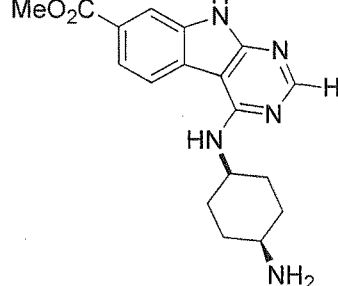
Compound number	Structure
11	 <chem>COC(=O)c1ccc2c(c1)c3c[nH]c4c3ncc4NCC5CCNCC5</chem>
12	 <chem>COC(=O)c1ccc2c(c1)c3c[nH]c4c3ncc4NCCN5CCOCC5</chem>
13	 <chem>COC(=O)c1ccc2c(c1)c3c[nH]c4c3ncc4NCCN5CCCCC5</chem>
14	 <chem>C1=NN=C(N1)c2ccc3c(c2)c4c[nH]c5c4ncc5NCCN6CCCCC6</chem>

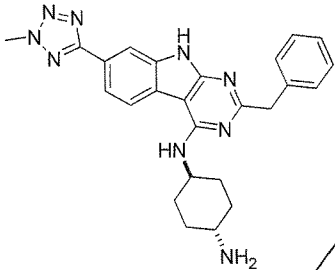
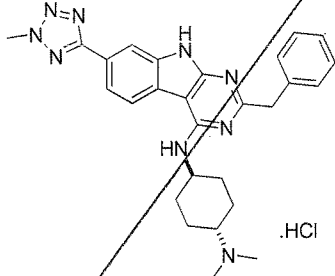
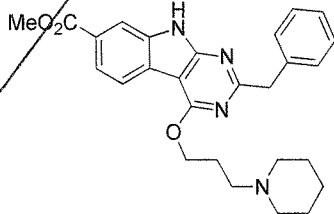
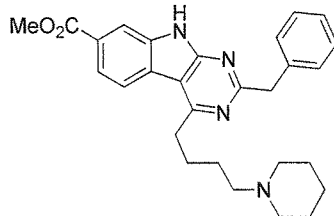
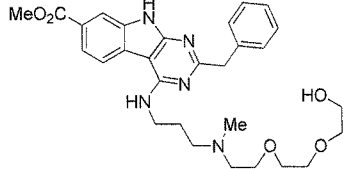
Compound number	Structure
15	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=O)NCCCN3CCCCC3CCc4cccnc4</chem>
16	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=O)NCCCN3CCCCC3CCc4cccnc4</chem>
17	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=O)NCCCN3CCCCC3CCc4ncnc4</chem>
18	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=O)NCCCN3CCCCC3CCc4ccsc4</chem>
19	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=O)NCCCN3CCCCC3CCc4cc(I)c(Br)cc4</chem>

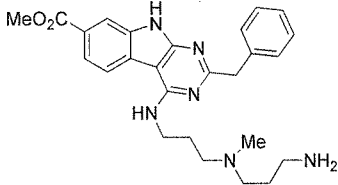
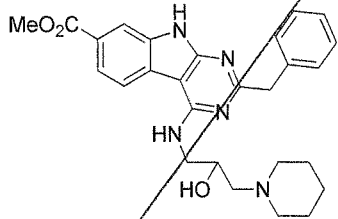
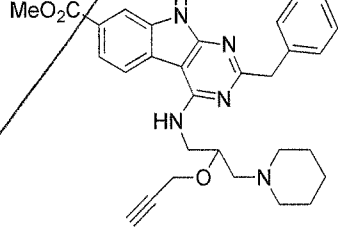
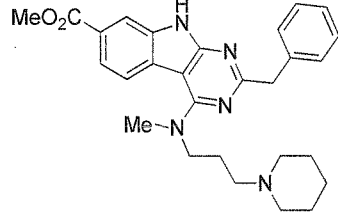
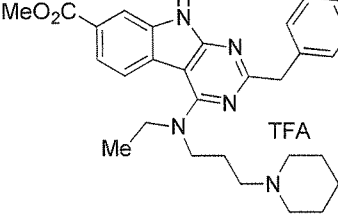
Compound number	Structure
20	 TFA
21	
22	
23	
24	

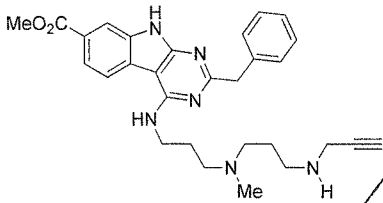
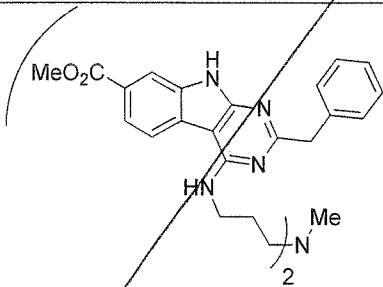
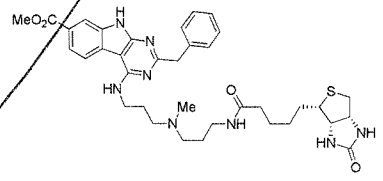
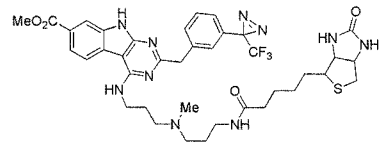
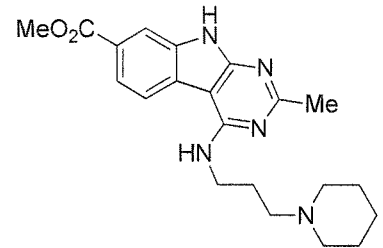
Compound number	Structure
25	
26	
27	
28	
29	

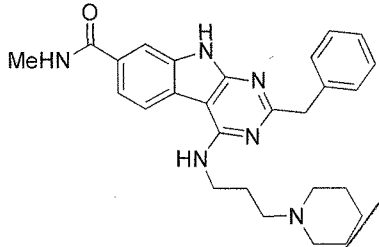
Compound number	Structure
30	 <chem>COC(=O)c1ccc2c(c1)[nH]c3nc(cc23)C(c4ccc(C)cc4)NC(CCN5CCCCC5)C6=CC=CC=C6</chem>
31	 <chem>COC(=O)c1ccc2c(c1)[nH]c3nc(cc23)C(c4ccc(F)cc4)NC(CCN5CCCCC5)C6=CC=CC=C6</chem>
32	 <chem>COC(=O)c1ccc2c(c1)[nH]c3nc(cc23)C(c4ccc(OC)cc4)NC(CCN5CCCCC5)C6=CC=CC=C6</chem>
33	 <chem>COC(=O)c1ccc2c(c1)[nH]c3nc(cc23)C(c4ccc(C(F)(F)F)cc4)NC(CCN5CCCCC5)C6=CC=CC=C6</chem>
34	 <chem>COC(=O)c1ccc2c(c1)[nH]c3nc(cc23)C(c4ccc(C(F)(F)F)cc4)NC(CCN5CCCCC5)C6=CC=CC=C6</chem>

Compound number	Structure
35	 <chem>C1=NC2=C(N1)C(=N3C(=NC(=N3)C4=CC=CC=C4)C5=CC=CC=C5)C(=N2)NCCCN6CCCCC6.[TFA-]</chem>
36	 <chem>C1=NC2=C(N1)C(=N3C(=NC(=N3)C4=CC=CC=C4)C5=CC=CC=C5)C(=N2)NCCCN6CCCCC6.[Cl-]</chem>
37	 <chem>N#Cc1ccc2c(c1)c3c(n2)nc(Cc4ccccc4)c3NCCCN5CCCCC5</chem>
38	 <chem>COC(=O)c1ccc2c(c1)c3c(n2)nc(=O)c3N[C@H]4CCCCC4N</chem>
39	 <chem>COC(=O)c1ccc2c(c1)c3c(n2)nc(=O)c3N[C@H]4CCCCC4N</chem>

Compound number	Structure
40	
41	
42	
43	
44	

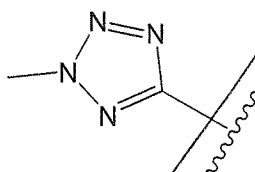
Compound number	Structure
45	
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Compound number	Structure
50	
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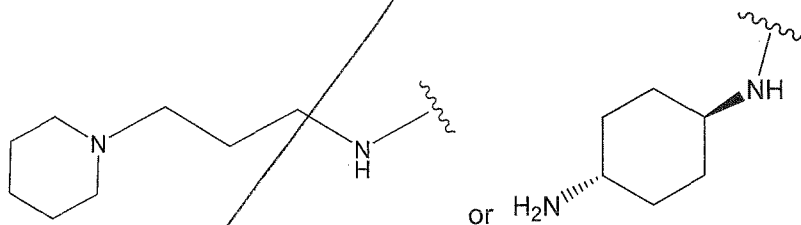
Compound number	Structure
55	

or a salt thereof.

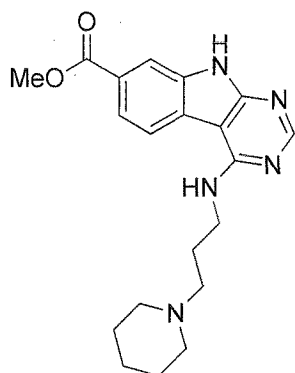
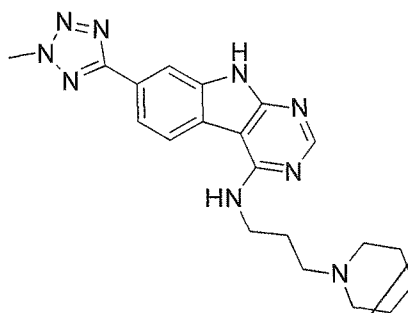
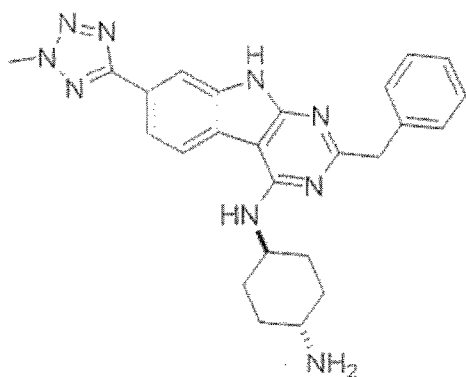
7. A compound according to claim 2, wherein R^2 is benzyl or H.
8. A compound according to claim 2, wherein R^5 and R^6 join together with C to form:



9. A compound according to claim 2, wherein W is

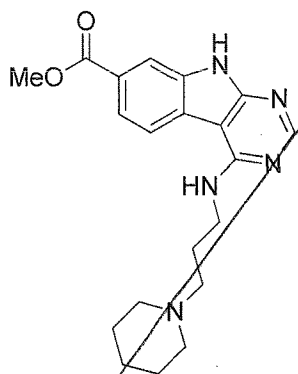


10. The compound according to claim 1, wherein the compound is

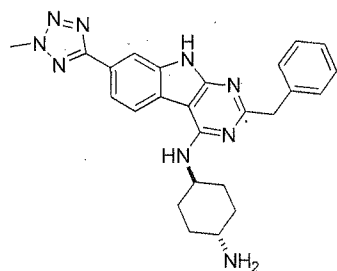


or a pharmaceutically acceptable salt thereof.

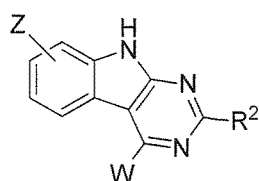
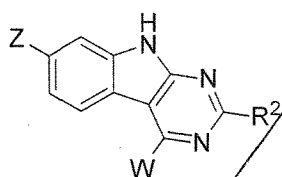
11. The compound of claim 1 which is a hydrochloride salt of



12. The compound of claim 1 which is a hydrobromide salt of



13. A method of increasing stem and progenitor cells, the method comprising; contacting a starting population in the presence of at least one compound, optionally together with at least one cell expanding factor which is a biologic or another small molecule, wherein said compound is of general formula I or II



or a salt thereof,

wherein:

Z is

- 1) $-P(O)(OR^1)(OR^1)$,
- 2) $-C(O)OR^1$,
- 3) $-C(O)NHR^1$,
- 4) $-C(O)N(R^1)R^1$,
- 5) $-C(O)R^1$,
- 6) $-CN$,
- 7) $-SR^1$,
- 8) $-S(O)_2NH_2$,
- 9) $-S(O)_2NHR^1$,
- 10) $-S(O)_2N(R^1)R^1$,
- 11) $-S(O)R^1$,

- 12) $-\text{S}(\text{O})_2\text{R}^1$,
- 13) $-\text{L}$,
- 14) $-\text{benzyl}$ optionally substituted with 1, 2 or 3 R^{A} or R^1 substituents,
- 15) $-\text{L-heteroaryl}$ optionally substituted with one or more R^{A} or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 16) $-\text{L-heterocyclyl}$ optionally substituted with one or more R^{A} or R^1 substituents attached on either one or both the L and the heterocyclyl groups,
- 17) $-\text{L-aryl}$ optionally substituted with one or more R^{A} or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 18) $-\text{heteroaryl}$ optionally substituted with one or more R^{A} or R^1 substituents, or
- 19) $-\text{aryl}$ optionally substituted with one or more R^{A} or R^1 substituents,

and wherein each substituent is optionally attached to the L group if it is not already present, and wherein, when (R^1) and R^1 are attached to a nitrogen atom, optionally they join together with the nitrogen atom to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the is substituted with one or more R^1 or R^{A} ;

W is

- 1) $-\text{H}$,
- 2) $-\text{halogen}$,
- 3) $-\text{OR}^1$,
- 4) $-\text{L-OH}$,
- 5) $-\text{L-OR}^1$,
- 6) $-\text{SR}^1$,
- 7) $-\text{CN}$,
- 8) $-\text{P}(\text{O})(\text{OR}^1)(\text{OR}^1)$,
- 9) $-\text{NHR}^1$,
- 10) $-\text{N}(\text{R}^1)\text{R}^1$,
- 11) $-\text{L-NH}_2$,
- 12) $-\text{L-NHR}^1$,
- 13) $-\text{L-N}(\text{R}^1)\text{R}^1$,
- 14) $-\text{L-SR}^1$,
- 15) $-\text{L-S}(\text{O})\text{R}^1$,
- 16) $-\text{L-S}(\text{O})_2\text{R}^1$,

- 17) -L-P(O)(OR¹)(OR¹),
- 18) -C(O)OR¹,
- 19) -C(O)NH₂,
- 20) -C(O)NHR¹,
- 21) -C(O)N(R¹)R¹,
- 22) -NHC(O)R¹,
- 23) -NR¹C(O)R¹,
- 24) -NHC(O)OR¹,
- 25) -NR¹C(O)OR¹,
- 26) -OC(O)NH₂,
- 27) -OC(O)NHR¹,
- 28) -OC(O)N(R¹)R¹,
- 29) -OC(O)R¹,
- 30) -C(O)R¹,
- 31) -NHC(O)NH₂,
- 32) -NHC(O)NHR¹,
- 33) -NHC(O)N(R¹)R¹,
- 34) -NR¹C(O)NH₂,
- 35) -NR¹C(O)NHR¹,
- 36) -NR¹C(O)N(R¹)R¹,
- 37) -NHS(O)₂R¹,
- 38) -NR¹S(O)₂R¹,
- 39) -S(O)₂NH₂,
- 40) -S(O)₂NHR¹,
- 41) -S(O)₂N(R¹)R¹,
- 42) -S(O)R¹,
- 43) -S(O)₂R¹,
- 44) -OS(O)₂R¹,
- 45) -S(O)₂OR¹,
- 46) -benzyl optionally substituted with 1, 2 or 3 R^A or R¹ substituents,
- 47) -L-heteroaryl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and the heteroaryl groups,
- 48) -L-heterocyclyl optionally substituted with one or more R^A or R¹ substituents attached on either or both the L and the heterocyclyl groups,

- 49) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 50) -L-NR¹(R¹),
- 51) -(L-)₂ NR¹,
- 52) -L-(N(R¹)-L)_n - N(R¹)R¹,
- 53) -L-(N(R¹)-L)_n - heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 54) -L-(N(R¹)-L)_n - heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 55) -L-(N(R¹)-L)_n - aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 56) -O-L-N(R¹)R¹,
- 57) -O-L- heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 58) -O-L- heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 59) -O-L- aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 60) -(O-L)₂-NR¹,
- 61) -O-L-(N(R¹)-L)_n - N(R¹)R¹,
- 62) -O-L-(N(R¹)-L)_n - heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 63) -O-L-(N(R¹)-L)_n - heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 64) -O-L-(N(R¹)-L)_n - aryl optionally substituted with one or more R^A or R^1 substituents,
- 65) -S-L- heteroaryl optionally substituted with one or more R^A or R^1 substituents,
- 66) -S-L- heterocyclyl optionally substituted with one or more R^A or R^1 substituents,
- 67) -S-L- aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 68) -(S-L)₂ NR¹,
- 69) -S-L-(N(R¹)-L)_n - N(R¹)R¹,
- 70) -S-L-(N(R¹)-L)_n - heteroaryl optionally substituted with one or more R^A substituents,
- 71) -S-L-(N(R¹)-L)_n - heterocyclyl optionally substituted with one or more R^A substituents,

72) $-S-L-(N(R^1)-L)_n$ - aryl optionally substituted with one or more R^A substituents,

73) $-NR^1(R^1)$,

74) $-(N(R^1)-L)_n - N(R^1)R^1$,

75) $-(N(R^1)L)_2 - NR^1$,

76) $-(N(R^1)-L)_n - N(R^1)R^A$,

77) $-(N(R^1)-L)_n$ - heteroaryl optionally substituted with one or more R^A or R^1 substituents,

78) $-(N(R^1)-L)_n$ - heterocyclyl optionally substituted with one or more R^A or R^1 substituents;

79) $-(N(R^1)-L)_n$ - aryl optionally substituted with one or more R^A or R^1 substituents,

80) -heteroaryl optionally substituted with one or more R^A substituents, or

81) -aryl optionally substituted with one or more R^A substituents,

and wherein each substituent is optionally attached to the L group if it is not already present,

and wherein when two R^1 substituents are present on the same nitrogen atom, then each R^1 substituent is independently selected from the list of R^1 values described thereafter,

and wherein n is an integer equal to either 0, 1, 2, 3, 4, or 5,

and wherein, when (R^1) and R^1 are attached to a nitrogen atom, optionally they join together with the nitrogen atom to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A ;

L is

- 1) $-C_{1-6}$ alkyl,
- 2) $-C_{2-6}$ alkenyl,
- 3) $-C_{2-6}$ alkynyl,
- 4) $-C_{3-7}$ cycloalkyl,
- 5) $-C_{3-7}$ cycloalkenyl,
- 6) heterocyclyl,
- 7) $-C_{1-6}$ alkyl- $-C_{3-7}$ cycloalkyl,
- 8) $-C_{1-6}$ alkyl-heterocyclyl,
- 9) aryl, or
- 10) heteroaryl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkyl, the cycloalkenyl, the heterocyclyl, the aryl and the heteroaryl groups are each independently optionally substituted with one or two R^A substituent;

R^1 is

- 1) -H,
- 2) -C₁₋₆ alkyl,
- 3) -C₂₋₆ alkenyl,
- 4) -C₂₋₆ alkynyl,
- 5) -C₃₋₇ cycloalkyl,
- 6) -C₃₋₇ cycloalkenyl,
- 7) -C₁₋₅ perfluorinated,
- 8) -heterocyclyl,
- 9) -aryl,
- 10) -heteroaryl,
- 11) -benzyl, or
- 12) 5-[(3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d]imidazol-4-yl]pentanoyl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkenyl, the perfluorinated alkyl, the heterocyclyl, the aryl, the heteroaryl and the benzyl groups are each independently optionally substituted with 1, 2 or 3 R^A or R^1 substituents;

R^2 is

- 1) -H,
- 2) -C₁₋₆ alkyl,
- 3) -SR¹,
- 4) -C(O)R¹,
- 5) -S(O)R¹,
- 6) -S(O)₂R¹,
- 7) -benzyl optionally substituted with 1, 2 or 3 R^A or R^1 substituents,
- 8) -L-heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heteroaryl groups,
- 9) -L-heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heterocyclyl groups,
- 10) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the aryl groups,

11) -heteroaryl optionally substituted with one or more R^A or R^1 substituents, or
12) -aryl optionally substituted with one or more R^A or R^1 substituents,
and wherein each substituent is optionally attached to the L group if it is not already present;

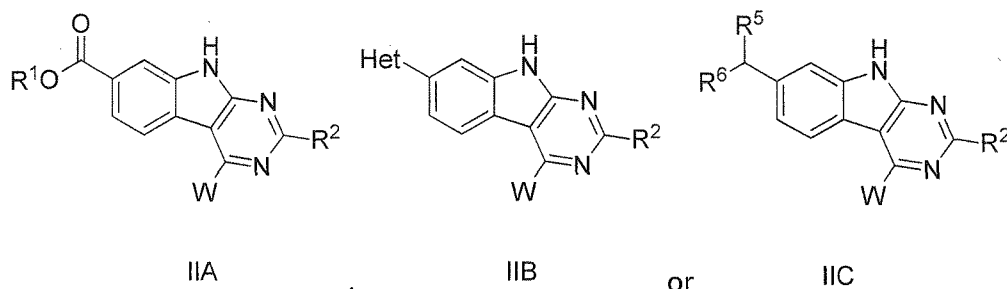
R^A is

- 1) -halogen,
- 2) $-\text{CF}_3$,
- 3) $-\text{OH}$,
- 4) $-\text{OR}^1$,
- 5) $-\text{L-OH}$,
- 6) $-\text{L-OR}^1$,
- 7) $-\text{OCF}_3$,
- 8) $-\text{SH}$,
- 9) $-\text{SR}^1$,
- 10) $-\text{CN}$,
- 11) $-\text{NO}_2$,
- 12) $-\text{NH}_2$,
- 13) $-\text{NHR}^1$,
- 14) $-\text{NR}^1\text{R}^1$,
- 15) $-\text{L-NH}_2$,
- 16) $-\text{L-NHR}^1$,
- 17) $-\text{L-SR}^1$,
- 18) $-\text{L-S(O)R}^1$,
- 19) $-\text{L-S(O)}_2\text{R}^1$,
- 20) $-\text{C(O)OH}$,
- 21) $-\text{C(O)OR}^1$,
- 22) $-\text{C(O)NH}_2$,
- 23) $-\text{C(O)NHR}^1$,
- 24) $-\text{C(O)N(R}^1\text{)R}^1$,
- 25) $-\text{NHC(O)R}^1$,
- 26) $-\text{NR}^1\text{C(O)R}^1$,
- 27) $-\text{NHC(O)OR}^1$,
- 28) $-\text{NR}^1\text{C(O)OR}^1$,
- 29) $-\text{OC(O)NH}_2$,

- 30) -OC(O)NHR¹,
- 31) -OC(O)N(R¹)R¹,
- 32) -OC(O)R¹,
- 33) -C(O)R¹,
- 34) -NHC(O)NH₂,
- 35) -NHC(O)NHR¹,
- 36) -NHC(O)N(R¹)R¹,
- 37) -NR¹C(O)NH₂,
- 38) -NR¹C(O)NHR¹,
- 39) -NR¹C(O)N(R¹)R¹,
- 40) -NHS(O)₂R¹,
- 41) -NR¹S(O)₂R¹,
- 42) -S(O)₂NH₂,
- 43) -S(O)₂NHR¹,
- 44) -S(O)₂N(R¹)R¹,
- 45) -S(O)R¹,
- 46) -S(O)₂R¹,
- 47) -OS(O)₂R¹,
- 48) -S(O)₂OR¹,
- 49) -benzyl,
- 50) -N₃, or
- 51) -C(-N=N-)(CF₃),

and wherein the benzyl group is optionally substituted with 1, 2 or 3 R^A or R¹ substituents.

- 14. The method of claim 13, which is ex vivo.
- 15. The method of claim 14, comprising contacting the starting population with at least one cell expanding factor which is a biologic.
- 16. The method of claim 13, wherein the compound is of formula IIA, IIB or IIC

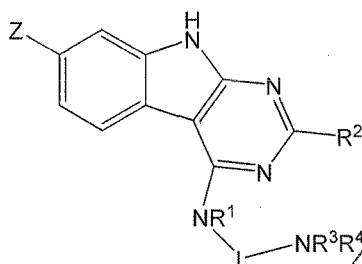


or a salt thereof

wherein Het is a 3 to 7-membered heterocycle, optionally substituted with one or more R^1 or R^A and R^5 and R^6 join together with C to form a 5 to 7-membered ring which optionally includes one or more heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

17. The method of claim 16, wherein the ring is a 5-membered ring, and the heteroatom is N.

18. The method of claim 13, wherein the compound is of formula



or a salt thereof,

wherein R^3 and R^4 are the same or different and are each independently H or R^1 , or R^3 and R^4 join together with N to which they are attached to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

19. The method of claim 13, wherein:

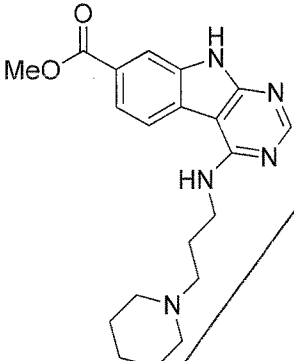
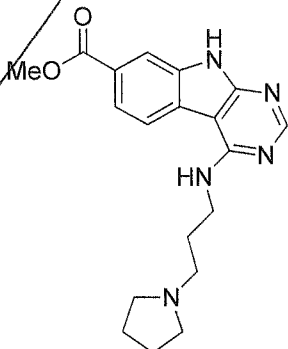
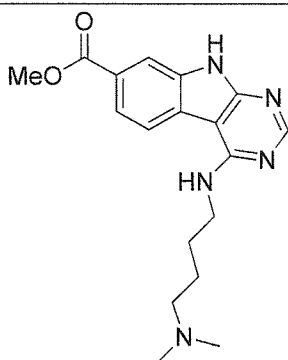
Z is CO_2Me or 2-methyl-2H-tetrazol-5-yl;

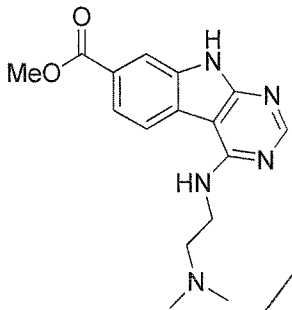
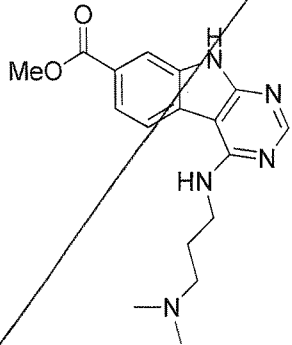
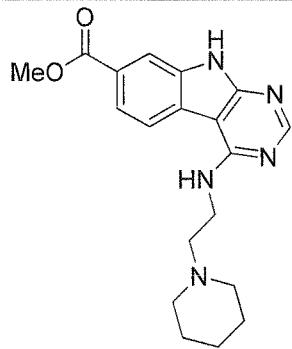
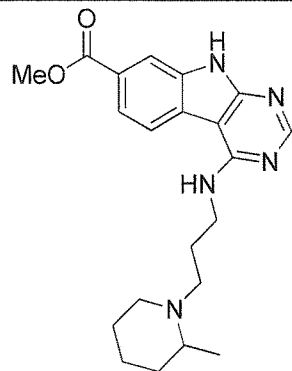
R^2 is benzyl, or H; and

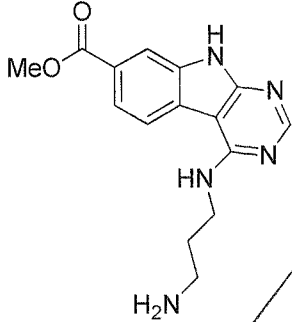
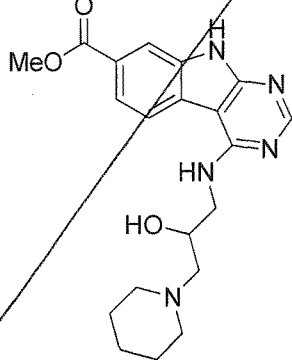
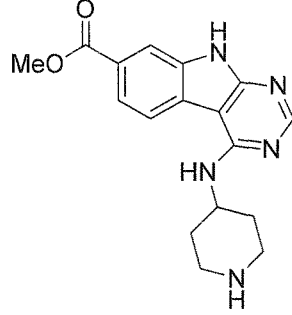
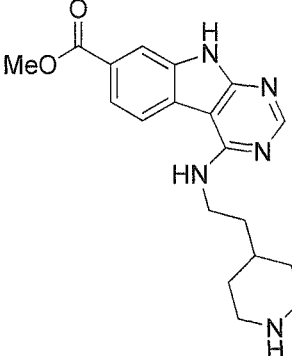
W is $\text{NH-L-N}(R^1)R^1$ wherein L is C_{2-4} alkyl or C_{3-7} cycloalkyl and R^1 and (R^1) is C_{1-4} alkyl or H; or (R^1) and R^1 join together with the nitrogen atom to which they are attached to form a 3 to 7-

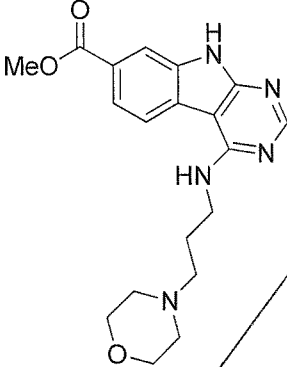
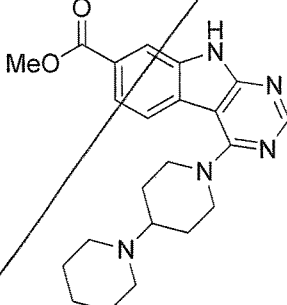
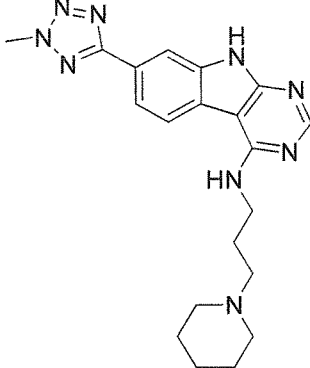
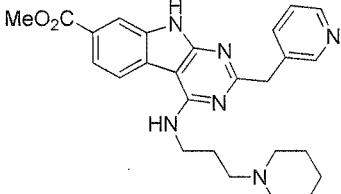
membered ring, which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R¹ or R^A.

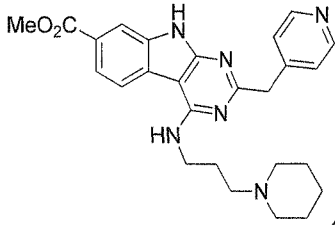
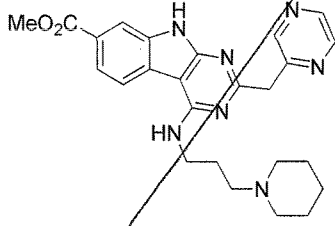
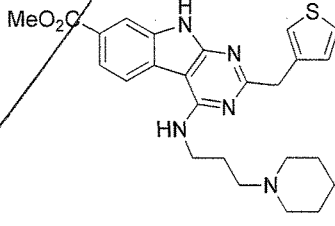
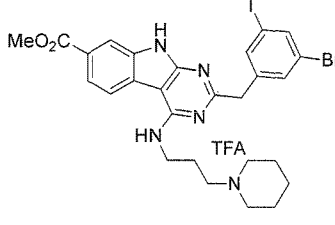
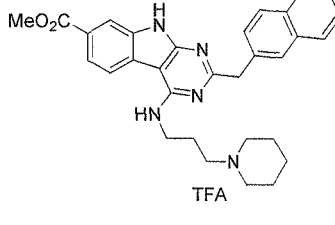
20. The method of claim 13, wherein the compound is:

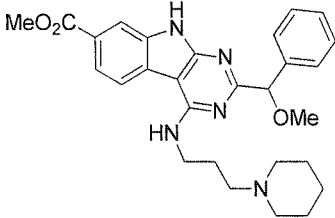
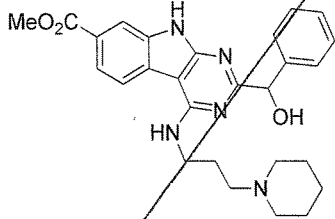
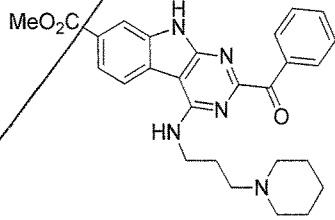
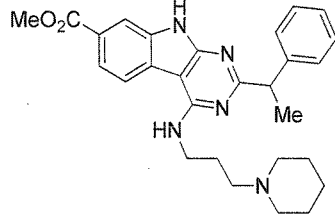
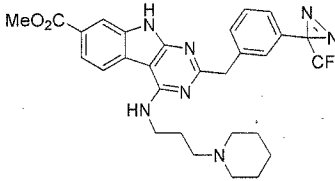
Compound number	Structure
1	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCCN3CCCCC3</chem>
2	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCCN3CCCC3</chem>
3	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCCCN(C)C</chem>

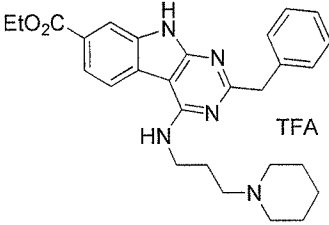
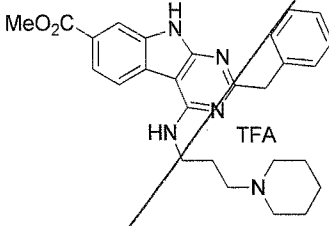
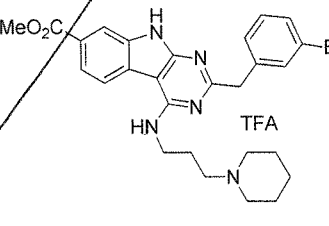
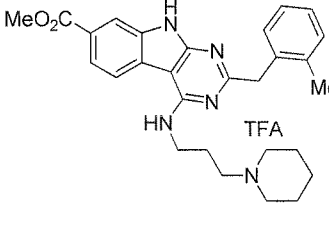
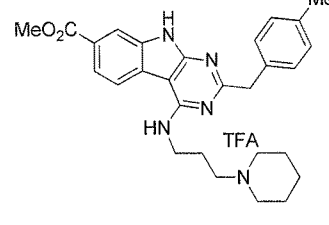
Compound number	Structure
4	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCNCCN(C)C</chem>
5	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCNCCN(C)C</chem>
6	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCNCCN1CCCCC1</chem>
7	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCNCCN1CCCCC1C</chem>

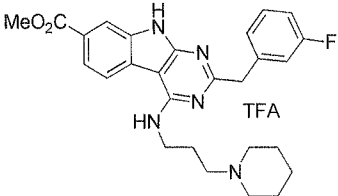
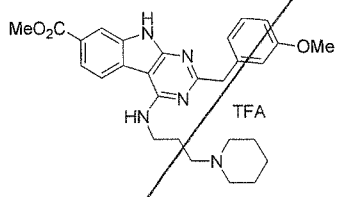
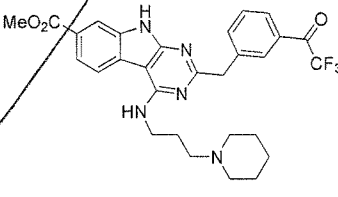
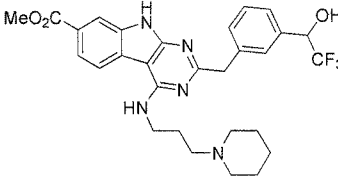
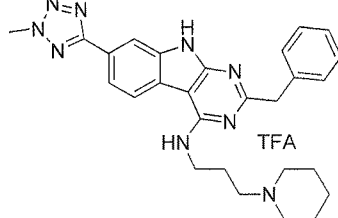
Compound number	Structure
8	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCCN</chem>
9	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCC(O)CN4CCCCC4</chem>
10	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2Nc4ccncc4</chem>
11	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCCN4CCCCC4C</chem>

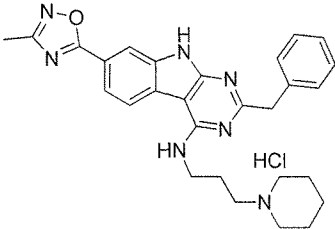
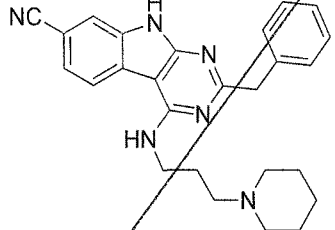
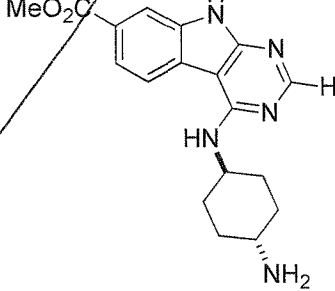
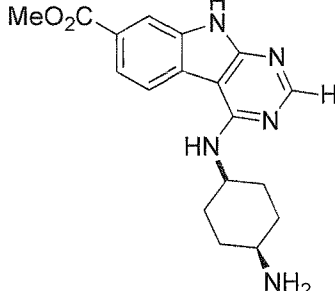
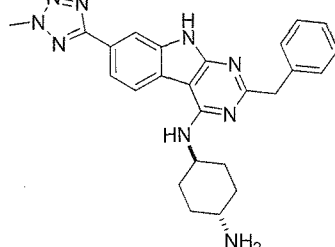
Compound number	Structure
12	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3NCCN4CCOCC4</chem>
13	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3NCC4CCN(C4)C5CCNCC5</chem>
14	 <chem>CN1C=NN=N1c1ccc2c(c1)c3c(c2)ncn3NCCCN4CCCCC4</chem>
15	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3NCCN4CCCCC4NCC5=CC=CC=N5</chem>

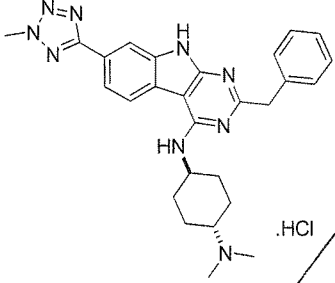
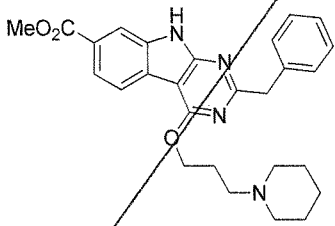
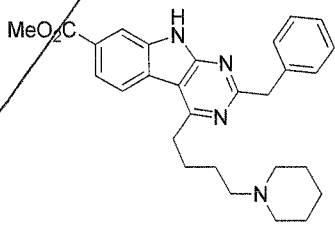
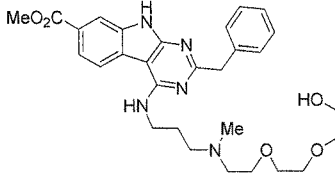
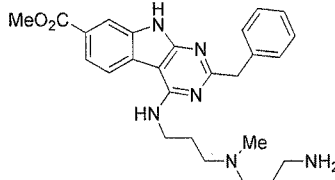
Compound number	Structure
16	
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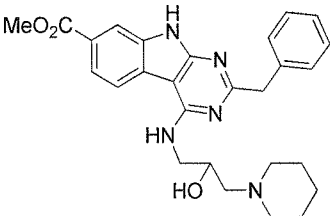
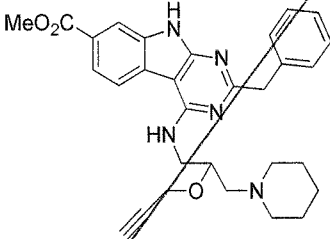
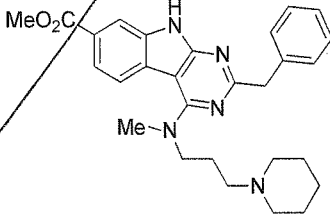
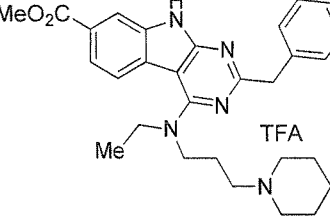
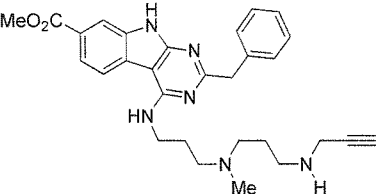
Compound number	Structure
21	 <chem>COC(=O)c1ccc2c(c1)c3c(nc4ccccc4n3)nc5c2cnc5NCCCN6CCCCC6</chem>
22	 <chem>COC(=O)c1ccc2c(c1)c3c(nc4ccccc4n3)nc5c2cnc5NCCCN6CCCCC6</chem>
23	 <chem>COC(=O)c1ccc2c(c1)c3c(nc4ccccc4n3)nc5c2cnc5NCCCN6CCCCC6</chem>
24	 <chem>COC(=O)c1ccc2c(c1)c3c(nc4ccccc4n3)nc5c2cnc5NCCCN6CCCCC6</chem>
25	 <chem>COC(=O)c1ccc2c(c1)c3c(nc4ccccc4n3)nc5c2cnc5NCCCN6CCCCC6</chem>

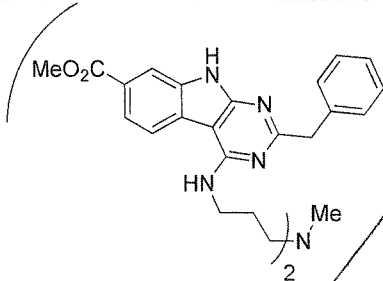
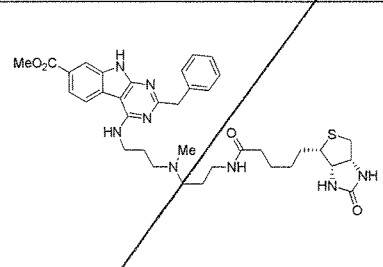
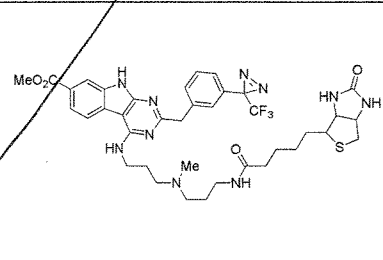
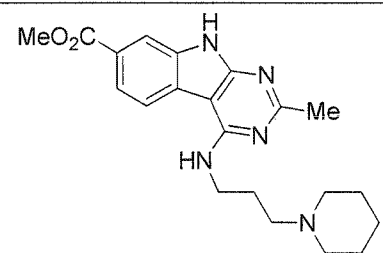
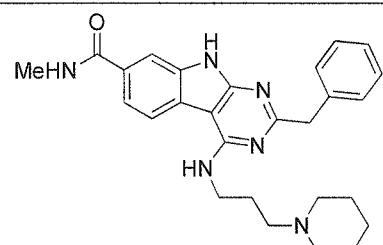
Compound number	Structure
26	
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Compound number	Structure
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Compound number	Structure
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Compound number	Structure
41	 <chem>CN1CCCC[C@H]1Nc2nc(Cc3ccccc3)c4c2c(c[nH]4)c5ccc(cc5C6=NN=N6)N</chem> .HCl
42	 <chem>COC(=O)c1ccc2c(c1)c3c(nc[nH]23Cc4ccccc4)Oc5ccccc5N</chem>
43	 <chem>COC(=O)c1ccc2c(c1)c3c(nc[nH]23Cc4ccccc4)CCCN5CCCCC5</chem>
44	 <chem>COC(=O)c1ccc2c(c1)c3c(nc[nH]23Cc4ccccc4)NCCCN(C)CCOCCO</chem>
45	 <chem>COC(=O)c1ccc2c(c1)c3c(nc[nH]23Cc4ccccc4)NCCCN(C)CCN</chem>

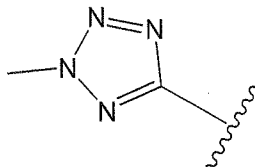
Compound number	Structure
46	
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Compound number	Structure
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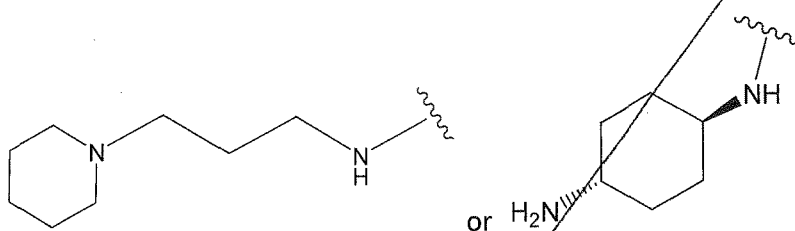
or a salt thereof.

21. The method of claim 16, wherein R² is benzyl or H.

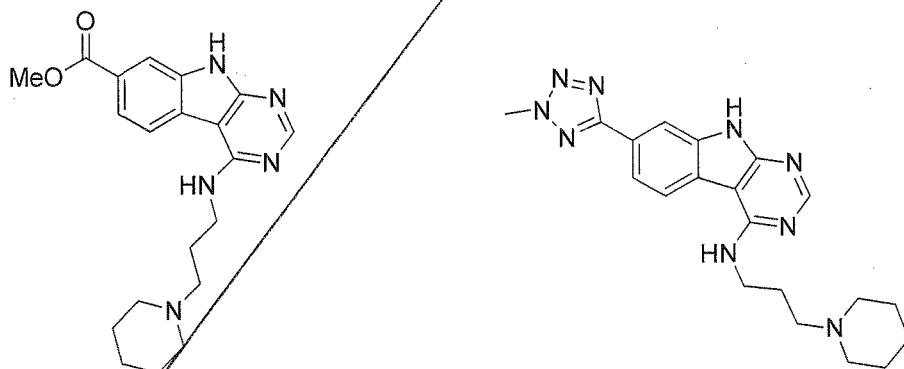
22. The method of claim 16, wherein R^5 and R^6 join together with C to form:

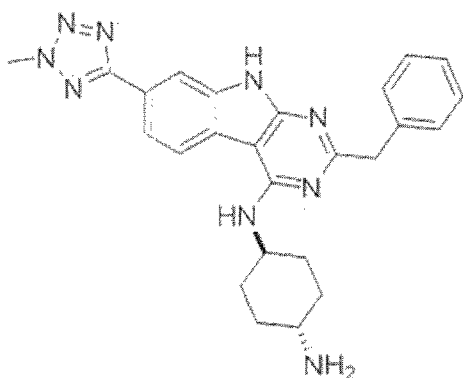


23. The method of claim 16, wherein W is



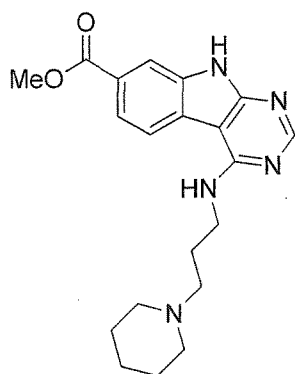
24. The method of claim 13, wherein the compound is



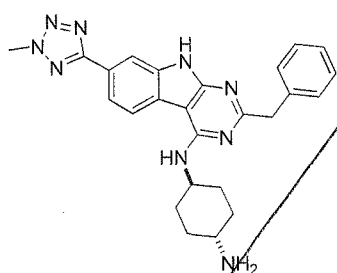


or a pharmaceutically acceptable salt thereof.

25. The method of claim 13, wherein the compound is a hydrochloride salt of



26. The method of claim 13, wherein the compound is a hydrobromide salt of

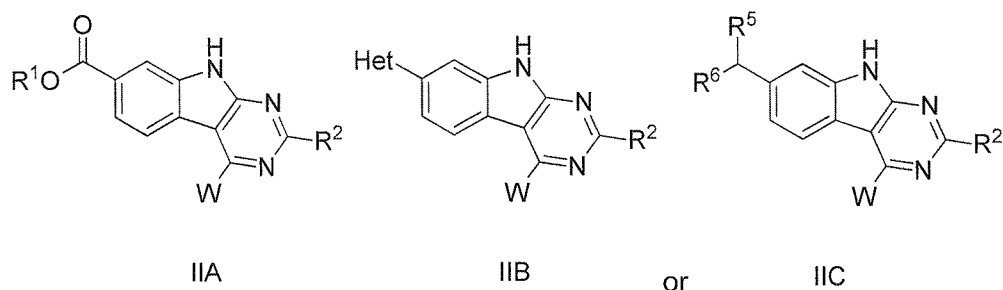


27. The method according to claim 13, wherein the stem and progenitor cells are human hematopoietic stem and progenitor cells.

28. The method according to claim 13, wherein the starting cell population includes CD34⁺ cells harvested from mobilized peripheral blood (mPB), bone marrow (BM) or umbilical cord blood (UCB).
29. The method according to claim 28, wherein the starting cell population includes CD34⁺ cells harvested from umbilical cord blood (UCB).
30. The method according to claim 13, wherein the starting cell population essentially consists of CD34⁺ cells purified from one or two umbilical cord blood units.
31. The method according to claim 30, comprising culturing the starting cell population in presence of said compound from about 2 days to about 21 days.
32. The method according to claim 30, comprising administering said compound to the starting cell population at a concentration between 1 nM and 3000 nM.
33. The method of claim 15, wherein the biologic comprises Interleukin-3 (IL-3), Granulocyte Macrophage Colony-Stimulating Factor (GM-CSF), Thrombopoietin (TPO), FMS-Like Tyrosine Kinase 3 Ligand (FLT3-L), Stem Cell Factor (SCF), Interleukin-6 (IL-6) or a combination thereof.
34. The method of claim 33, wherein the biologic comprises SCF, FLT3-L, TPO, IL-6 or a combination thereof.
35. The method of claim 13, wherein the other small molecule is StemRegenin 1 (SR1).
36. A cell population as expanded according to a method as defined in claim 13.

CLAIMS

1. A compound of formula IIA, IIB or IIC



or a salt thereof;

wherein Het is a 3 to 7-membered heterocycle, optionally substituted with one or more R^1 or R^A , and R^5 and R^6 are the same or different and are each independently L, or they join together with C to form a 5 to 7-membered ring which optionally includes one or more heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A ; W is

- 1) $-OR^1$, wherein R^1 is $-C_{1-6}$ alkyl, $-C_{2-6}$ alkenyl, $-C_{2-6}$ alkynyl, $-C_{3-7}$ cycloalkyl, $-C_{3-7}$ cycloalkenyl, $-C_{1-5}$ perfluorinated, -heterocyclyl, -aryl, -heteroaryl, -benzyl, or 5-[(3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d]imidazol-4-yl]pentanoyl, wherein the alkyl, the alkenyl, the alkynyl, the cycloalkenyl, the perfluorinated alkyl, the heterocyclyl, the aryl, the heteroaryl and the benzyl groups are each independently optionally substituted with 1, 2 or 3 R^A or R^1 substituents;
- 2) $-L-OH$,
- 3) $-L-OR^1$,
- 4) $-SR^1$,
- 5) $-CN$,
- 6) $-P(O)(OR^1)(OR^1)$,
- 7) $-NHR^1$,
- 8) $-N(R^1)R^1$,
- 9) $-L-NH_2$,
- 10) $-L-NHR^1$,
- 11) $-L-N(R^1)R^1$,
- 12) $-L-SR^1$,
- 13) $-L-S(O)R^1$,
- 14) $-L-S(O)_2R^1$,
- 15) $-L-P(O)(OR^1)(OR^1)$,

- 16) $-\text{C}(\text{O})\text{OR}^1$,
- 17) $-\text{C}(\text{O})\text{NH}_2$,
- 18) $-\text{C}(\text{O})\text{NHR}^1$,
- 19) $-\text{C}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 20) $-\text{NHC}(\text{O})\text{R}^1$,
- 21) $-\text{NR}^1\text{C}(\text{O})\text{R}^1$,
- 22) $-\text{NHC}(\text{O})\text{OR}^1$,
- 23) $-\text{NR}^1\text{C}(\text{O})\text{OR}^1$,
- 24) $-\text{OC}(\text{O})\text{NH}_2$,
- 25) $-\text{OC}(\text{O})\text{NHR}^1$,
- 26) $-\text{OC}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 27) $-\text{OC}(\text{O})\text{R}^1$,
- 28) $-\text{C}(\text{O})\text{R}^1$,
- 29) $-\text{NHC}(\text{O})\text{NH}_2$,
- 30) $-\text{NHC}(\text{O})\text{NHR}^1$,
- 31) $-\text{NHC}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 32) $-\text{NR}^1\text{C}(\text{O})\text{NH}_2$,
- 33) $-\text{NR}^1\text{C}(\text{O})\text{NHR}^1$,
- 34) $-\text{NR}^1\text{C}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 35) $-\text{NHS}(\text{O})_2\text{R}^1$,
- 36) $-\text{NR}^1\text{S}(\text{O})_2\text{R}^1$,
- 37) $-\text{S}(\text{O})_2\text{NH}_2$,
- 38) $-\text{S}(\text{O})_2\text{NHR}^1$,
- 39) $-\text{S}(\text{O})_2\text{N}(\text{R}^1)\text{R}^1$,
- 40) $-\text{S}(\text{O})\text{R}^1$,
- 41) $-\text{S}(\text{O})_2\text{R}^1$,
- 42) $-\text{OS}(\text{O})_2\text{R}^1$,
- 43) $-\text{S}(\text{O})_2\text{OR}^1$,
- 44) -benzyl optionally substituted with 1, 2 or 3 R^A or R^1 substituents,
- 45) -L-heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 46) -L-heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heterocyclyl groups,

- 47) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 48) -L-NR¹(R¹),
- 49) -(L-)₂ NR¹,
- 50) -L-(N(R¹)-L)_n - N(R¹)R¹,
- 51) -L-(N(R¹)-L)_n - heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 52) -L-(N(R¹)-L)_n - heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 53) -L-(N(R¹)-L)_n - aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 54) -O-L-N(R¹)R¹,
- 55) -O-L- heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 56) -O-L- heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 57) -O-L- aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 58) -(O-L)₂-NR¹,
- 59) -O-L-(N(R¹)-L)_n - N(R¹)R¹,
- 60) -O-L-(N(R¹)-L)_n - heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 61) -O-L-(N(R¹)-L)_n - heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 62) -O-L-(N(R¹)-L)_n- aryl optionally substituted with one or more R^A or R^1 substituents,
- 63) -S-L- heteroaryl optionally substituted with one or more R^A or R^1 substituents,
- 64) -S-L- heterocyclyl optionally substituted with one or more R^A or R^1 substituents,
- 65) -S-L- aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 66) -(S-L)₂ NR¹,
- 67) -S-L-(N(R¹)-L)_n - N(R¹)R¹,
- 68) -S-L-(N(R¹)-L)_n - heteroaryl optionally substituted with one or more R^A substituents,
- 69) -S-L-(N(R¹)-L)_n - heterocyclyl optionally substituted with one or more R^A substituents,

- 70) $-S-L-(N(R^1)-L)_n$ – aryl optionally substituted with one or more R^A substituents,
 71) $-NR^1(R^1)$,
 72) $-(N(R^1)-L)_n - N(R^1)R^1$,
 73) $-(N(R^1)L)_2 - NR^1$,
 74) $-(N(R^1)-L)_n - N(R^1)R^A$,
 75) $-(N(R^1)-L)_n$ – heteroaryl optionally substituted with one or more R^A or R^1 substituents,
 76) $-(N(R^1)-L)_n$ – heterocyclyl optionally substituted with one or more R^A or R^1 substituents,
 77) $-(N(R^1)-L)_n$ – aryl optionally substituted with one or more R^A or R^1 substituents,
 78) –heteroaryl optionally substituted with one or more R^A substituents, or
 79) –aryl optionally substituted with one or more R^A substituents,

and wherein each substituent is optionally attached to the L group if it is not already present,
 and wherein when two R^1 substituents are present on the same nitrogen atom, then each R^1 substituent is independently selected from the list of R^1 values described thereafter,
 and wherein n is an integer equal to either 0, 1, 2, 3, 4, or 5,
 and wherein, when (R^1) and R^1 are attached to a nitrogen atom, optionally they join together with the nitrogen atom to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A ;

L is

- 1) $-C_{1-6}$ alkyl,
- 2) $-C_{2-6}$ alkenyl,
- 3) $-C_{2-6}$ alkynyl,
- 4) $-C_{3-7}$ cycloalkyl,
- 5) $-C_{3-7}$ cycloalkenyl,
- 6) heterocyclyl,
- 7) $-C_{1-6}$ alkyl- $-C_{3-7}$ cycloalkyl,
- 8) $-C_{1-6}$ alkyl-heterocyclyl,
- 9) aryl, or
- 10) heteroaryl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkyl, the cycloalkenyl, the heterocyclyl, the aryl and the heteroaryl groups are each independently optionally substituted with one or two R^A substituent;

R¹ is

- 1) -H,
- 2) -C₁₋₆ alkyl,
- 3) -C₂₋₆ alkenyl,
- 4) -C₂₋₆ alkynyl,
- 5) -C₃₋₇ cycloalkyl,
- 6) -C₃₋₇ cycloalkenyl,
- 7) -C₁₋₅ perfluorinated,
- 8) -heterocyclyl,
- 9) -aryl,
- 10) -heteroaryl,
- 11) -benzyl, or
- 12) 5-[(3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d]imidazol-4-yl]pentanoyl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkenyl, the perfluorinated alkyl, the heterocyclyl, the aryl, the heteroaryl and the benzyl groups are each independently optionally substituted with 1, 2 or 3 R^A or R¹ substituents;

R² is

- 1) -H,
- 2) -C₁₋₆ alkyl,
- 3) -SR¹,
- 4) -C(O)R¹,
- 5) -S(O)R¹,
- 6) -S(O)₂R¹,
- 7) -benzyl optionally substituted with 1, 2 or 3 R^A or R¹ substituents,
- 8) -L-heteroaryl optionally substituted with one or more R^A or R¹ substituents attached on either one or both the L and the heteroaryl groups,
- 9) -L-heterocyclyl optionally substituted with one or more R^A or R¹ substituents attached on either one or both the L and the heterocyclyl groups,
- 10) -L-aryl optionally substituted with one or more R^A or R¹ substituents attached on either one or both the L and the aryl groups,
- 11) -heteroaryl optionally substituted with one or more R^A or R¹ substituents, or
- 12) -aryl optionally substituted with one or more R^A or R¹ substituents,

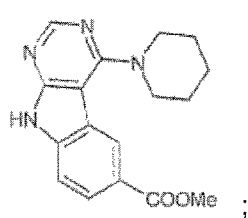
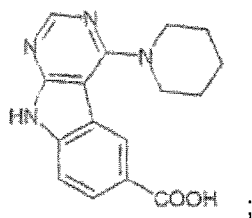
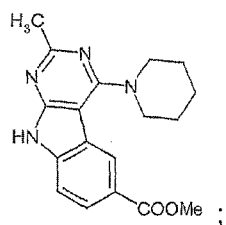
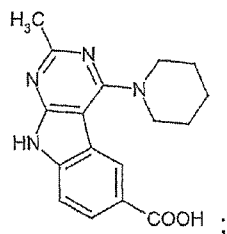
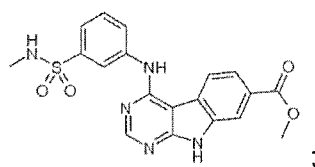
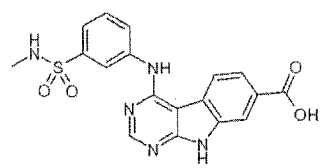
and wherein each substituent is optionally attached to the L group if it is not already present;

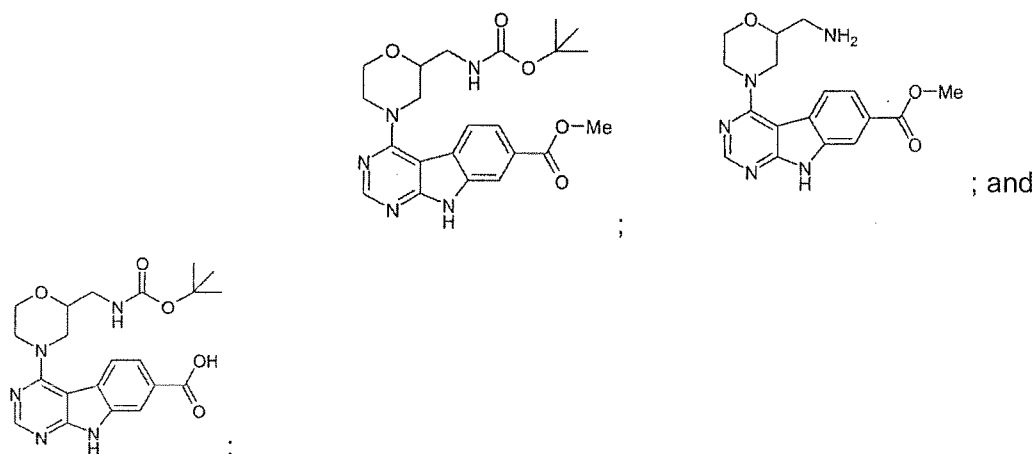
R^A is

- 1) -halogen,
- 2) $-\text{CF}_3$,
- 3) $-\text{OH}$,
- 4) $-\text{OR}^1$,
- 5) $-\text{L-OH}$,
- 6) $-\text{L-OR}^1$,
- 7) $-\text{OCF}_3$,
- 8) $-\text{SH}$,
- 9) $-\text{SR}^1$,
- 10) $-\text{CN}$,
- 11) $-\text{NO}_2$,
- 12) $-\text{NH}_2$,
- 13) $-\text{NHR}^1$,
- 14) $-\text{NR}^1\text{R}^1$,
- 15) $-\text{L-NH}_2$,
- 16) $-\text{L-NHR}^1$,
- 17) $-\text{L-SR}^1$,
- 18) $-\text{L-S(O)R}^1$,
- 19) $-\text{L-S(O)}_2\text{R}^1$,
- 20) $-\text{C(O)OH}$,
- 21) $-\text{C(O)OR}^1$,
- 22) $-\text{C(O)NH}_2$,
- 23) $-\text{C(O)NHR}^1$,
- 24) $-\text{C(O)N(R}^1)\text{R}^1$,
- 25) $-\text{NHC(O)R}^1$,
- 26) $-\text{NR}^1\text{C(O)R}^1$,
- 27) $-\text{NHC(O)OR}^1$,
- 28) $-\text{NR}^1\text{C(O)OR}^1$,
- 29) $-\text{OC(O)NH}_2$,
- 30) $-\text{OC(O)NHR}^1$,
- 31) $-\text{OC(O)N(R}^1)\text{R}^1$,
- 32) $-\text{OC(O)R}^1$,
- 33) $-\text{C(O)R}^1$,

- 34) -NHC(O)NH_2 ,
- 35) -NHC(O)NHR^1 ,
- 36) $\text{-NHC(O)N(R}^1\text{)R}^1$,
- 37) $\text{-NR}^1\text{C(O)NH}_2$,
- 38) $\text{-NR}^1\text{C(O)NHR}^1$,
- 39) $\text{-NR}^1\text{C(O)N(R}^1\text{)R}^1$,
- 40) $\text{-NHS(O)}_2\text{R}^1$,
- 41) $\text{-NR}^1\text{S(O)}_2\text{R}^1$,
- 42) $\text{-S(O)}_2\text{NH}_2$,
- 43) $\text{-S(O)}_2\text{NHR}^1$,
- 44) $\text{-S(O)}_2\text{N(R}^1\text{)R}^1$,
- 45) -S(O)R^1 ,
- 46) $\text{-S(O)}_2\text{R}^1$,
- 47) $\text{-OS(O)}_2\text{R}^1$,
- 48) $\text{-S(O)}_2\text{OR}^1$,
- 49) -benzyl ,
- 50) -N_3 , or
- 51) $\text{-C(-N=N-)(CF}_3\text{)}$,

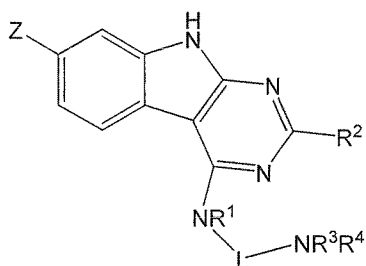
and wherein the benzyl group is optionally substituted with 1, 2 or 3 R^A or R^1 substituents provided that the compound of Formula (I) is other than





2. A compound according to claim 1, wherein the compound is of formula IIB and the ring of Het is a 5-membered ring, and the heteroatom is N.

3. A compound according to claim 1, wherein the compound is of formula



or a salt thereof,

wherein R^3 and R^4 are the same or different and are each independently H, or R^1 , or R^3 and R^4 join together with N to which they are attached to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

4. A compound according to claim 1, wherein:

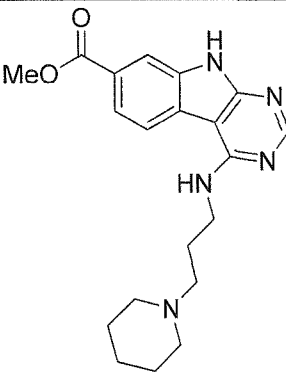
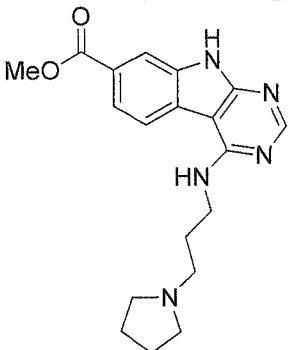
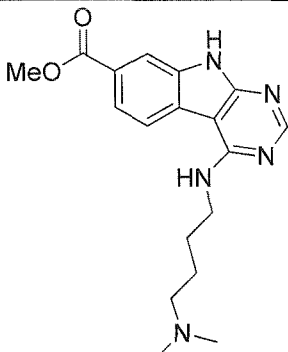
Z is CO_2Me or 2-methyl-2H-tetrazol-5-yl;

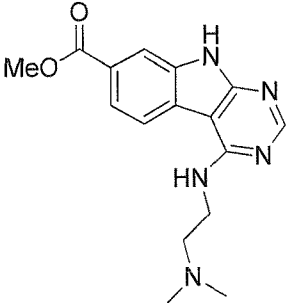
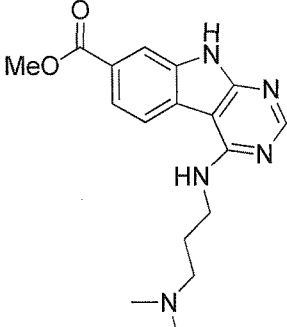
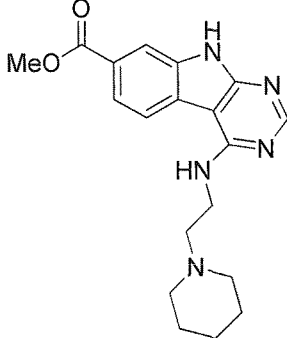
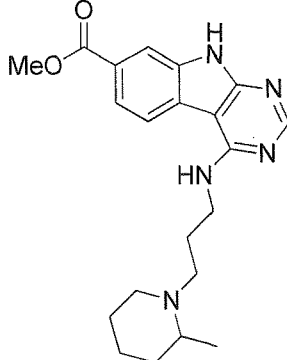
R^2 is benzyl or H; and

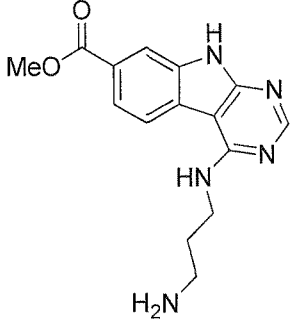
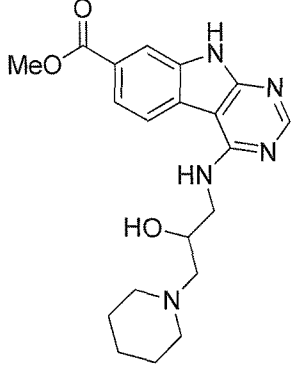
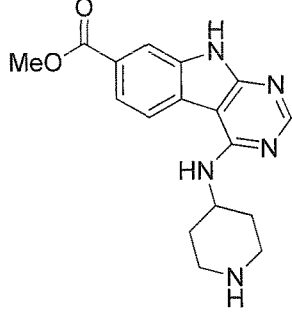
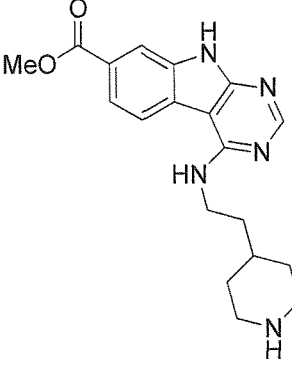
W is $\text{NH-L-N}(R^1)R^1$ wherein L is C_{2-4} alkyl or C_{3-7} cycloalkyl and R^1 and (R^1) is C_{1-4} alkyl or H; or (R^1) and R^1 join together with the nitrogen atom to which they are attached to form a 3 to 7-

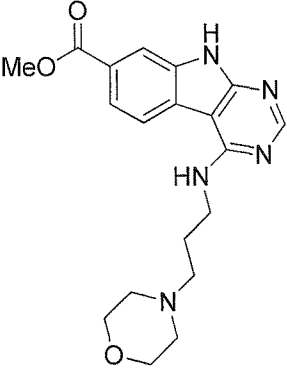
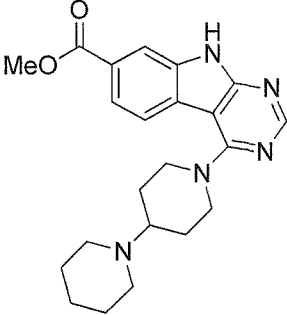
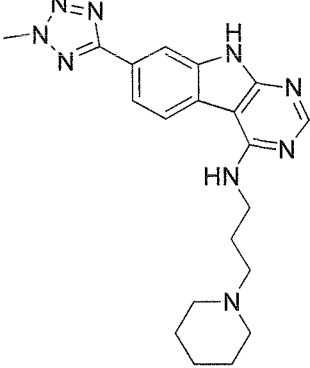
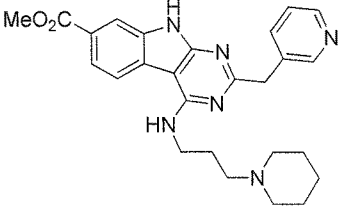
membered ring, which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R¹ or R^A.

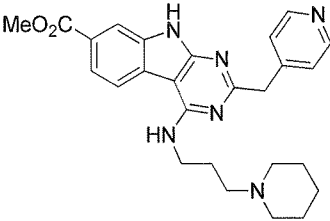
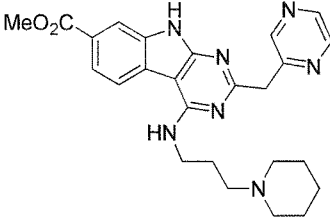
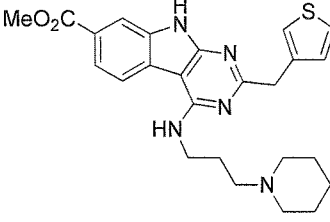
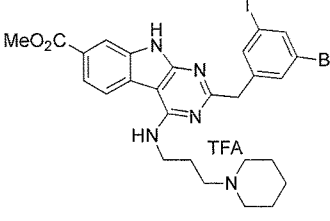
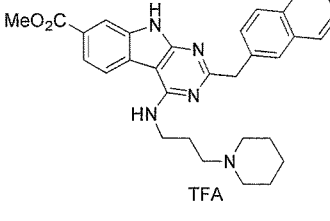
5. A compound according to claim 1 which is:

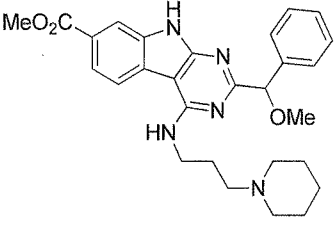
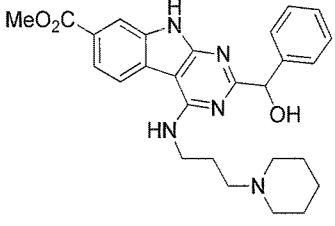
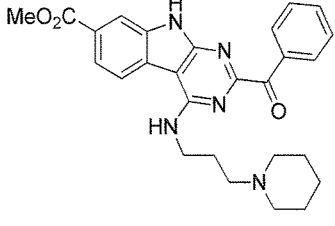
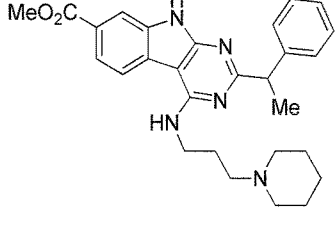
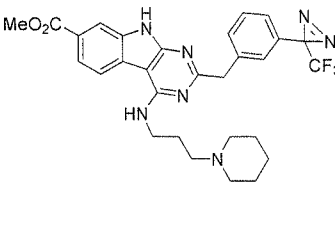
Compound number	Structure
1	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CNCN4CCCC4</chem>
2	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CNCN4CCCC4</chem>
3	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CNCNCCN(C)C</chem>

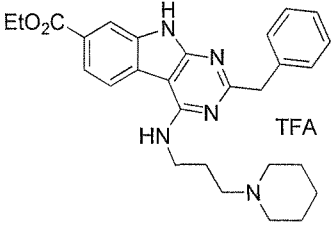
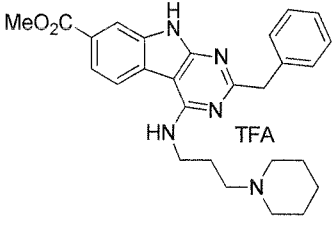
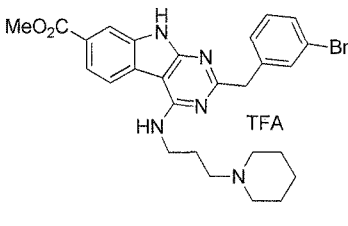
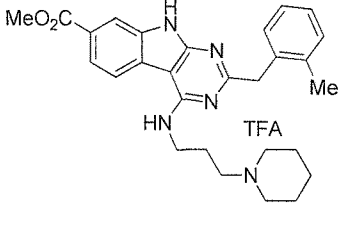
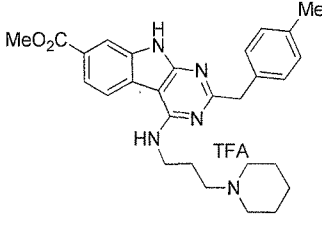
Compound number	Structure
4	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCN(C)CC</chem>
5	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCN(C)CCC</chem>
6	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCCN1CCCCC1</chem>
7	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)NCCN1CCCC(C)1</chem>

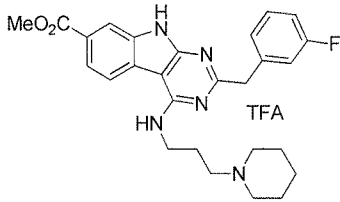
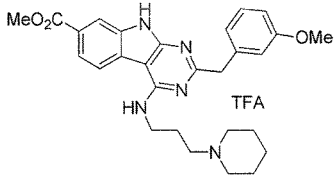
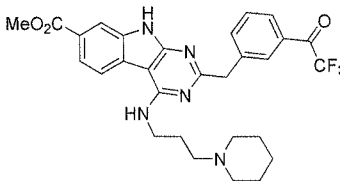
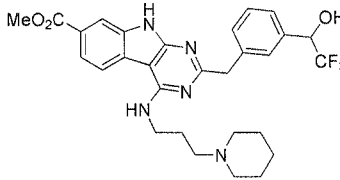
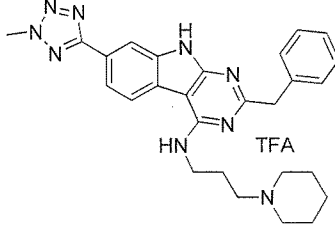
Compound number	Structure
8	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCCN</chem>
9	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCC(O)CN4CCCCC4</chem>
10	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2Nc4ccncc4</chem>
11	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCCc4ccncc4</chem>

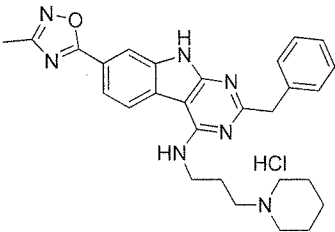
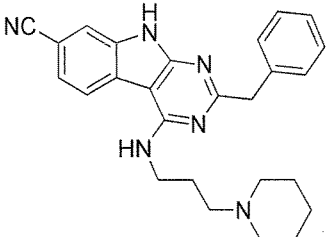
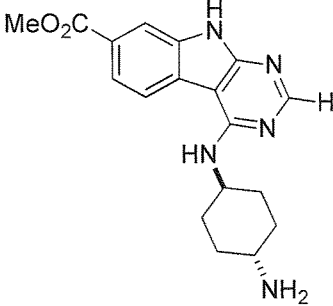
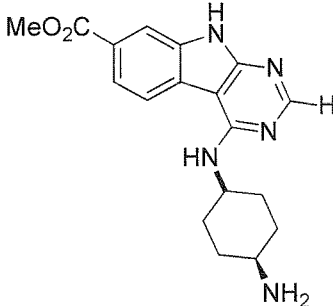
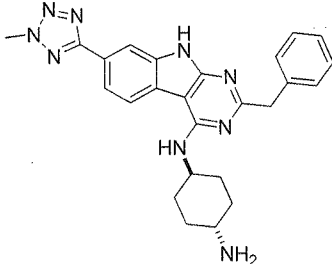
Compound number	Structure
12	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3NCCN4CCOCC4</chem>
13	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3NCC4CCN(C4)CC5CCNCC5</chem>
14	 <chem>Cc1nn[n+]([n-])c1-c2ccc3c(c2)c4c(c3)ncn4NCCCN5CCCCC5</chem>
15	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)c4c(c3)ncn4NCCCN5CCCCC5Cc6ccccn6</chem>

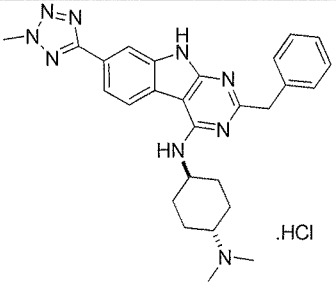
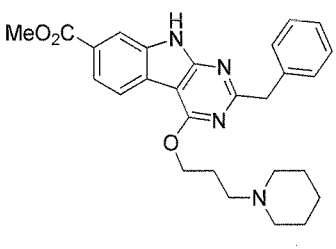
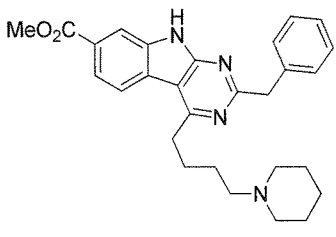
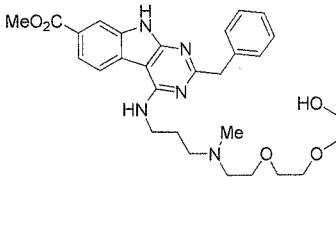
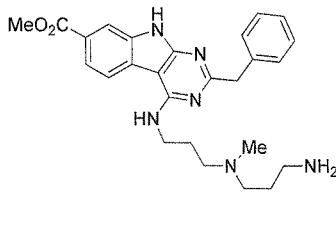
Compound number	Structure
16	
17	
18	
19	
20	

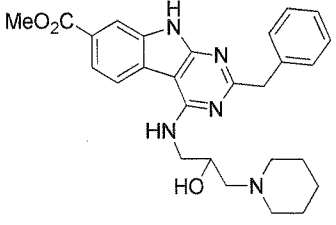
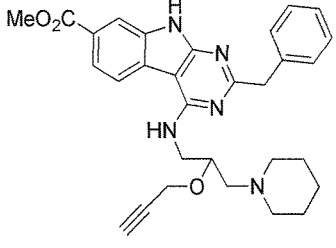
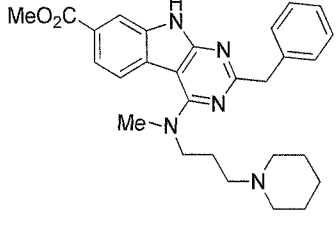
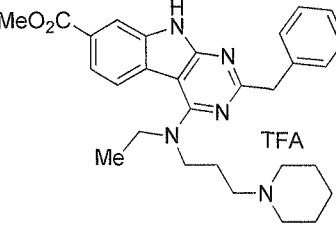
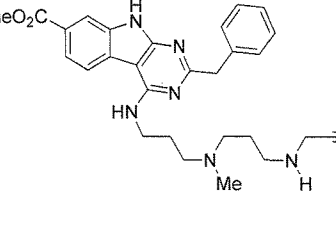
Compound number	Structure
21	 <chem>COC(=O)c1ccc(cc1)c2nc3c(ncn3C(Cc4ccccc4)OC)nc2NCCCCN5CCCCC5</chem>
22	 <chem>COC(=O)c1ccc(cc1)c2nc3c(ncn3C(Cc4ccccc4)O)nc2NCCCCN5CCCCC5</chem>
23	 <chem>COC(=O)c1ccc(cc1)c2nc3c(ncn3C(=O)c4ccccc4)nc2NCCCCN5CCCCC5</chem>
24	 <chem>COC(=O)c1ccc(cc1)c2nc3c(ncn3C(C)c4ccccc4)nc2NCCCCN5CCCCC5</chem>
25	 <chem>COC(=O)c1ccc(cc1)c2nc3c(ncn3Cc4ccc(cc4)C5=NN=C5C(F)(F)F)nc2NCCCCN6CCCCC6</chem>

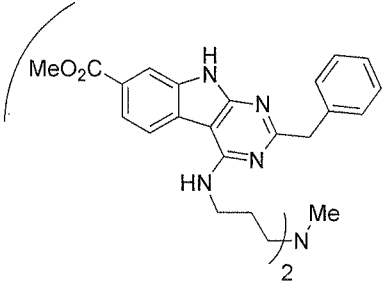
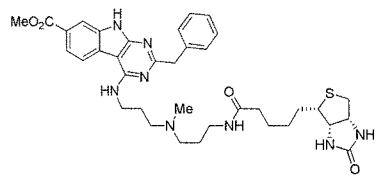
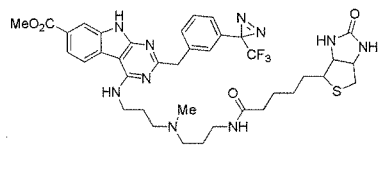
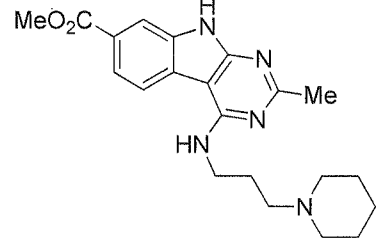
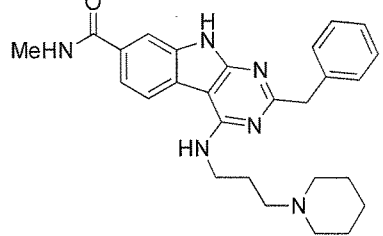
Compound number	Structure
26	 <chem>CCOC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCCN4CCCCC4</chem> TFA
27	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCCN4CCCCC4</chem> TFA
28	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCCN4CCCCC4Cc5ccc(Br)cc5</chem> TFA
29	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCCN4CCCCC4Cc5cccc(C)c5</chem> TFA
30	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCCN4CCCCC4Cc5ccc(C)cc5</chem> TFA

Compound number	Structure
31	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)NCCCN3CCCCC3</chem> TFA
32	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)NCCCN3CCCCC3</chem> TFA
33	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)NCCCN3CCCCC3</chem> C(=O)c1ccc(C(F)(F)F)cc1
34	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)NCCCN3CCCCC3</chem> c1ccc(C(F)(F)F)c1
35	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)NCCCN3CCCCC3</chem> TFA

Compound number	Structure
36	
37	
38	
39	
40	

Compound number	Structure
41	 <chem>CN1CCCC[C@H]1NC2=C(N3C=CC=C(C=C3N2)C4=CC=CC=C4C5=NN=N[N+]5=O)C6=CC=CC=C6.Cl</chem>
42	 <chem>COC(=O)c1ccc2c(c1)[nH]c3c2n(Cc4ccccc4)c(OCCCN5CCCCC5)n3</chem>
43	 <chem>COC(=O)c1ccc2c(c1)[nH]c3c2n(Cc4ccccc4)c(CCCCN5CCCCC5)n3</chem>
44	 <chem>COC(=O)c1ccc2c(c1)[nH]c3c2n(Cc4ccccc4)c(NCCCN(C)CCOC5=CC=CC=C5O)n3</chem>
45	 <chem>COC(=O)c1ccc2c(c1)[nH]c3c2n(Cc4ccccc4)c(NCCCN(C)CCN)n3</chem>

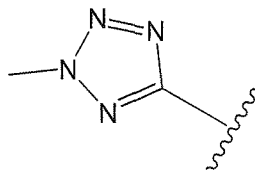
Compound number	Structure
46	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c(c3)nc(CCN(CO)CCN5CCCCC5)c4</chem>
47	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c(c3)nc(CCN(COCC5CCCCC5)CC6=CC=CC=C6)c4</chem>
48	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c(c3)nc(CN(C)CCCN5CCCCC5)c4</chem>
49	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c(c3)nc(CN(C)CCCN5CCCCC5)c4</chem> TFA
50	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c(c3)nc(CN(C)CCCN(C)CCCN(C)CC#C)c4</chem>

Compound number	Structure
51	
52	
53	
54	
55	

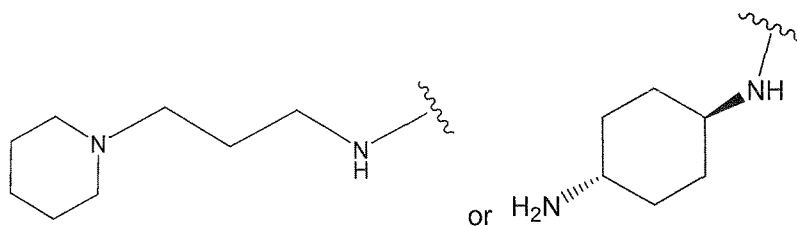
or a salt thereof.

6. A compound according to claim 1, wherein R² is benzyl or H.

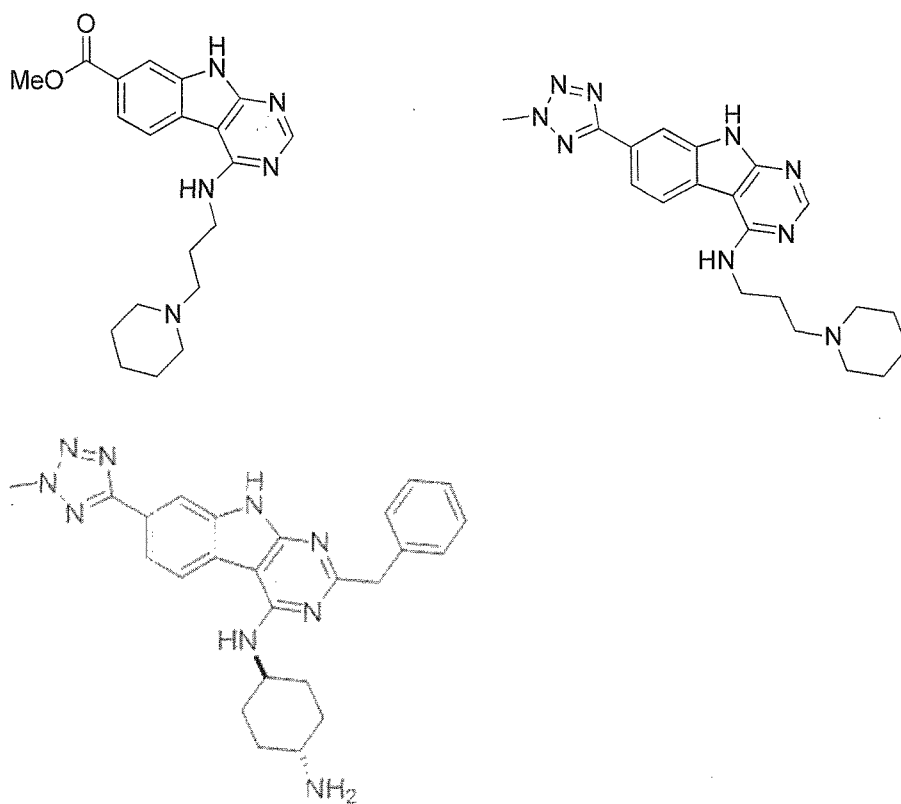
7. A compound according to claim 1, wherein R^5 and R^6 join together with C to form:



8. A compound according to claim 1, wherein W is

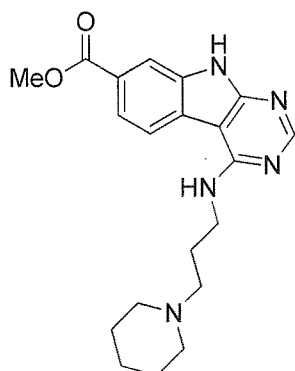


9. The compound according to claim 1, wherein the compound is

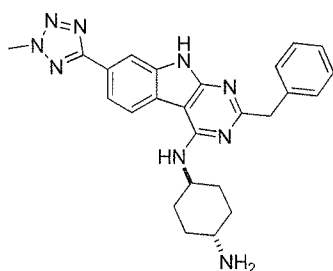


or a pharmaceutically acceptable salt thereof.

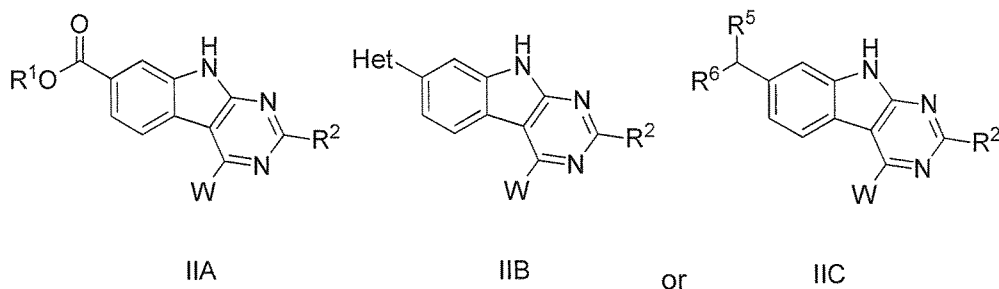
10. The compound of claim 1 which is a hydrochloride salt of



11. The compound of claim 1 which is a hydrobromide salt of



12. A method of increasing stem and progenitor cells *in vitro* or *ex vivo*, the method comprising; contacting a starting population in the presence of at least one compound, optionally together with at least one cell expanding factor which is a biologic or another small molecule, wherein said compound is of formula IIA, IIB or IIC



or a salt thereof;

wherein Het is a 3 to 7-membered heterocycle, optionally substituted with one or more R^1 or R^A , and R^5 and R^6 are the same or different and are each independently L, or they join together with C to form a 5 to 7-membered ring which optionally includes one or more heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^AW is

- 1) -H,
- 2) -halogen,
- 3) -OR¹,
- 4) -L-OH,
- 5) -L-OR¹,
- 6) -SR¹,
- 7) -CN,
- 8) -P(O)(OR¹)(OR¹),
- 9) -NHR¹,
- 10) -N(R¹)R¹,
- 11) -L-NH₂,
- 12) -L-NHR¹,
- 13) -L-N(R¹)R¹,
- 14) -L-SR¹,
- 15) -L-S(O)R¹,
- 16) -L-S(O)₂R¹,
- 17) -L-P(O)(OR¹)(OR¹),
- 18) -C(O)OR¹,
- 19) -C(O)NH₂,
- 20) -C(O)NHR¹,
- 21) -C(O)N(R¹)R¹,
- 22) -NHC(O)R¹,
- 23) -NR¹C(O)R¹,
- 24) -NHC(O)OR¹,
- 25) -NR¹C(O)OR¹,
- 26) -OC(O)NH₂,
- 27) -OC(O)NHR¹,
- 28) -OC(O)N(R¹)R¹,
- 29) -OC(O)R¹,
- 30) -C(O)R¹,

- 31) -NHC(O)NH_2 ,
- 32) -NHC(O)NHR^1 ,
- 33) $\text{-NHC(O)N(R}^1\text{)R}^1$,
- 34) $\text{-NR}^1\text{C(O)NH}_2$,
- 35) $\text{-NR}^1\text{C(O)NHR}^1$,
- 36) $\text{-NR}^1\text{C(O)N(R}^1\text{)R}^1$,
- 37) $\text{-NHS(O)}_2\text{R}^1$,
- 38) $\text{-NR}^1\text{S(O)}_2\text{R}^1$,
- 39) $\text{-S(O)}_2\text{NH}_2$,
- 40) $\text{-S(O)}_2\text{NHR}^1$,
- 41) $\text{-S(O)}_2\text{N(R}^1\text{)R}^1$,
- 42) -S(O)R^1 ,
- 43) $\text{-S(O)}_2\text{R}^1$,
- 44) $\text{-OS(O)}_2\text{R}^1$,
- 45) $\text{-S(O)}_2\text{OR}^1$,
- 46) -benzyl optionally substituted with 1, 2 or 3 R^A or R^1 substituents,
- 47) -L-heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heteroaryl groups,
- 48) -L-heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and the heterocyclyl groups,
- 49) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 50) $\text{-L-NR}^1(\text{R}^1)$,
- 51) $\text{-(L-)}_2\text{NR}^1$,
- 52) $\text{-L-(N(R}^1\text{)-L)}_n\text{-N(R}^1\text{)R}^1$,
- 53) $\text{-L-(N(R}^1\text{)-L)}_n$ – heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 54) $\text{-L-(N(R}^1\text{)-L)}_n$ – heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 55) $\text{-L-(N(R}^1\text{)-L)}_n$ – aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 56) $\text{-O-L-N(R}^1\text{)R}^1$,
- 57) -O-L- heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,

- 58) -O-L- heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 59) -O-L- aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 60) $-(O-L)_2-NR^1$,
- 61) $-O-L-(N(R^1)-L)_n - N(R^1)R^1$,
- 62) $-O-L-(N(R^1)-L)_n$ – heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heteroaryl groups,
- 63) $-O-L-(N(R^1)-L)_n$ – heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and heterocyclyl groups,
- 64) $-O-L-(N(R^1)-L)_n$ - aryl optionally substituted with one or more R^A or R^1 substituents,
- 65) -S-L- heteroaryl optionally substituted with one or more R^A or R^1 substituents,
- 66) -S-L- heterocyclyl optionally substituted with one or more R^A or R^1 substituents,
- 67) -S-L- aryl optionally substituted with one or more R^A or R^1 substituents attached on either or both the L and aryl groups,
- 68) $-(S-L)_2 NR^1$,
- 69) $-S-L-(N(R^1)-L)_n - N(R^1)R^1$,
- 70) $-S-L-(N(R^1)-L)_n$ – heteroaryl optionally substituted with one or more R^A substituents,
- 71) $-S-L-(N(R^1)-L)_n$ – heterocyclyl optionally substituted with one or more R^A substituents,
- 72) $-S-L-(N(R^1)-L)_n$ – aryl optionally substituted with one or more R^A substituents,
- 73) $-NR^1(R^1)$,
- 74) $-(N(R^1)-L)_n - N(R^1)R^1$,
- 75) $-(N(R^1)-L)_2 -NR^1$,
- 76) $-(N(R^1)-L)_n - N(R^1)R^A$,
- 77) $-(N(R^1)-L)_n$ – heteroaryl optionally substituted with one or more R^A or R^1 substituents,
- 78) $-(N(R^1)-L)_n$ – heterocyclyl optionally substituted with one or more R^A or R^1 substituents,
- 79) $-(N(R^1)-L)_n$ – aryl optionally substituted with one or more R^A or R^1 substituents,
- 80) -heteroaryl optionally substituted with one or more R^A substituents, or
- 81) -aryl optionally substituted with one or more R^A substituents,

and wherein each substituent is optionally attached to the L group if it is not already present,

and wherein when two R^1 substituents are present on the same nitrogen atom, then each R^1 substituent is independently selected from the list of R^1 values described thereafter,

and wherein n is an integer equal to either 0, 1, 2, 3, 4, or 5,

and wherein, when (R^1) and R^1 are attached to a nitrogen atom, optionally they join together with the nitrogen atom to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A ;

L is

- 1) $-C_{1-6}$ alkyl,
- 2) $-C_{2-6}$ alkenyl,
- 3) $-C_{2-6}$ alkynyl,
- 4) $-C_{3-7}$ cycloalkyl,
- 5) $-C_{3-7}$ cycloalkenyl,
- 6) heterocyclyl,
- 7) $-C_{1-6}$ alkyl- $-C_{3-7}$ cycloalkyl,
- 8) $-C_{1-6}$ alkyl-heterocyclyl,
- 9) aryl, or
- 10) heteroaryl,

and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkyl, the cycloalkenyl, the heterocyclyl, the aryl and the heteroaryl groups are each independently optionally substituted with one or two R^A substituent;

R^1 is

- 1) $-H$,
- 2) $-C_{1-6}$ alkyl,
- 3) $-C_{2-6}$ alkenyl,
- 4) $-C_{2-6}$ alkynyl,
- 5) $-C_{3-7}$ cycloalkyl,
- 6) $-C_{3-7}$ cycloalkenyl,
- 7) $-C_{1-5}$ perfluorinated,
- 8) -heterocyclyl,
- 9) -aryl,
- 10) -heteroaryl,
- 11) -benzyl, or

12) 5-[(3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d]imidazol-4-yl]pentanoyl,
and wherein the alkyl, the alkenyl, the alkynyl, the cycloalkenyl, the perfluorinated alkyl, the heterocyclyl, the aryl, the heteroaryl and the benzyl groups are each independently optionally substituted with 1, 2 or 3 R^A or R^1 substituents;

R^2 is

- 1) -H,
- 2) -C₁₋₆ alkyl,
- 3) -SR¹,
- 4) -C(O)R¹,
- 5) -S(O)R¹,
- 6) -S(O)₂R¹,
- 7) -benzyl optionally substituted with 1, 2 or 3 R^A or R^1 substituents,
- 8) -L-heteroaryl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heteroaryl groups,
- 9) -L-heterocyclyl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the heterocyclyl groups,
- 10) -L-aryl optionally substituted with one or more R^A or R^1 substituents attached on either one or both the L and the aryl groups,
- 11) -heteroaryl optionally substituted with one or more R^A or R^1 substituents, or
- 12) -aryl optionally substituted with one or more R^A or R^1 substituents,

and wherein each substituent is optionally attached to the L group if it is not already present;

R^A is

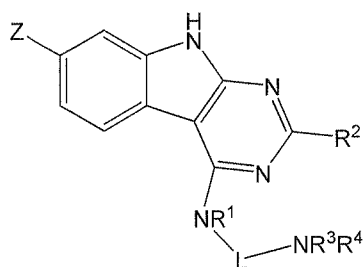
- 1) -halogen,
- 2) -CF₃,
- 3) -OH,
- 4) -OR¹,
- 5) -L-OH,
- 6) -L-OR¹,
- 7) -OCF₃,
- 8) -SH,
- 9) -SR¹,
- 10) -CN,

- 11) $-\text{NO}_2$,
- 12) $-\text{NH}_2$,
- 13) $-\text{NHR}^1$,
- 14) $-\text{NR}^1\text{R}^1$,
- 15) $-\text{L}-\text{NH}_2$,
- 16) $-\text{L}-\text{NHR}^1$,
- 17) $-\text{L}-\text{SR}^1$,
- 18) $-\text{L}-\text{S}(\text{O})\text{R}^1$,
- 19) $-\text{L}-\text{S}(\text{O})_2\text{R}^1$,
- 20) $-\text{C}(\text{O})\text{OH}$,
- 21) $-\text{C}(\text{O})\text{OR}^1$,
- 22) $-\text{C}(\text{O})\text{NH}_2$,
- 23) $-\text{C}(\text{O})\text{NHR}^1$,
- 24) $-\text{C}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 25) $-\text{NHC}(\text{O})\text{R}^1$,
- 26) $-\text{NR}^1\text{C}(\text{O})\text{R}^1$,
- 27) $-\text{NHC}(\text{O})\text{OR}^1$,
- 28) $-\text{NR}^1\text{C}(\text{O})\text{OR}^1$,
- 29) $-\text{OC}(\text{O})\text{NH}_2$,
- 30) $-\text{OC}(\text{O})\text{NHR}^1$,
- 31) $-\text{OC}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 32) $-\text{OC}(\text{O})\text{R}^1$,
- 33) $-\text{C}(\text{O})\text{R}^1$,
- 34) $-\text{NHC}(\text{O})\text{NH}_2$,
- 35) $-\text{NHC}(\text{O})\text{NHR}^1$,
- 36) $-\text{NHC}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 37) $-\text{NR}^1\text{C}(\text{O})\text{NH}_2$,
- 38) $-\text{NR}^1\text{C}(\text{O})\text{NHR}^1$,
- 39) $-\text{NR}^1\text{C}(\text{O})\text{N}(\text{R}^1)\text{R}^1$,
- 40) $-\text{NHS}(\text{O})_2\text{R}^1$,
- 41) $-\text{NR}^1\text{S}(\text{O})_2\text{R}^1$,
- 42) $-\text{S}(\text{O})_2\text{NH}_2$,
- 43) $-\text{S}(\text{O})_2\text{NHR}^1$,
- 44) $-\text{S}(\text{O})_2\text{N}(\text{R}^1)\text{R}^1$,

- 45) $-S(O)R^1$,
- 46) $-S(O)_2R^1$,
- 47) $-OS(O)_2R^1$,
- 48) $-S(O)_2OR^1$,
- 49) -benzyl,
- 50) $-N_3$, or
- 51) $-C(-N=N-)(CF_3)$,

and wherein the benzyl group is optionally substituted with 1, 2 or 3 R^A or R^1 substituents.

- 13. The method of claim 12, which is ex vivo.
- 14. The method of claim 13, comprising contacting the starting population with at least one cell expanding factor which is a biologic.
- 15. The method of claim 12, wherein the compound is of formula IIB and the ring of Het is a 5-membered ring, and the heteroatom is N.
- 16. The method of claim 12, wherein the compound is of formula



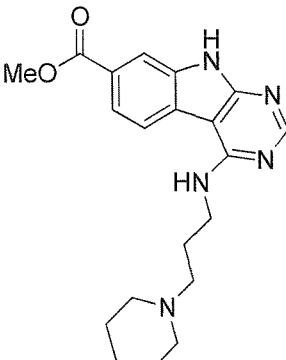
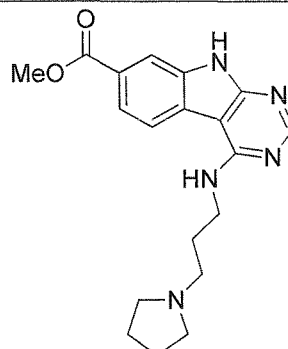
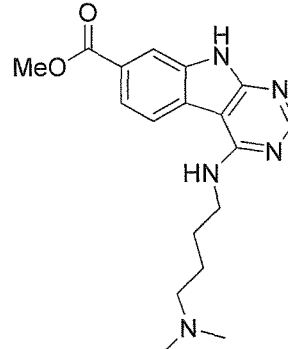
or a salt thereof,

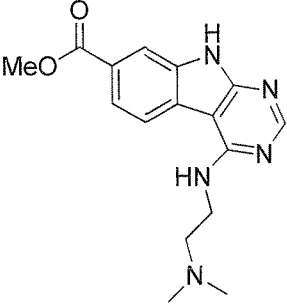
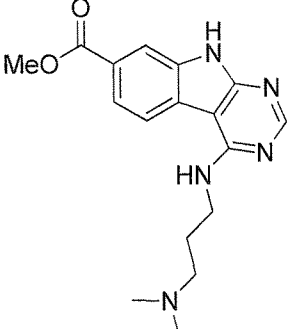
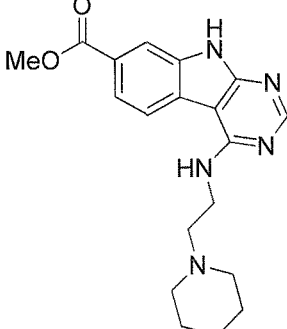
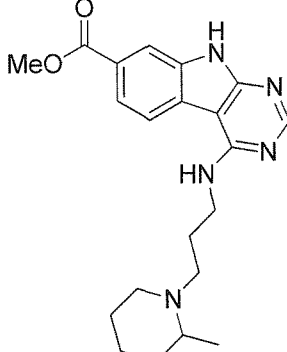
wherein R^3 and R^4 are the same or different and are each independently H or R^1 , or R^3 and R^4 join together with N to which they are attached to form a 3 to 7-membered ring which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

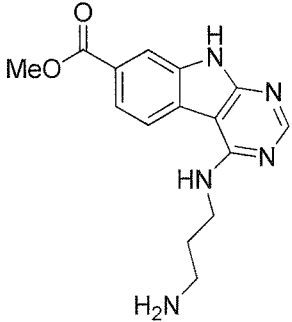
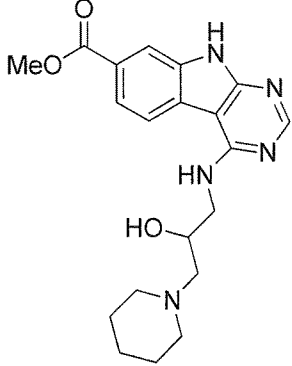
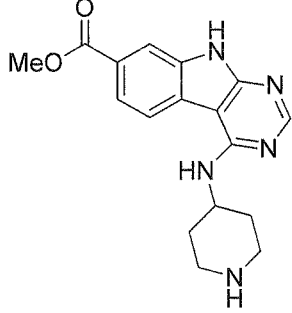
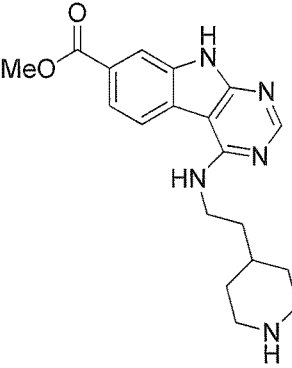
- 17. The method of claim 12, wherein:
 Z is CO_2Me or 2-methyl-2H-tetrazol-5-yl;
 R^2 is benzyl, or H; and

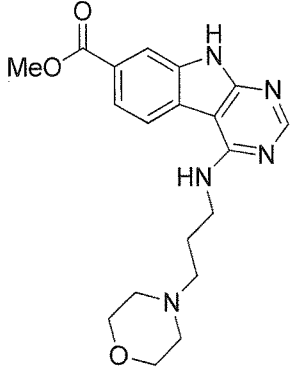
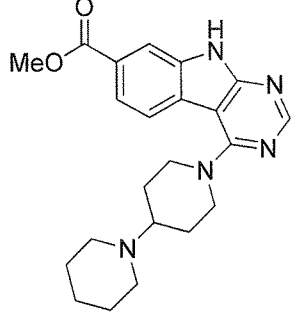
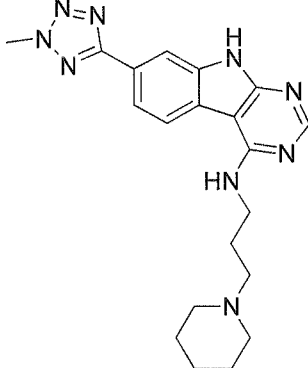
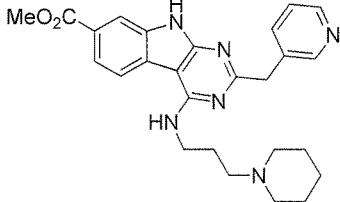
W is $\text{NH-L-N(R}^1\text{)R}^1$ wherein L is C_{2-4} alkyl or C_{3-7} cycloalkyl and R^1 and (R^1) is C_{1-4} alkyl or H; or (R^1) and R^1 join together with the nitrogen atom to which they are attached to form a 3 to 7-membered ring, which optionally includes one or more other heteroatom selected from N, O and S, optionally the ring is substituted with one or more R^1 or R^A .

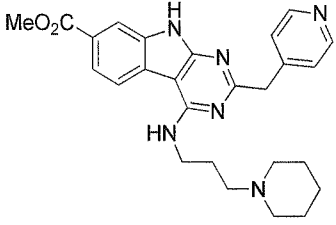
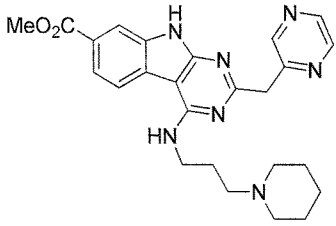
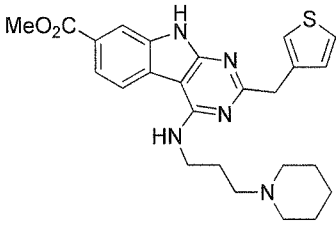
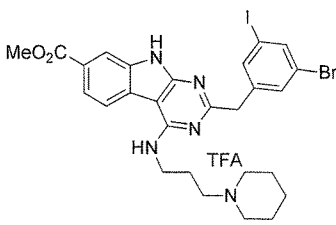
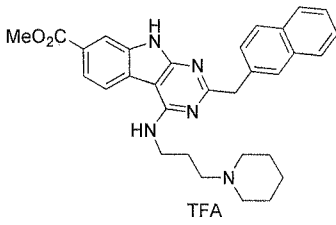
18. The method of claim 12, wherein the compound is:

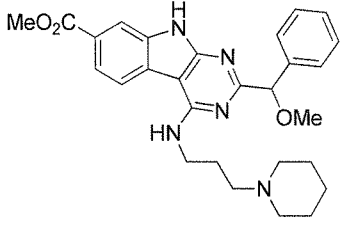
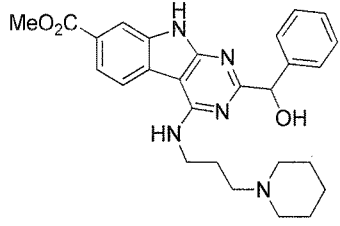
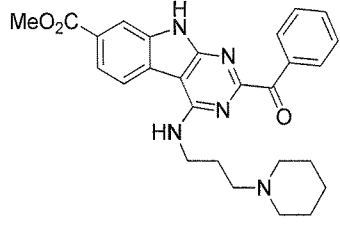
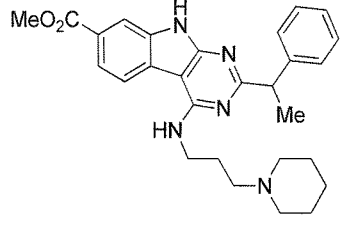
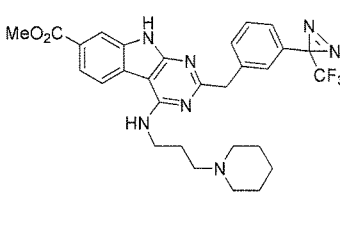
Compound number	Structure
1	
2	
3	

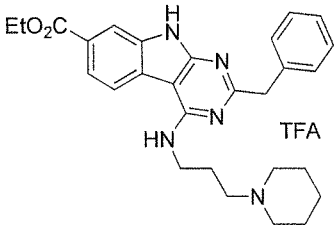
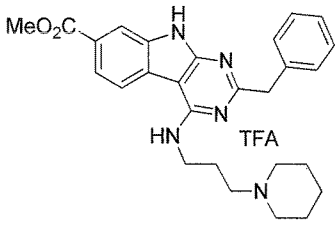
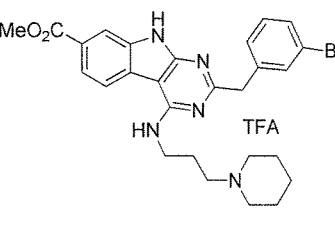
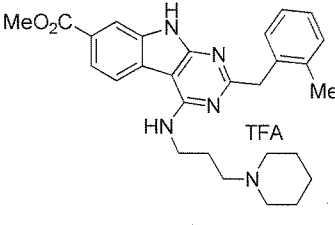
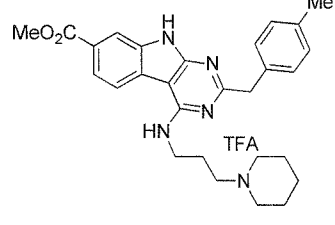
Compound number	Structure
4	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CN(C)C</chem>
5	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CN(C)CC</chem>
6	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CNCC4CCCC4</chem>
7	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)ncn3CNCCC4CCN(C)CC4</chem>

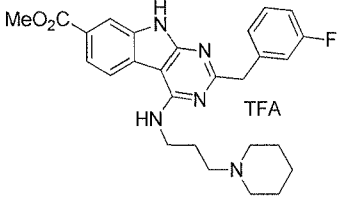
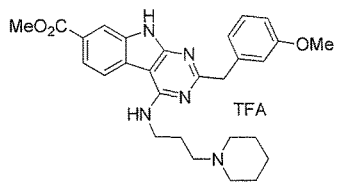
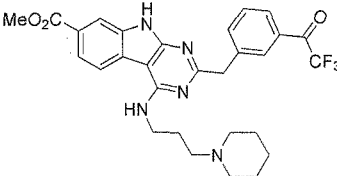
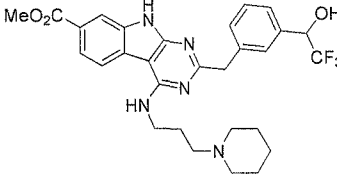
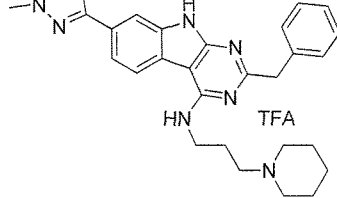
Compound number	Structure
8	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCCN</chem>
9	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCC(O)CN1CCCCC1</chem>
10	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2Nc4ccncc4</chem>
11	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCC4CCNCC4</chem>

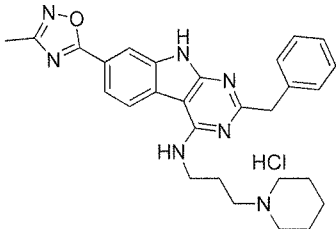
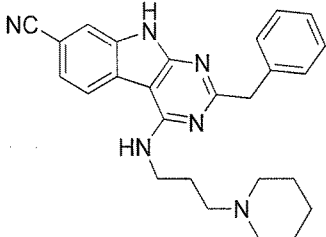
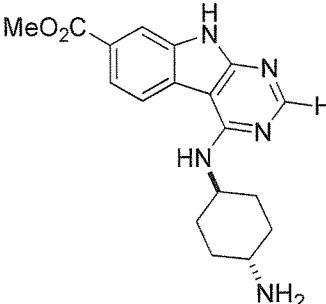
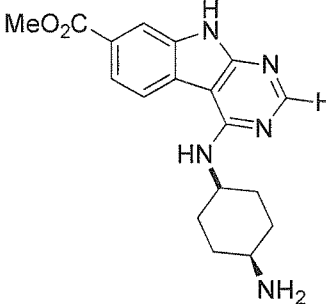
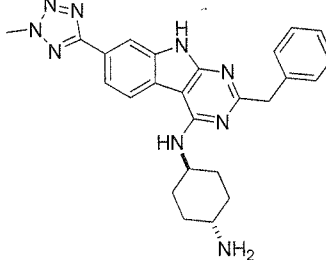
Compound number	Structure
12	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2NCCN4CCOCC4</chem>
13	 <chem>COC(=O)c1ccc2c(c1)c3ncnc3n2N(C4CCNCC4)C5CCNCC5</chem>
14	 <chem>CN1C=NN=N1c2ccc3c(c2)c4ncnc4n3NCCCN5CCCCC5</chem>
15	 <chem>COC(=O)c1ccc2c(c1)c3nc(nc3n2)C4=CC=CC=N4NCCCN5CCCCC5</chem>

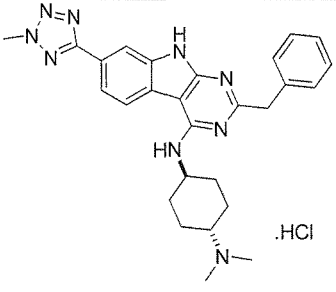
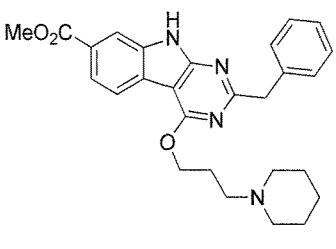
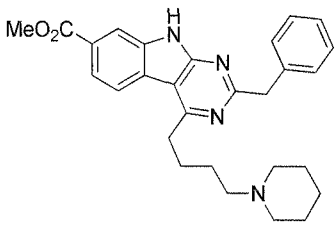
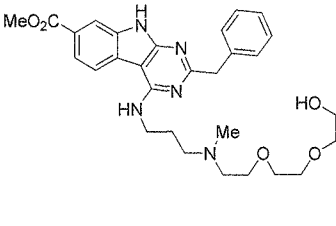
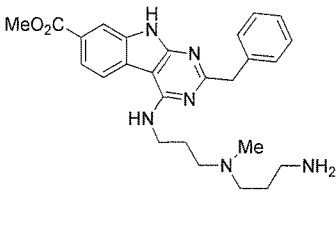
Compound number	Structure
16	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c3nc(Cc5ccncc5)n4NCCCN6CCCCC6</chem>
17	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c3nc(Cc5ccncn5)n4NCCCN6CCCCC6</chem>
18	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c3nc(Cc5ccsc5)n4NCCCN6CCCCC6</chem>
19	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c3nc(Cc5cc(Br)cc5I)n4NCCCN6CCCCC6.[TFA-]</chem>
20	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n4c3nc(Cc5c6ccccc6cc5)n4NCCCN6CCCCC6.[TFA-]</chem>

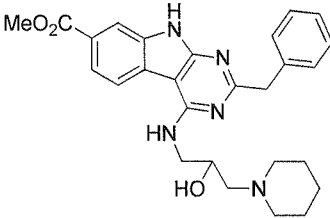
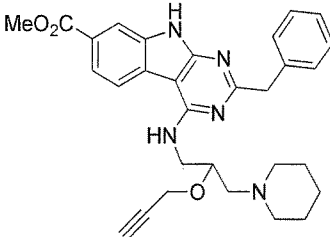
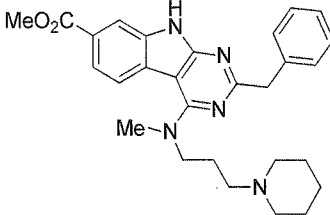
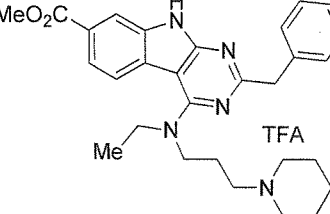
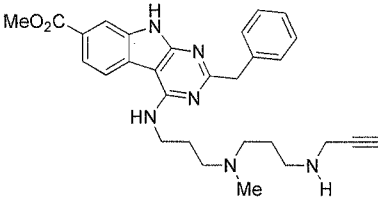
Compound number	Structure
21	 <chem>COC(=O)c1ccc2c(c1)c3c(ncn3C4=CC=C(C=C4)OC)NC5CCNCC5</chem>
22	 <chem>COC(=O)c1ccc2c(c1)c3c(ncn3C4=CC=C(C=C4)O)NC5CCNCC5</chem>
23	 <chem>COC(=O)c1ccc2c(c1)c3c(ncn3C(=O)c4ccccc4)NC5CCNCC5</chem>
24	 <chem>COC(=O)c1ccc2c(c1)c3c(ncn3C(C)c4ccccc4)NC5CCNCC5</chem>
25	 <chem>COC(=O)c1ccc2c(c1)c3c(ncn3Cc4ccc(cc4)N5C=NC(=C5)C(F)(F)F)NC6CCNCC6</chem>

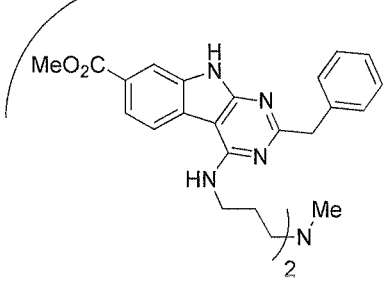
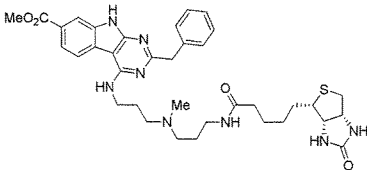
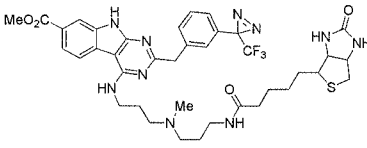
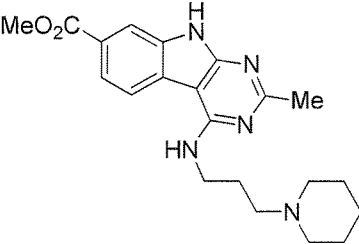
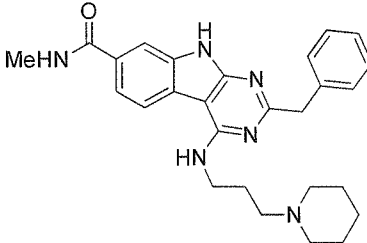
Compound number	Structure
26	 <chem>CCOC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCN4CCCCC4</chem> TFA
27	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCN4CCCCC4</chem> TFA
28	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCN4CCCCC4</chem> TFA
29	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCN4CCCCC4</chem> TFA
30	 <chem>COC(=O)c1ccc2c(c1)c3c(c2)n(c3)CNCNCCN4CCCCC4</chem> TFA

Compound number	Structure
31	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)c3nc(cc3NCCCN4CCCCC4)Cc5ccc(F)cc5</chem> TFA
32	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)c3nc(cc3NCCCN4CCCCC4)Cc5ccc(OC)cc5</chem> TFA
33	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)c3nc(cc3NCCCN4CCCCC4)Cc5ccc(C(F)(F)F)cc5</chem> TFA
34	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)c3nc(cc3NCCCN4CCCCC4)Cc5ccc(C(F)(F)F)cc5</chem> TFA
35	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)c3nc(cc3NCCCN4CCCCC4)Cc5ccc(C(F)(F)F)cc5</chem> TFA

Compound number	Structure
36	
37	
38	
39	
40	

Compound number	Structure
41	 <chem>CN1CCCCC1NC2=C3C(=NC=C3N2Cc4ccccc4)c5cc(C#NN)ccc5</chem> .HCl
42	 <chem>COC(=O)c1ccc2c(c1)c3ccccc3n2C(=O)OCCCCN4CCCCC4</chem>
43	 <chem>COC(=O)c1ccc2c(c1)c3ccccc3n2C(=O)CCCCN4CCCCC4</chem>
44	 <chem>COC(=O)c1ccc2c(c1)c3ccccc3n2C(=O)NCCCCN(C)CCOCCOCCO</chem>
45	 <chem>COC(=O)c1ccc2c(c1)c3ccccc3n2C(=O)NCCCCN(C)CCN</chem>

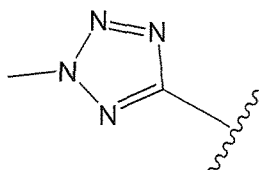
Compound number	Structure
46	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)C(=N)C(=N)C(=O)NCC(O)CN3CCCCC3</chem>
47	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)C(=N)C(=N)C(=O)NCCOC(C#C)CN3CCCCC3</chem>
48	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)C(=N)C(=N)C(=O)N(C)CCCN3CCCCC3</chem>
49	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)C(=N)C(=N)C(=O)N(C)CCCN3CCCCC3.C(F)(F)F</chem>
50	 <chem>COC(=O)c1ccc2c(c1)c(c[nH]2)C(=N)C(=N)C(=N)C(=O)NCCCN(C)CCCN(C)CC#N</chem>

Compound number	Structure
51	
52	
53	
54	
55	

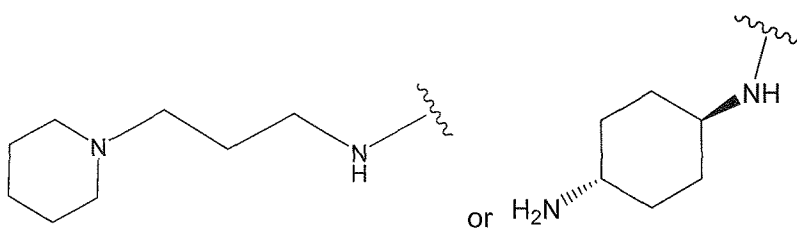
or a salt thereof.

19. The method of claim 12, wherein R^2 is benzyl or H.

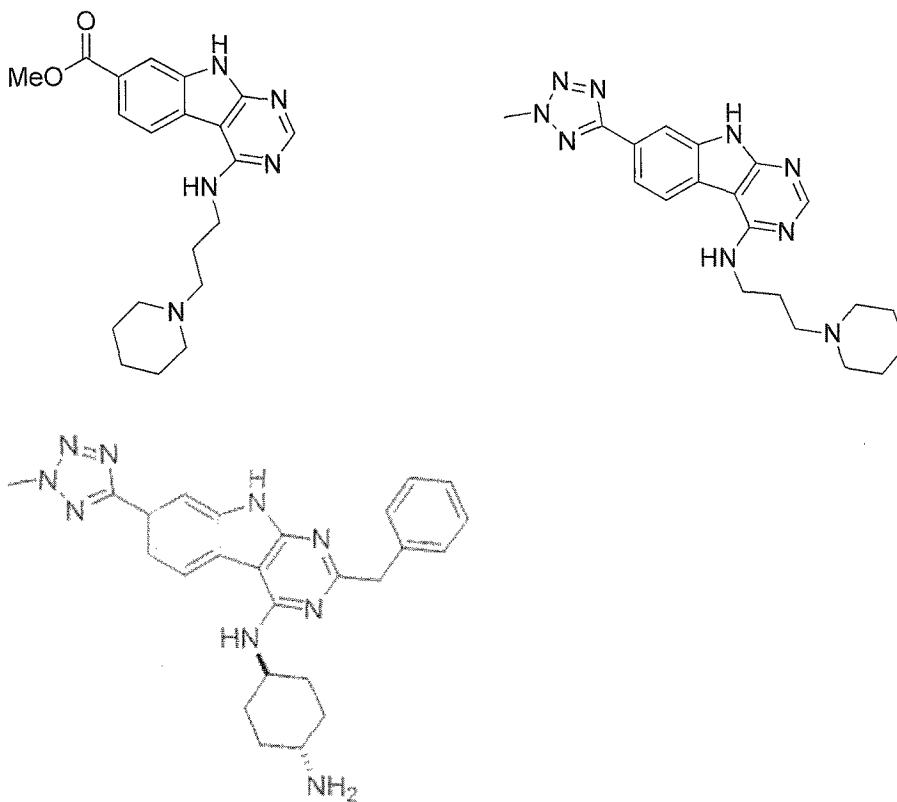
20. The method of claim 12, wherein R^5 and R^6 join together with C to form:



21. The method of claim 12, wherein W is

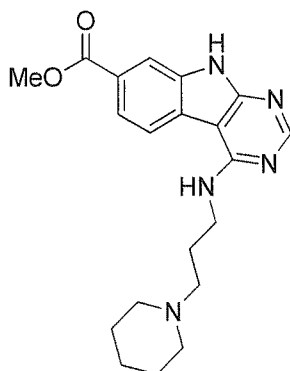


22. The method of claim 12, wherein the compound is

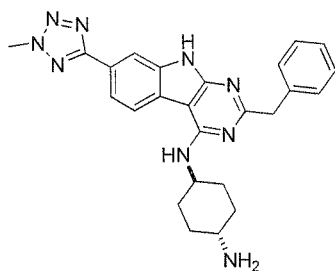


or a pharmaceutically acceptable salt thereof.

23. The method of claim 12, wherein the compound is a hydrochloride salt of



24. The method of claim 12, wherein the compound is a hydrobromide salt of



25. The method according to claim 12, wherein the stem and progenitor cells are human hematopoietic stem and progenitor cells.

26. The method according to claim 12, wherein the starting cell population includes CD34+ cells harvested from mobilized peripheral blood (mPB), bone marrow (BM) or umbilical cord blood (UCB).

27. The method according to claim 26, wherein the starting cell population includes CD34+ cells harvested from umbilical cord blood (UCB).

28. The method according to claim 12, wherein the starting cell population essentially consists of CD34+ cells purified from one or two umbilical cord blood units.

29. The method according to claim 28, comprising culturing the starting cell population in presence of said compound from about 2 days to about 21 days.

30. The method according to claim 28, comprising administering said compound to the starting cell population at a concentration between 1 nM and 3000 nM.
31. The method of claim 14, wherein the biologic comprises Interleukin-3 (IL-3), Granulocyte Macrophage Colony-Stimulating Factor (GM-CSF), Thrombopoietin (TPO), FMS-Like Tyrosine Kinase 3 Ligand (FLT3-L), Stem Cell Factor (SCF), Interleukin-6 (IL-6) or a combination thereof.
32. The method of claim 31, wherein the biologic comprises SCF, FLT3-L, TPO, IL-6 or a combination thereof.
33. The method of claim 12, wherein the other small molecule is StemRegenin 1 (SR1).
34. A cell population as expanded according to a method as defined in claim 12.