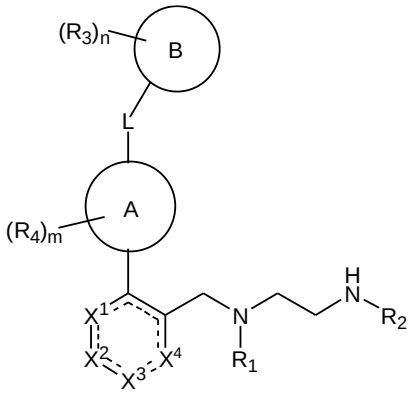
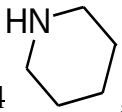
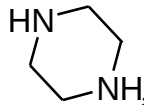
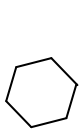
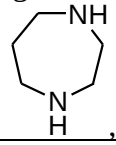
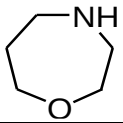
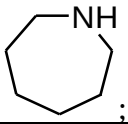
Claims

1. A compound shown in formula (I), or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof:



I

X^1, and X^2, are each independently selected from the group consisting of: CR, NR and N; X^3 and X^4 are each independently selected from the group consisting of: CR, NRCR' and N; the dash line is a chemical bond or absent;

ring A is selected from the group consisting of substituted , , , ,  and ; wherein, when the connection site connected to other structural fragments or unsubstituted saturated or partially unsaturated (non-aromatic) 4-8 membered carbocycle, and substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 4-8 membered heterocyclesubstituents is NH, the hydrogen atom on NH is lost to form the connection site;

ring B is selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_6-C_{10}arylC$_{10}$ aryl, substituted or unsubstituted 5-12 membered heteroaromatic ring, substituted or unsubstituted 3-12 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted C_1-C_6alkyl-6-10 membered aryl, substituted or unsubstituted C_3-C_{12}carbocycle, substituted or unsubstituted C_2-C_{10}acyl, substituted or unsubstituted C_2-C_{10}ester group, substituted or unsubstituted C_6-C_{10}aryloxy, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted C_1-C_4 alkyl-S(O)$_2$,and substituted or unsubstituted C_1-C_4alkyl-SO-;;

m and n are each independently selected from the group consisting of 0, 1, 2, 3, 4, 5 and 6;

L is selected from the group consisting of chemical bonds, -O-, -(CHR^6)$_p$-, -CHR^6-O-, -CHR^6-C(O)-, carbonyl, S, -NH-, -NHC(O)-, -NHS(O)$_2$-, -NHC(O)NH-, -NHC(S)NH-, -COO-, -O-S(O)$_2$-, -COO-CH$_2$-, -C(O)CH$_2$-, and -S(O)$_2$S, -NH-, or L is

absent;

p is selected from the group consisting of 1, 2 and 3;

~~R^1 and R^2 are each independently~~R^1 is selected from the group consisting of substituted or unsubstituted C_1-C_6 alkyl, and substituted or unsubstituted C_3-C_6 cycloalkyl;

R^2 is selected from the group consisting of H, substituted or unsubstituted C_1-C_6 alkyl, and substituted or unsubstituted C_3-~~C_6cycloalkyl~~C_6 cycloalkyl;

R^3 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_2-C_6alkenyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted ~~-C_1-C_6alkyl-phenyl, substituted or unsubstituted~~ C_3-C_{12}carbocycle, substituted or unsubstituted C_2-~~C_{10}acyl~~C_{10} acyl, substituted or unsubstituted C_2-C_{10}ester group, substituted or unsubstituted ~~C_6-C_{10}aryloxy, substituted or unsubstituted~~ C_1-C_6 amide, substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-SO-;

R is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-~~C_6alkyl~~C_6 alkyl, substituted or unsubstituted C_1-~~C_6alkoxy~~C_6 alkoxy, substituted or unsubstituted C_1-~~C_6alkylamino~~C_6 alkylamino, substituted or unsubstituted C_6-~~C_{10}aryl~~C_{10} aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 4-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted -C_1-~~C_6alkyl~~C_6 alkyl-phenyl, substituted or unsubstituted C_3-~~C_{12}carbocycle~~C_{12} carbocycle, substituted or unsubstituted C_2-~~C_{10}acyl~~C_{10} acyl, substituted or unsubstituted C_2-~~C_{10}ester~~C_{10} ester group, substituted or unsubstituted C_6-~~C_{10}aryloxy~~C_{10} aryloxy, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-SO-;

R' is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6 alkyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted C_1-C_6 alkylamino, substituted or unsubstituted C_1-C_6 amide;

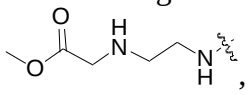
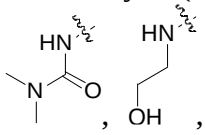
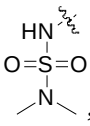
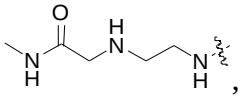
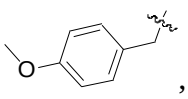
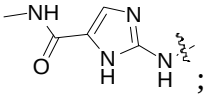
or two R or R' located on adjacent ring atoms together with the ring atoms to which they are attached form a substituted or unsubstituted 5-11 membered carbocycle or heterocycle, and the ring is partially unsaturated or saturated~~; preferably,~~, or the carbocycle or heterocycle is a 5-9 membered carbocycle or heterocycle~~, more preferably a 5-7 membered carbocycle or heterocycle (~~; and the carbocycle or heterocycle is saturated, partially unsaturated or aromatic~~);~~;

R^4 is a group selected from the group consisting of H, halogen, cyano, amino, nitro,

hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-~~C_6alkyl, substituted or unsubstituted C_2-C_6alkenyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted -C_1-C_6alkyl-phenyl, substituted or unsubstituted C_3-C_{12}carbocycle, substituted or unsubstituted C_2-C_{10}acyl, substituted or unsubstituted C_2-C_{10}ester group, substituted or unsubstituted C_6-C_{10}aryloxy, substituted or unsubstituted C_1-C_6-amide, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-~~;C_6 alkyl, substituted or unsubstituted C_2-C_6 alkenyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted C_1-C_6 alkylamino;

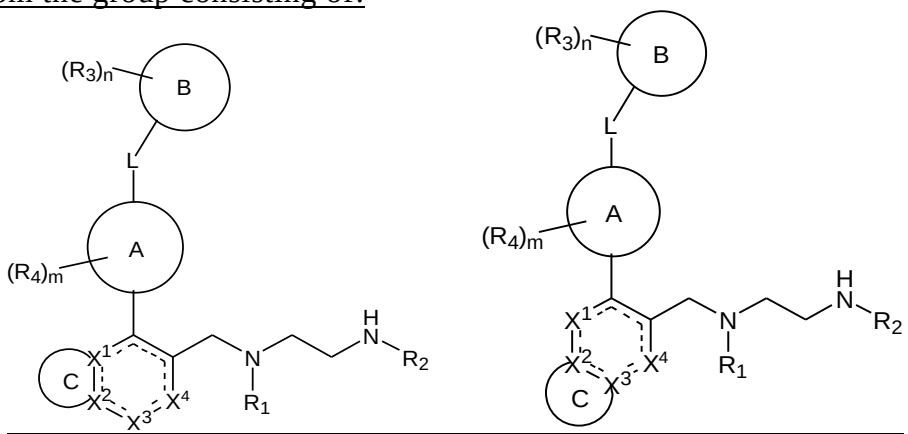
or two R^4 on the same or adjacent ring atoms together with the ring atoms to which they attached form a substituted or unsubstituted 3-11 membered carbocycle or heterocycle, and the ring is a partially unsaturated ring, saturated ring or aromatic ring;

R^6 is a group selected from the group consisting of H, halogen, cyano, ~~amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, acyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, and substituted or unsubstituted C_1-C_6alkylamino~~C_1-C_6 alkyl;

unless otherwise specified, in the above formulas, the "substituted" means that the hydrogen atom on the corresponding group is substituted by one or more substituents selected from the group consisting of: deuterium, tritium, halogen, hydroxyl, carboxyl, thiol, benzyl , oxo (=O), C_1-~~C_{12}alkoxycarbonyl~~C_{12} alkoxycarbonyl, C_1-~~C_6aldehyde~~C_6 aldehyde group, amino, C_1-C_6 amide, nitro, cyano, unsubstituted or halogenated C_1-~~C_6alkyl~~C_6 alkyl, C_2-~~C_{10}alkenyl~~C_{10} alkenyl, C_1-~~C_6alkoxy~~C_6 alkoxy, C_1-~~C_6alkyl~~C_6 alkyl-amino, C_1-~~C_6alkyl~~C_6 alkyl-sulfonamide, C_1-~~C_6alkyl~~C_6 alkyl-ureido, C_1-~~C_6alkyl~~C_6 alkyl-S-, C_6-~~C_{10}aryl~~C_{10} aryl, five- or six-membered heteroaryl, five- or six-membered non-aromatic ~~heterocyclyl, five- or six-membered non-aromatic heterocyclyl-(CH_2)-, -O-(C_6-C_{10}aryl), -O-(five or six membered heteroaryl), -NH-(C_6-C_{10}aryl), -NH-(five-membered or six-membered heteroaryl), C_1-C_{12}alkylaminocarbonyl~~heterocyclylC_1-C_{12} alkylaminocarbonyl, unsubstituted or halogenated C_2-~~C_{10}acyl~~C_{10} acyl, sulfonyl (-SO_2-OH), sulfonamide (-SO2-NH_2), phosphoryl (-PO_3-OH), unsubstituted or halogenated C_1-C_4alkyl-$S(O)_2$-, unsubstituted or halogenated C_1-C_4alkyl-SO-, , , , , , , and ; in each formula, the heterocycle or heteroaromatic ring has 1-3 heteroatoms selected from the group consisting of N, S and O; each aryl, heteroaryl, and heterocyclyl can be independently substituted by 1-3 substituents selected from the group consisting of deuterium, tritium, halogen, hydroxyl, carboxyl, thiol, C_1-C_6alkyl, and C_1-~~C_6alkoxy~~C_6

alkoxy.

~~2.~~2. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the compound has a structure selected from the group consisting of:



V VI

wherein, ring C is substituted or unsubstituted phenyl, substituted or unsubstituted 5-7 membered heterocyclyl, or substituted or unsubstituted 5-6 membered heteroaryl.

3. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein R^3 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-~~C_6alkyl~~C_6 alkyl, substituted or unsubstituted C_1-~~C_6alkoxy~~C_6 alkoxy, substituted or unsubstituted C_1-~~C_6alkylamino, substituted or unsubstituted C_6-C_{10}aryl~~C_6 alkylamino, substituted or unsubstituted 5-10 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted C_3-~~C_8carbocycle~~C_8 carbocycle, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-~~C_6ester~~C_6 ester group, substituted or unsubstituted ~~C_6-C_{10}aryloxy, substituted or unsubstituted~~ C_1-C_6 amide, substituted or unsubstituted ~~-C_1-C_6alkyl-phenyl, substituted or unsubstituted C_1-C_4alkyl~~C_1-C_4 alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-SO-; and/or

R is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-~~C_6alkyl~~C_6 alkyl, substituted or unsubstituted C_1-~~C_6alkoxy~~C_6 alkoxy, substituted or unsubstituted C_1-~~C_6alkylamino~~C_6 alkylamino, substituted or unsubstituted C_6-~~C_{10}aryl~~C_{10} aryl, substituted or unsubstituted 5-10 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted -C_1-~~C_6alkyl~~C_6 alkyl-phenyl, substituted or unsubstituted C_3-~~C_8carbocycle~~C_8 carbocycle, substituted or unsubstituted C_2-~~C_6acyl~~C_6 acyl, substituted or unsubstituted C_2-~~C_6ester~~C_6 ester group, substituted or unsubstituted C_6-~~C_{10}aryloxy~~C_{10} aryloxy, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted -C_1-~~C_6alkyl~~C_6 alkyl-phenyl, substituted or unsubstituted C_1-~~C_4alkyl~~C_4

alkyl-S(O)$_2$-, and substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-SO-;

R' is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6 alkyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted C_1-C_6 alkylamino;

or two R located on adjacent ring atoms together with the carbon atoms to which they attached form a substituted or unsubstituted 5-9 membered carbocycle or heterocycle, and the ring is partially unsaturated, saturated or aromatic~~; and/or~~.

~~3~~4. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein, ring B is selected from the group consisting of: ~~H, or~~ substituted or unsubstituted phenyl, substituted or unsubstituted 5-10 membered heteroaromatic ring~~, substituted or unsubstituted 3-12 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, and substituted or unsubstituted C_3-C_{12}carbocycle~~.

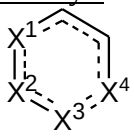
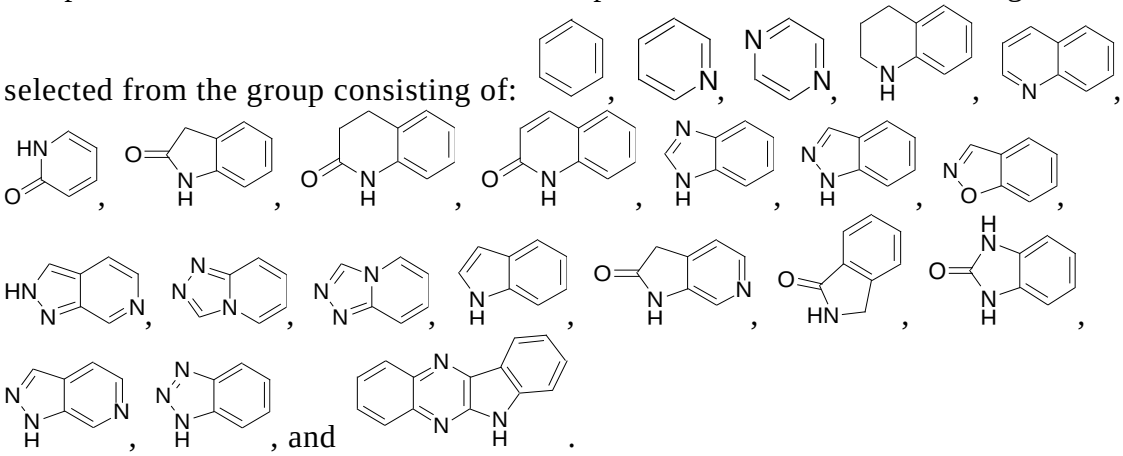
~~4. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein R^3 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-10 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6ester group, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted C_1-C_4alkyl-S(O)$_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-; and/or~~

5. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein

R is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-~~C_6alkyl~~C_6 alkyl, substituted or unsubstituted C_1-~~C_6alkoxy~~C_6 alkoxy, substituted or unsubstituted C_1-~~C_6alkylamino~~C_6 alkylamino, substituted or unsubstituted C_2-~~C_6acyl~~C_6 acyl, substituted or unsubstituted C_2-~~C_6ester~~C_6 ester group, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-S(O)$_2$-, and substituted or unsubstituted C_1-~~C_4alkyl~~C_4 alkyl-SO-; ~~or two R located on adjacent ring atoms together with~~R' is a group selected from the ~~ring atoms to which they are attached form a~~ group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted ~~5-7 membered carbocycle~~C_1-C_6 alkyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or ~~heterocycle; and/or~~unsubstituted C_1-C_6 alkylamino.

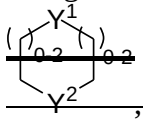
6. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein R^4 is a group selected from the

group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-~~C_6alkyl, substituted or unsubstituted C_3-C_8carbocycle, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_{10}ester group, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-; or two R^4 on adjacent ring atoms together with the carbon atoms to which they are attached form a substituted or unsubstituted 5-9 membered carbocycle or heterocycle, and the ring is partially unsaturated or saturated~~C_6 alkyl.

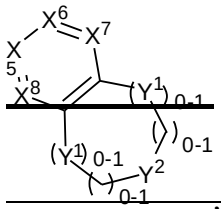
~~5. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein R^3 is a group selected from the group consisting of:~~7. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the ring  is selected from the group consisting of: .

~~6~~8. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein ring B is selected from the group consisting of substituted or unsubstituted C_6-~~C_{10}aryl~~C_{10} aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 4-12 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, and substituted or unsubstituted C_3-~~C_{12}carbocycle~~C_{12} carbocycle.

~~7~~9. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein~~, ring A is selected from the group consisting of:~~

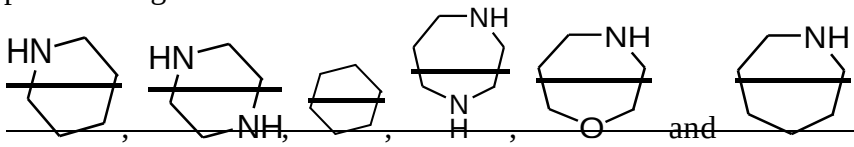
~~~~, ~~wherein, Y^1 and Y^2 are each independently selected from the group consisting of: CHR^6 and NR^6; 0-2 means that the number of carbon atoms can be 0, 1 or 2; and the L-B structure can be located at Y^1, Y^2 or other ring atoms (preferably at Y^1, Y^2);~~

~~or ring A together with two R^4 form a group selected from the group consisting of:~~



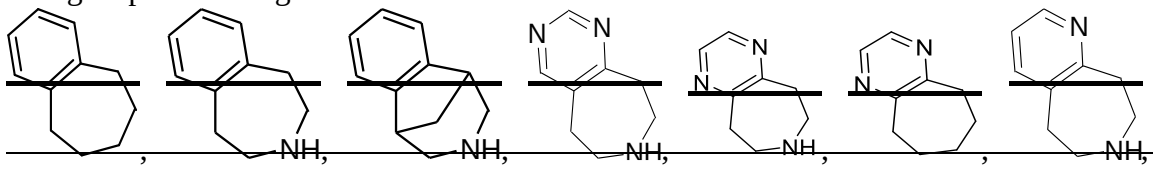
, wherein, Y^1 and Y^2 are each independently selected from the group consisting of: CHR^6, O and NR^6; X^5, X^6, X^7 and X^8 are each independently selected from the group consisting of: CR^6 and N.

8. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein R^3 is a group selected from the group consisting of: ring A is a substituted or unsubstitutedgroup selected from the group consisting of:

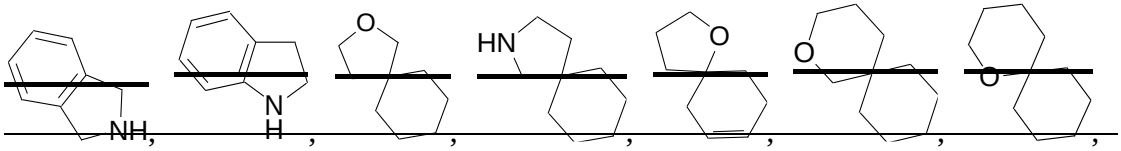


, , , , , and (wherein, when the connection site connected to other structural fragments or substituents is NH, the hydrogen atom on NH is lost to form the connection site);

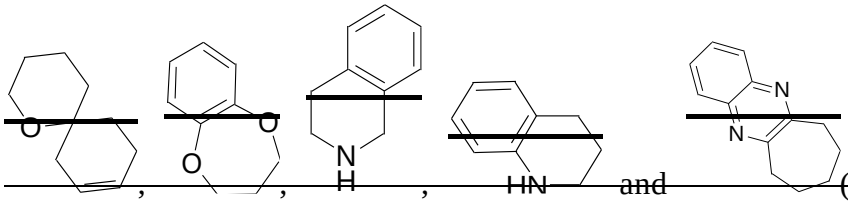
or ring A together with two R^4 form a substituted or unsubstituted group selected from the group consisting of:



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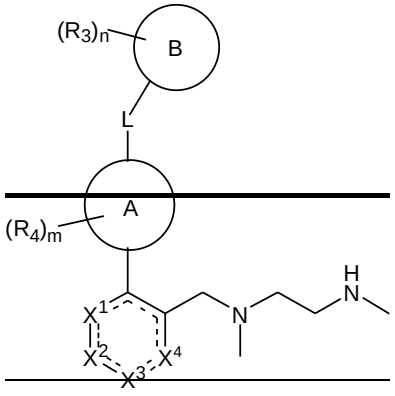


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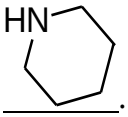


, , , , and (wherein, when the connection site with other structural fragments or substituents is NH, the hydrogen atom on NH is lost to form the connection site).

9. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the compound has a structure as shown in the following formula II:

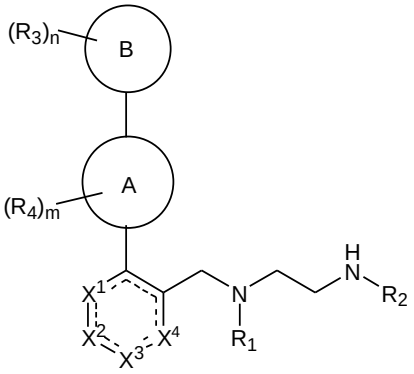


II



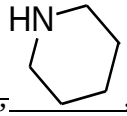
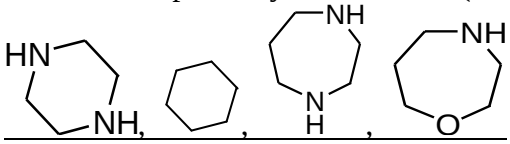
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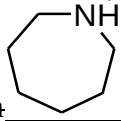
10. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the compound has a structure as shown in the following formula III:



III

wherein,

ring A is selected from the group consisting of ~~substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 4-8 membered carbocycle,~~ ,  and ~~substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 4-8 membered heterocycle;~~

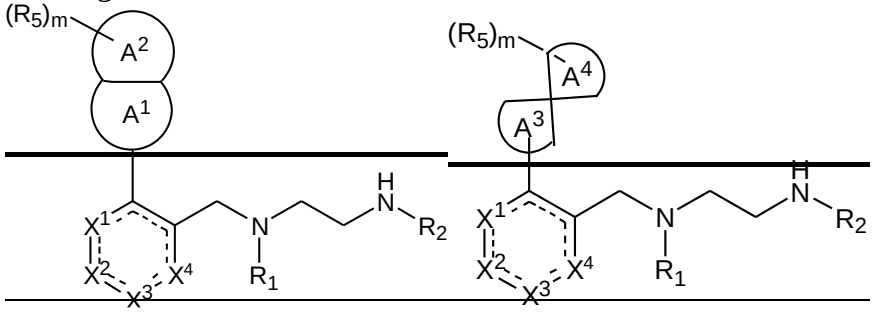
~~ring B is selected from~~ ; wherein, when the ~~group consisting of substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 3-12 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, and substituted or unsubstituted C_3-C_{12}heterocycle~~connection site connected to other structural fragments or substituents is NH, the hydrogen atom on NH is lost to form the connection site;

preferably, R^3 is a group selected from the group consisting of H, halogen, cyano,

amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6ester group, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-;

preferably, R^4 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino~~, substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-7 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted C_1-C_6alkyl-phenyl, substituted or unsubstituted C_3-C_8carbocycle, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6ester group, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-~~.

11. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the compound has a structure as shown in the following formula ~~IV~~V:



~~IV~~ ~~IVA~~

~~wherein,~~

~~ring A^1 is selected from the group consisting of substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 5-8 membered carbocycle, and substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 5-8 membered heterocycle;~~

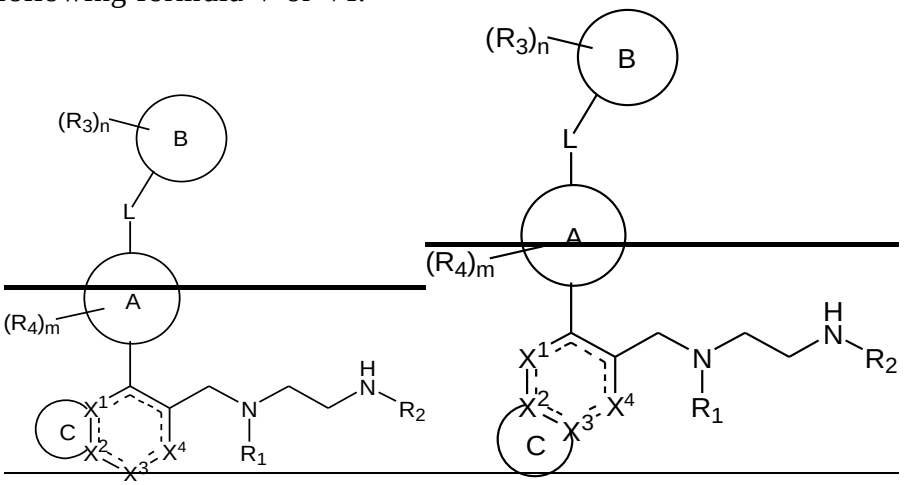
~~ring A^2 is selected from the group consisting of substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, and substituted or unsubstituted C_3-C_{12}carbocycle; and ring $A^2$is fused with ring A^1;~~

~~ring $A^3$and ring $A^4$are each independently selected from the group consisting of substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 5-8 membered carbocycle, and substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 3-8 membered heterocycle;~~

~~m is 0, 1, 2, 3 or 4; $R^5$is selected from the group consisting of H, halogen, cyano,~~

amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6ester group, substituted or unsubstituted C_6-C_{10}aryloxy or heteroaryloxy,substituted or unsubstituted C_6-C_{10}arylamino or heteroarylamino, substituted or unsubstituted C_1-C_6 amide, substituted or unsubstituted C_1-C_6alkyl-phenyl, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-; and R^5 can be located on ring A^1, ring A^2, ring A^3or ring A^4.

12. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the compound has a structure as shown in the following formula V or VI:

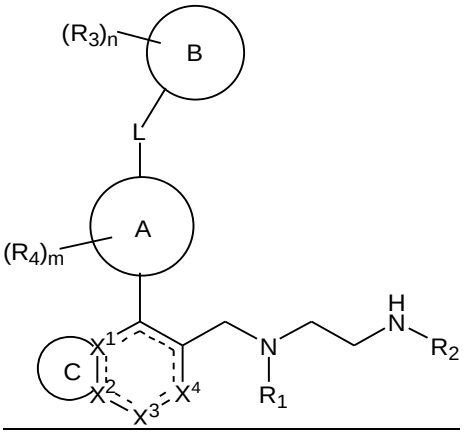


V VI

wherein, ring C is substituted or unsubstituted phenyl, substituted or unsubstituted 5-7 membered heterocyclyl, or substituted or unsubstituted 5-6 membered heteroaryl;

ring A is selected from the group consisting of substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 5-6 membered carbocycle, and substituted or unsubstituted saturated or partially unsaturated (non-aromatic) 4-8 membered heterocycle;

ring B is selected from the group consisting of substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-12 membered heteroaryl, substituted or unsubstituted 4-12 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, and substituted or unsubstituted C_3-C_{12}carbocycle;



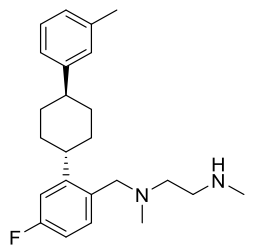
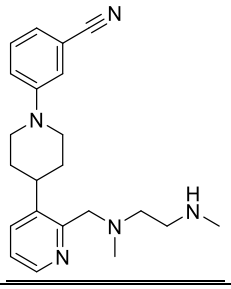
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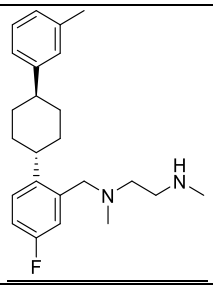
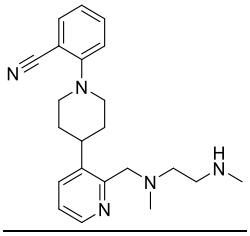
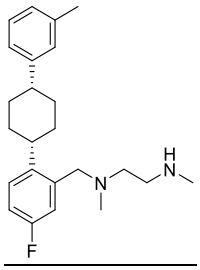
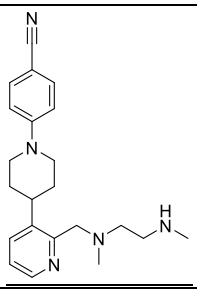
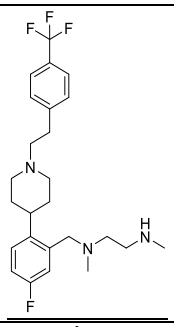
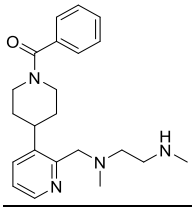
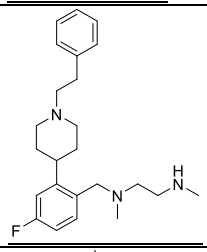
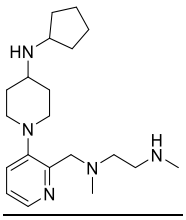
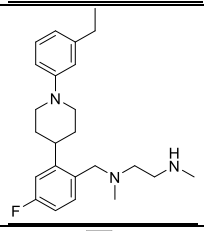
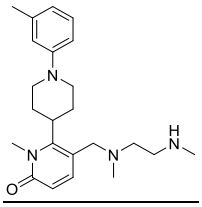
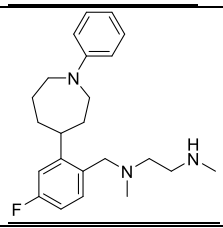
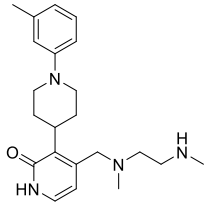
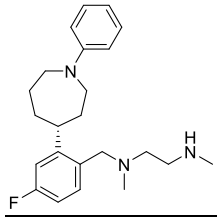
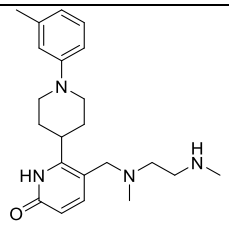
preferably, R^3 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6ester group, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-;

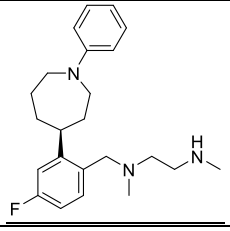
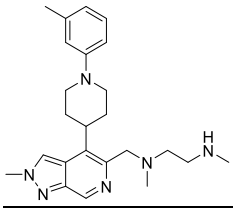
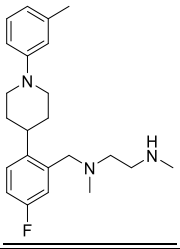
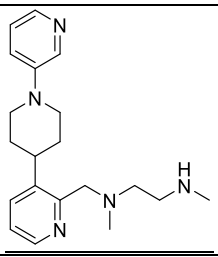
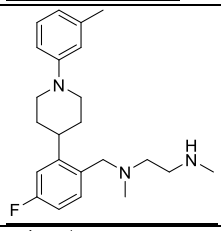
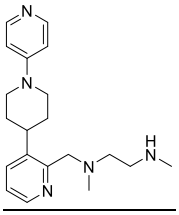
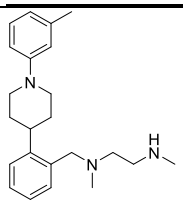
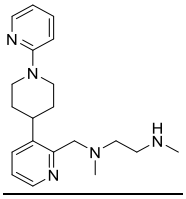
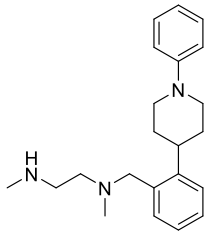
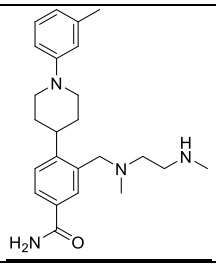
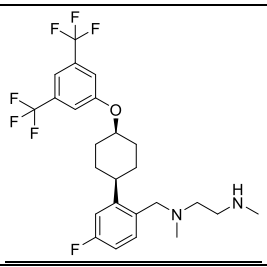
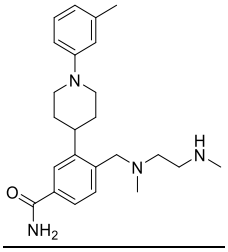
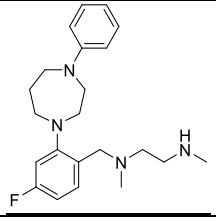
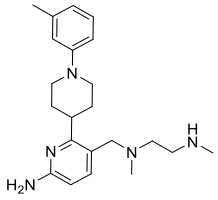
preferably, R^4 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino~~, substituted or unsubstituted C_6-C_{10}aryl, substituted or unsubstituted 5-7 membered heteroaryl, substituted or unsubstituted 5-7 membered heterocycle containing 1-3 heteroatoms selected from oxygen, sulfur and nitrogen, substituted or unsubstituted C_1-C_6alkyl-phenyl, substituted or unsubstituted C_3-C_8carbocycle, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6ester group, substituted or unsubstituted C_1-C_4alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-C_4alkyl-SO-~~.

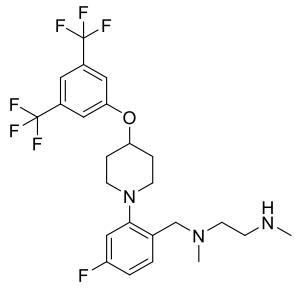
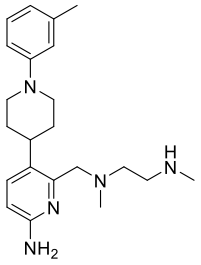
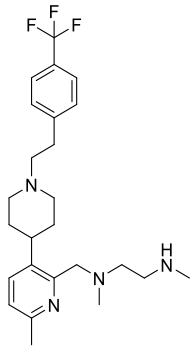
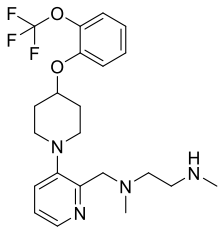
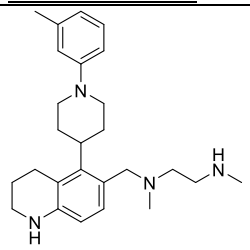
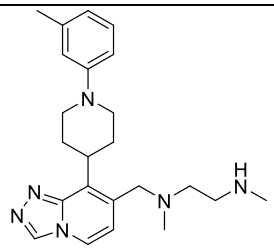
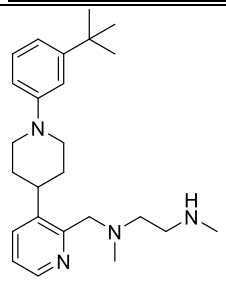
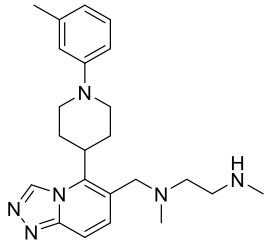
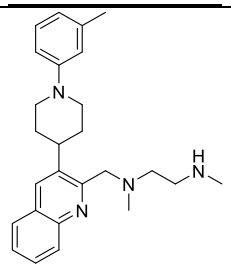
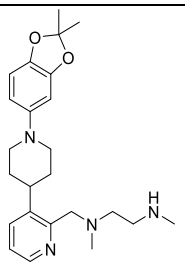
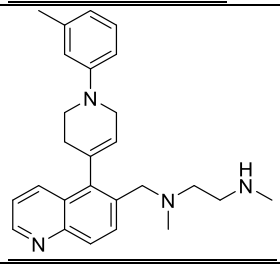
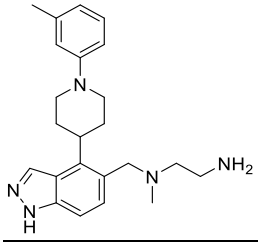
~~13~~12. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein the compound is any one of the compound ~~of Example P1-P448.~~selected from the group consisting of

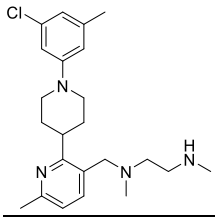
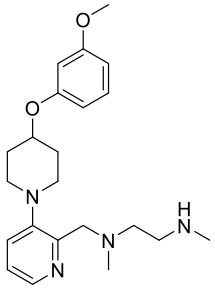
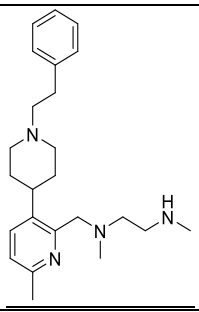
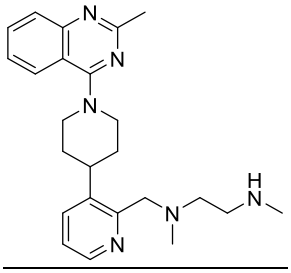
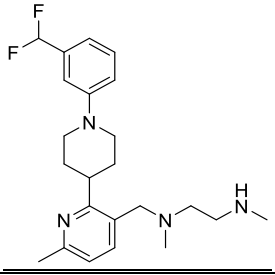
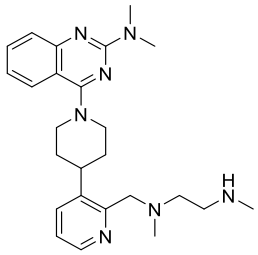
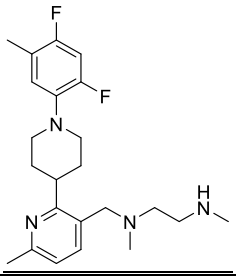
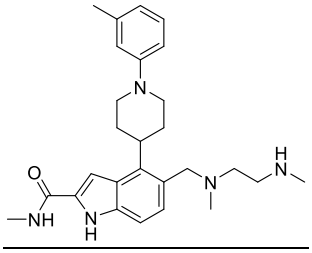
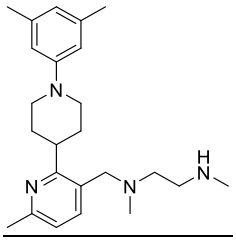
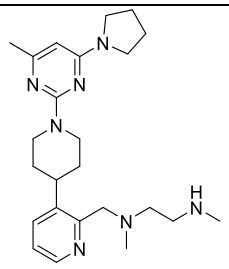
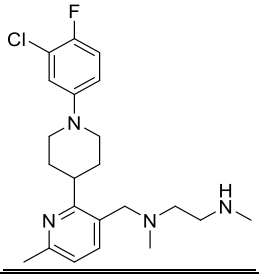
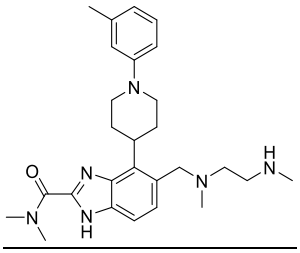
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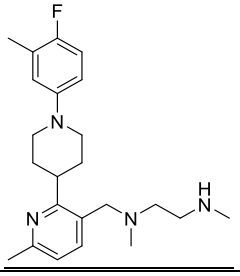
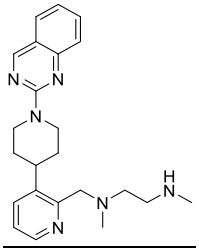
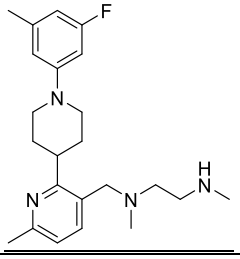
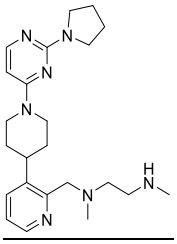
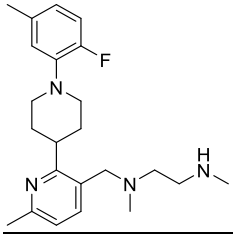
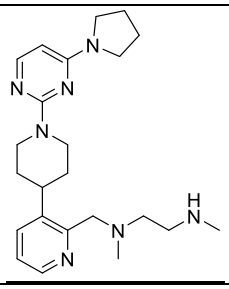
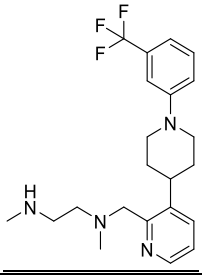
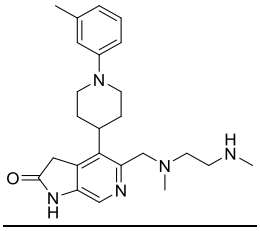
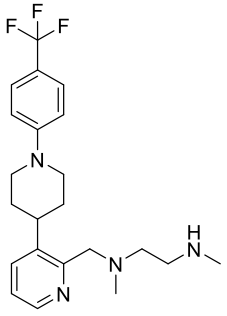
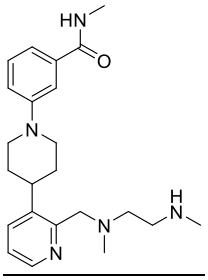
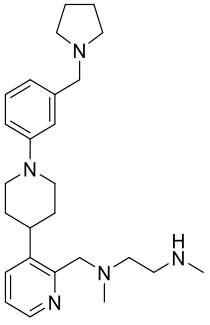
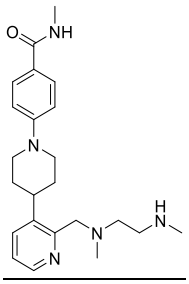
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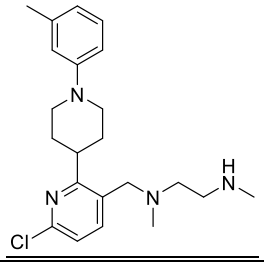
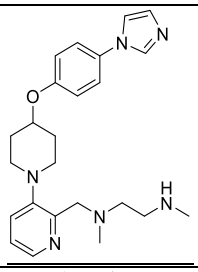
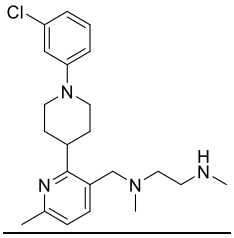
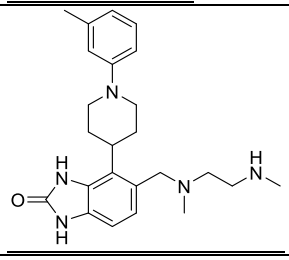
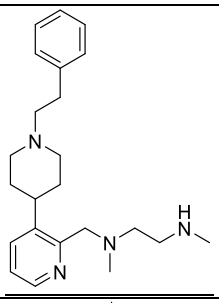
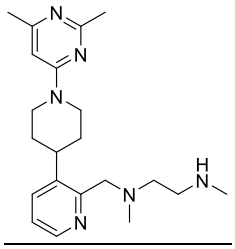
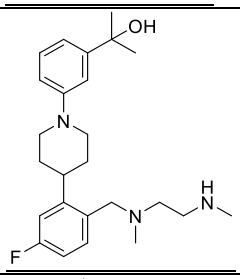
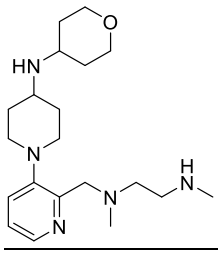
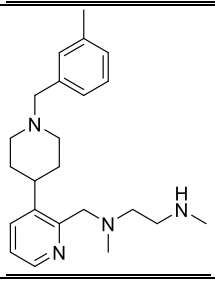
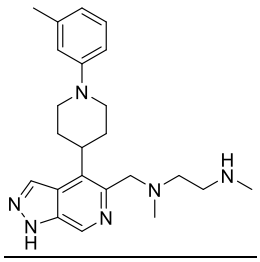
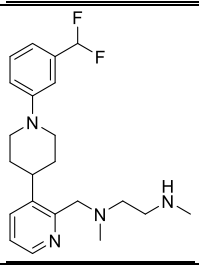
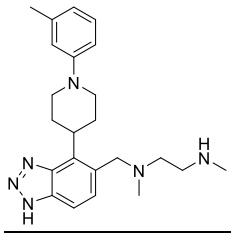
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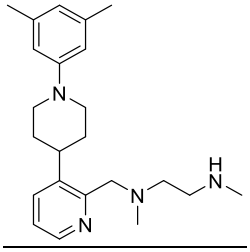
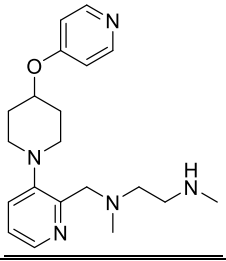
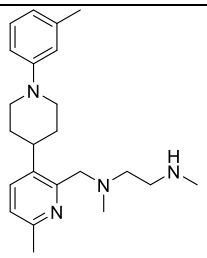
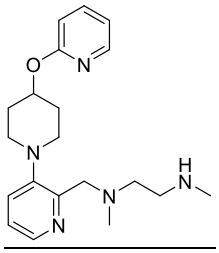
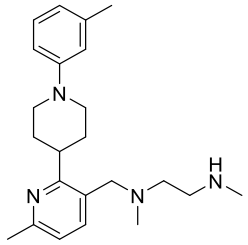
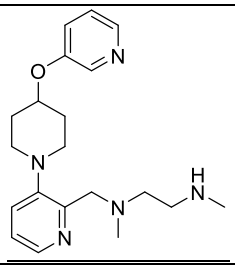
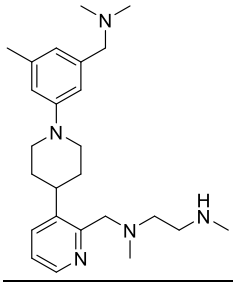
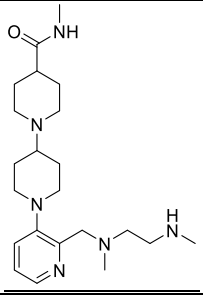
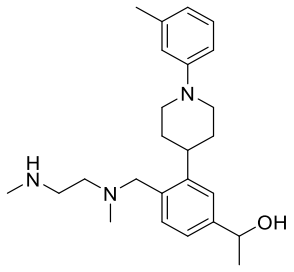
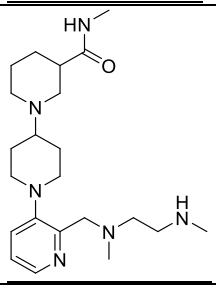
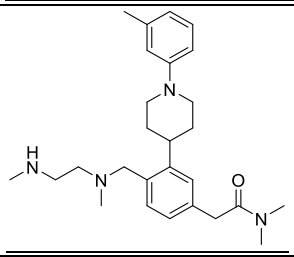
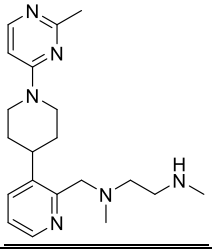
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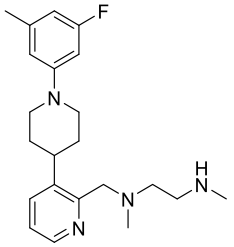
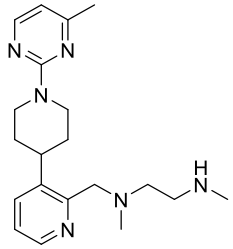
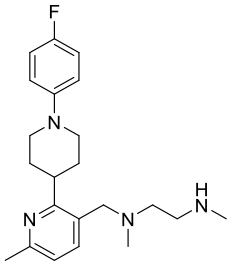
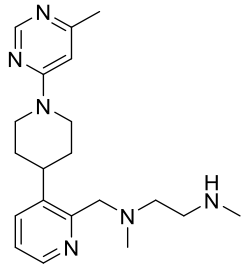
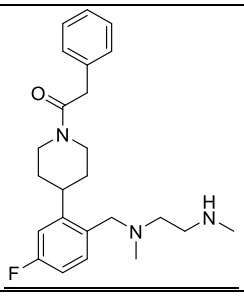
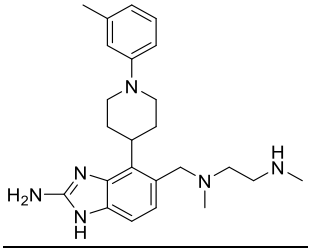
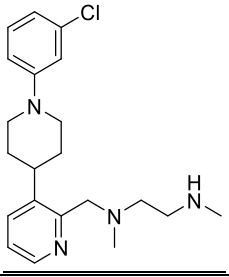
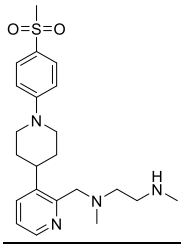
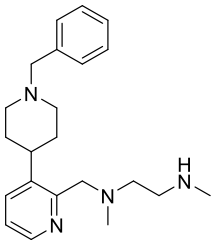
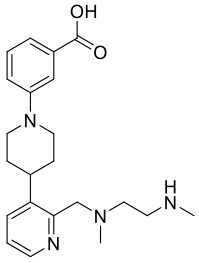
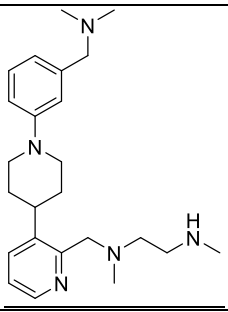
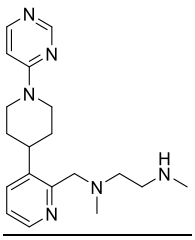
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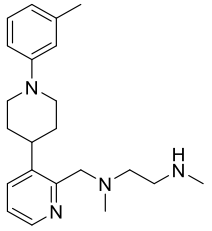
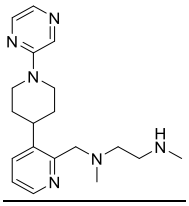
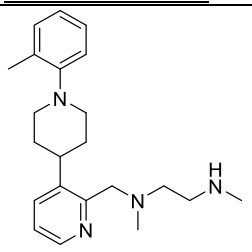
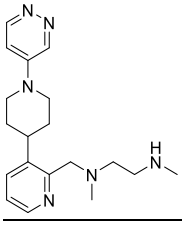
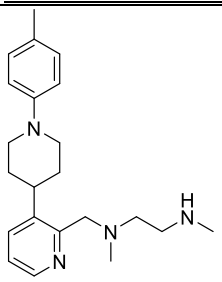
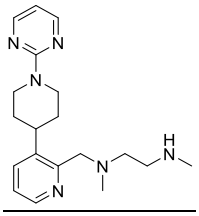
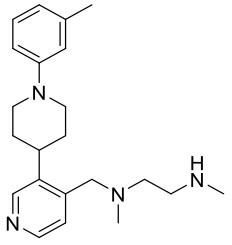
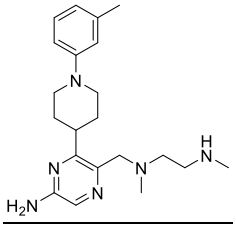
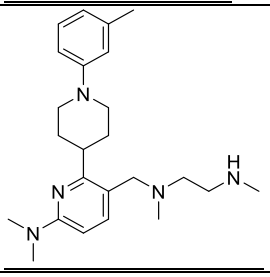
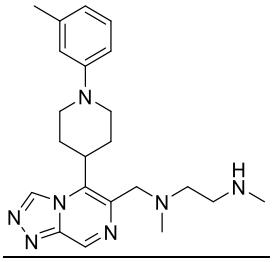
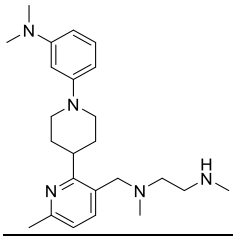
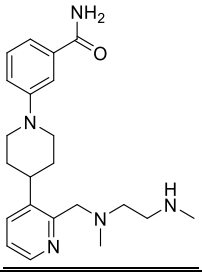
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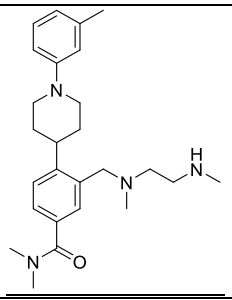
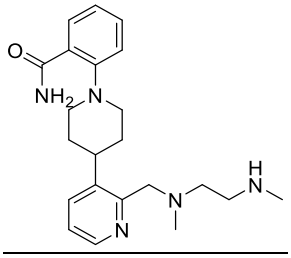
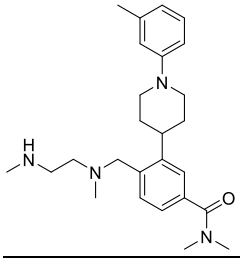
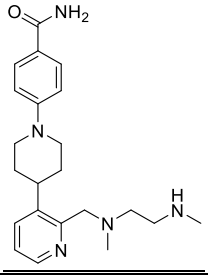
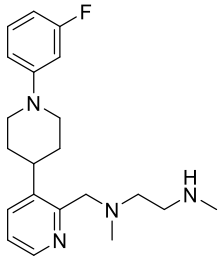
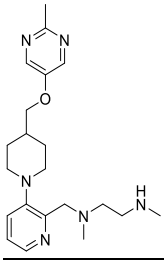
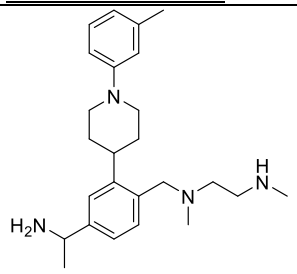
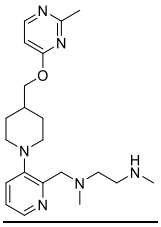
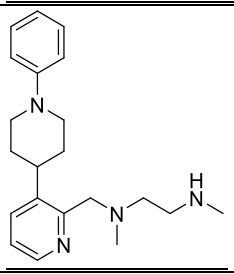
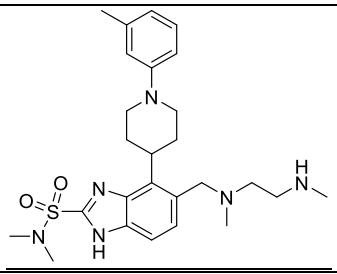
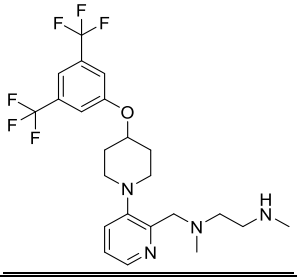
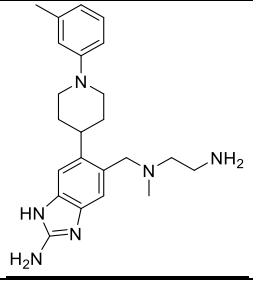
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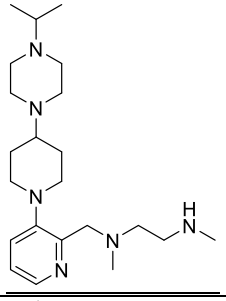
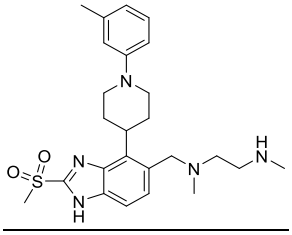
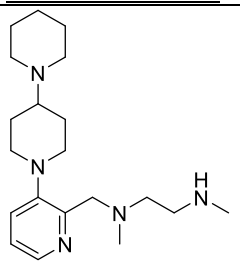
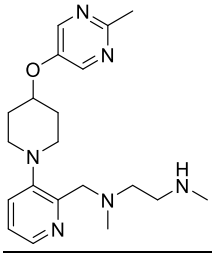
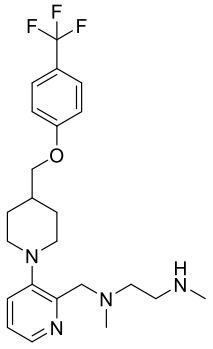
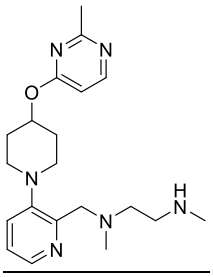
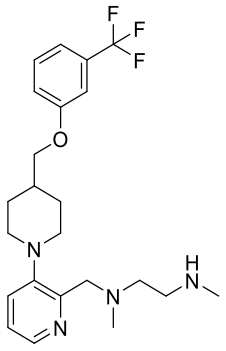
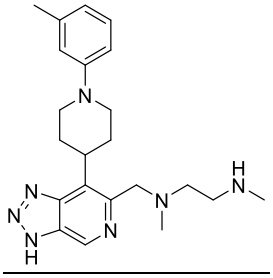
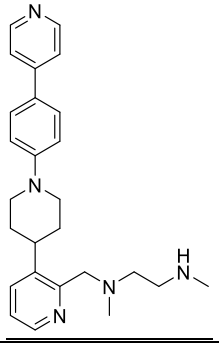
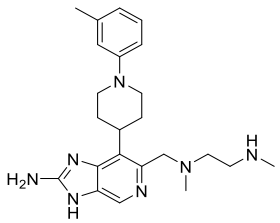
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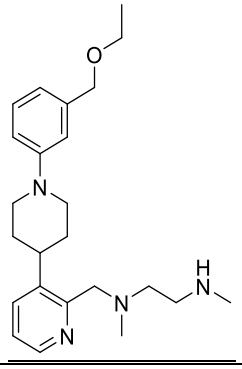
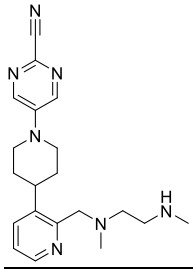
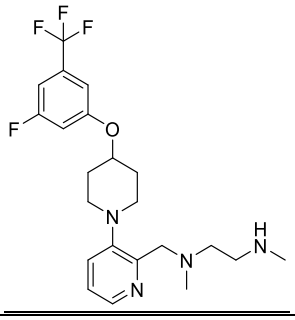
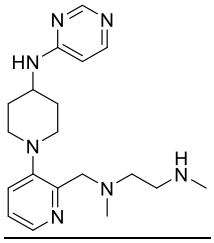
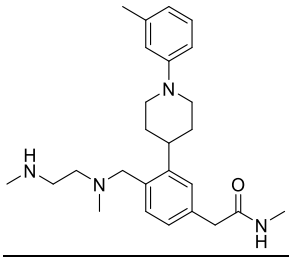
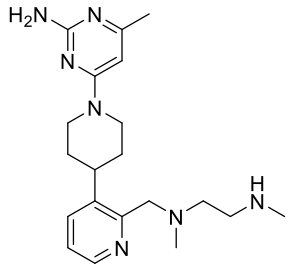
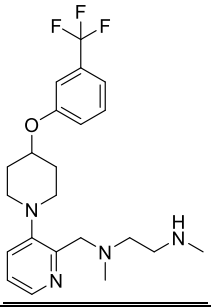
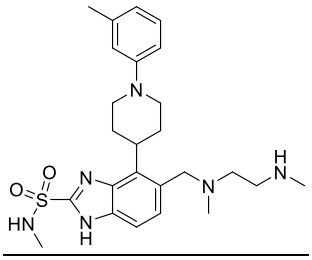
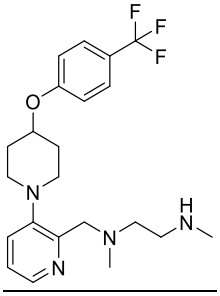
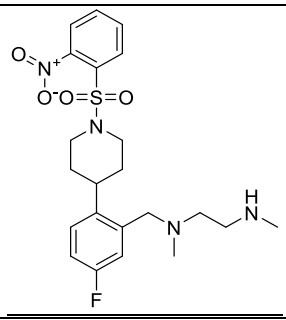
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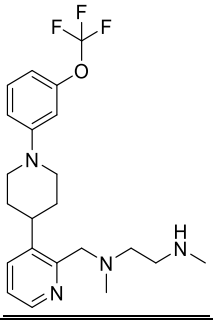
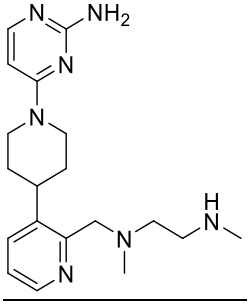
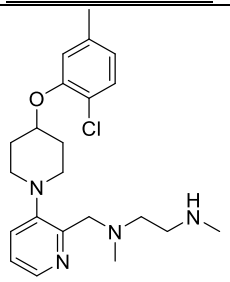
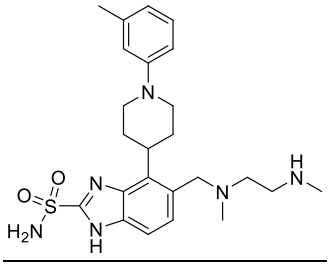
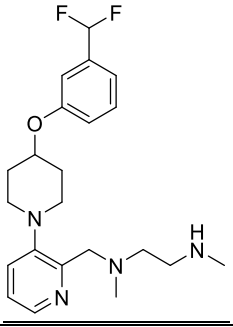
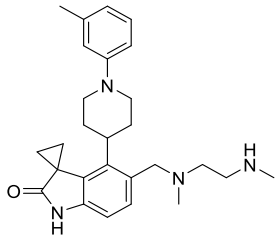
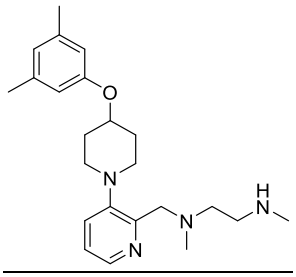
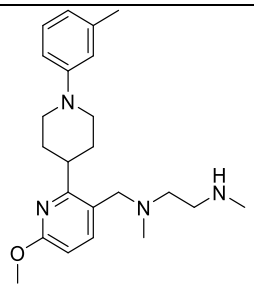
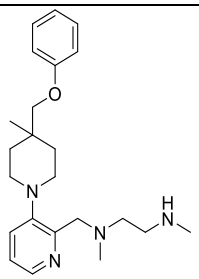
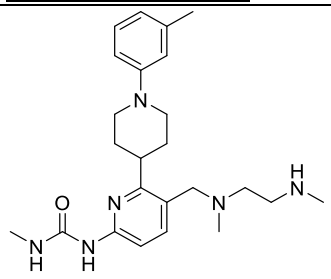
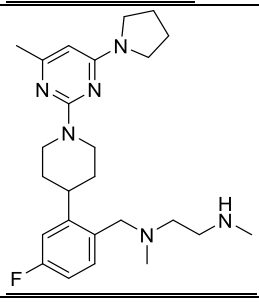
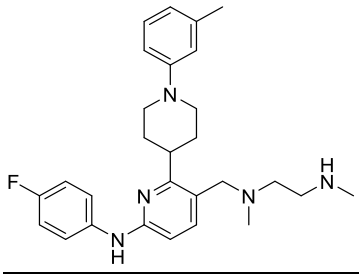
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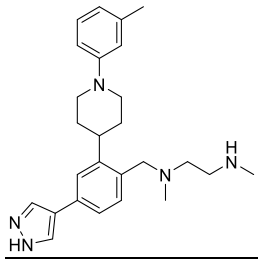
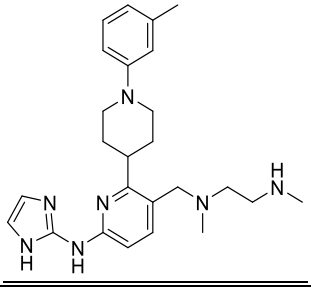
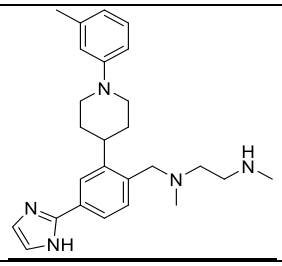
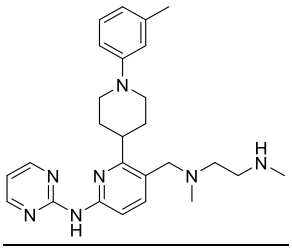
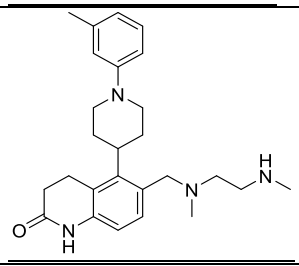
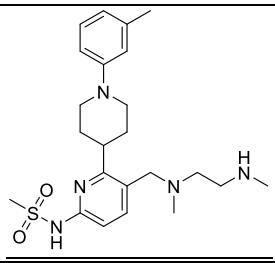
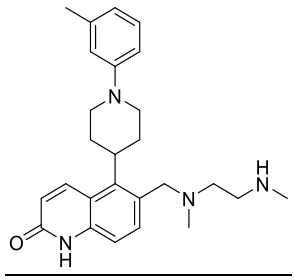
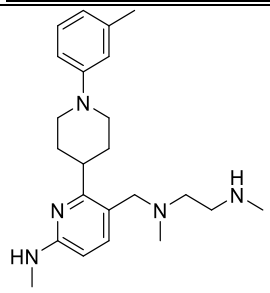
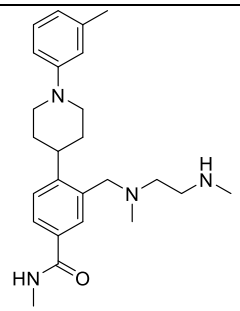
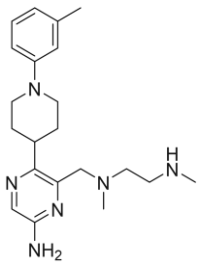
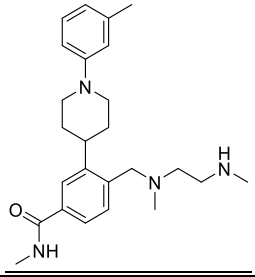
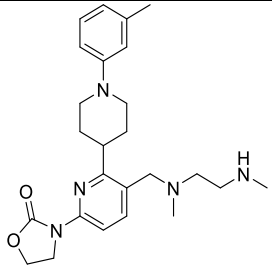
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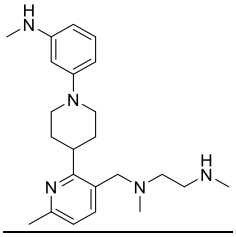
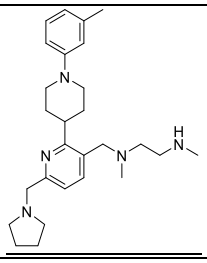
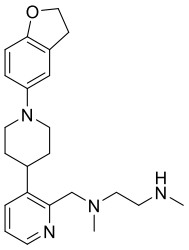
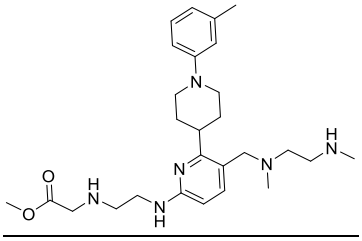
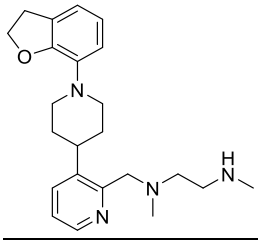
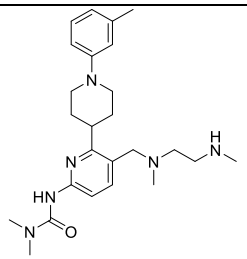
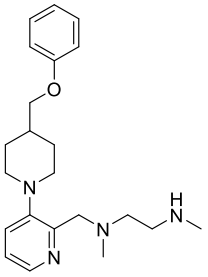
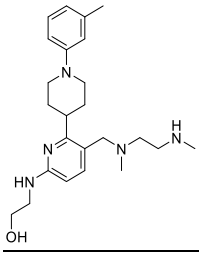
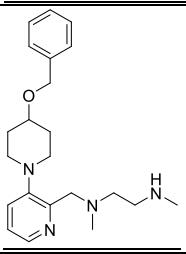
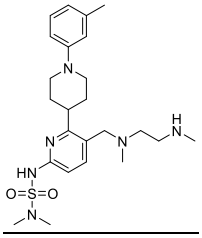
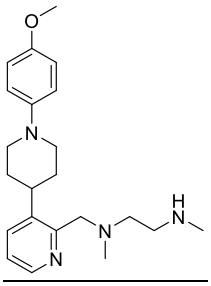
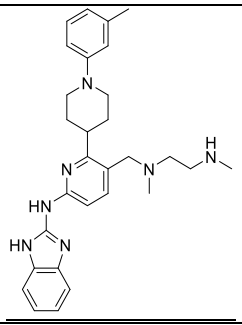
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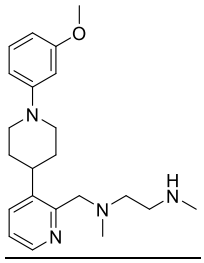
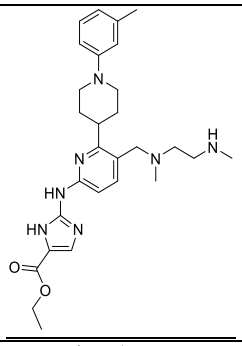
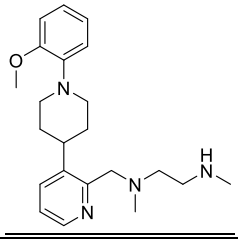
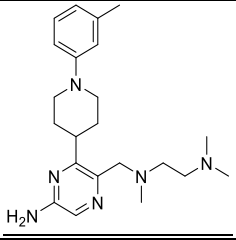
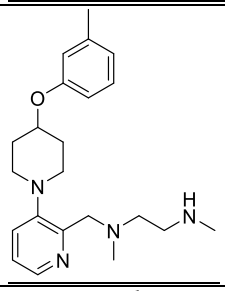
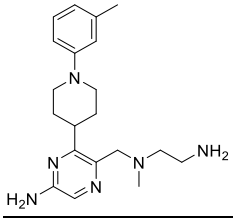
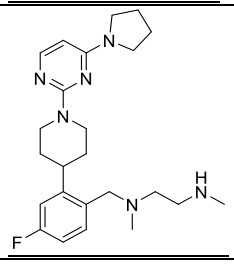
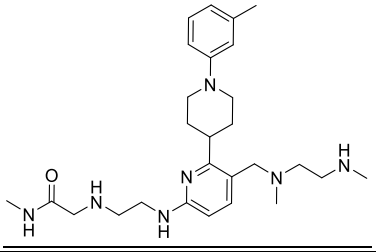
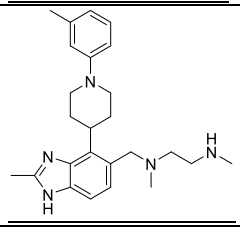
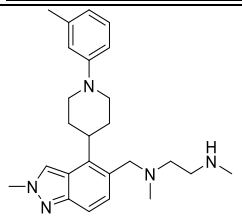
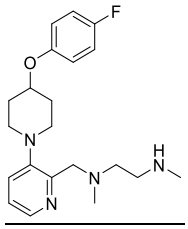
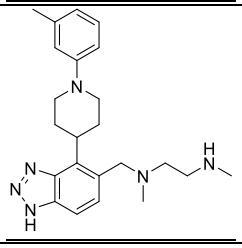
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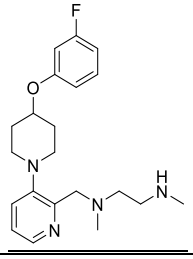
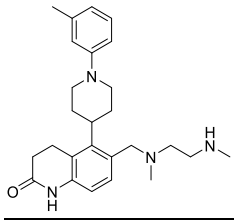
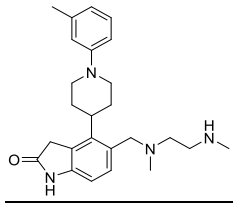
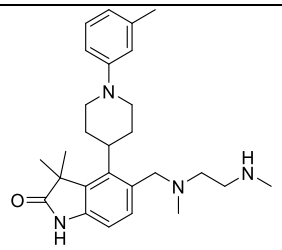
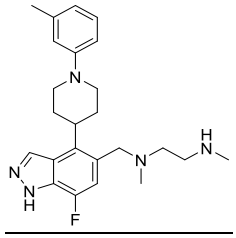
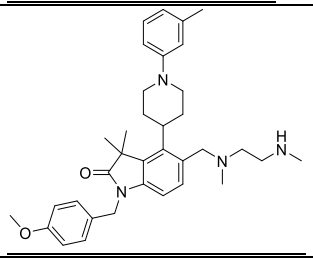
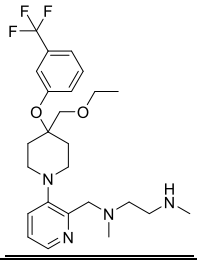
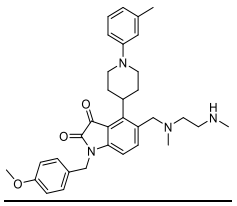
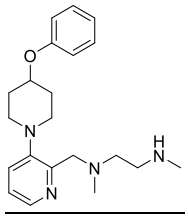
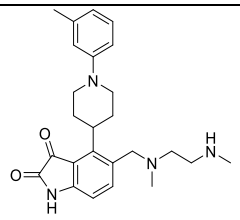
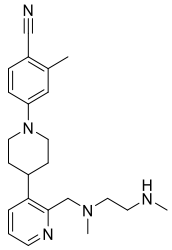
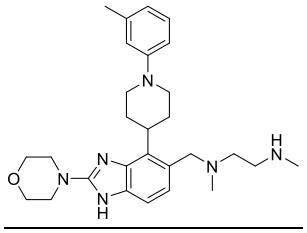
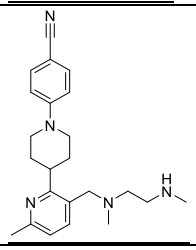
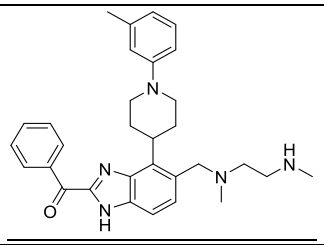
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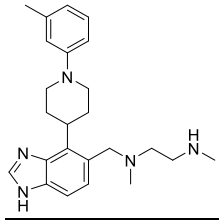
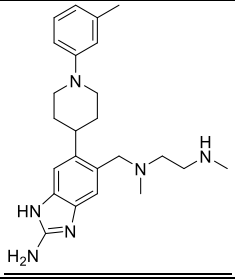
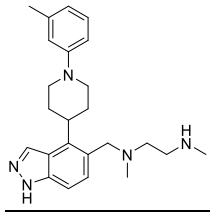
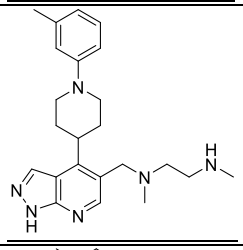
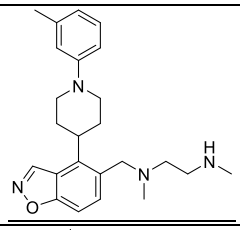
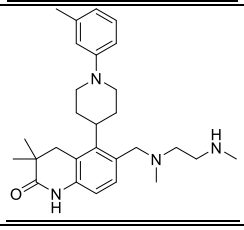
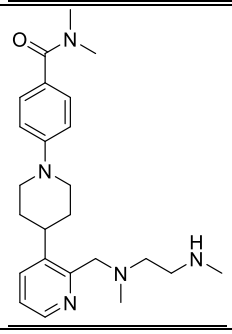
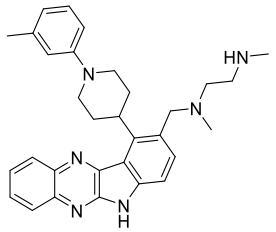
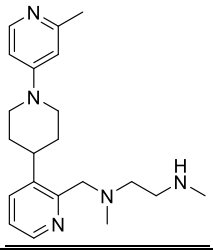
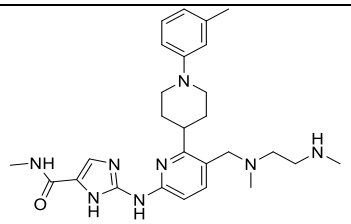
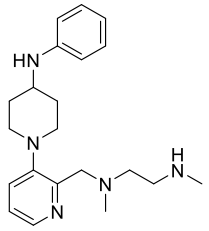
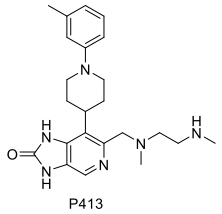
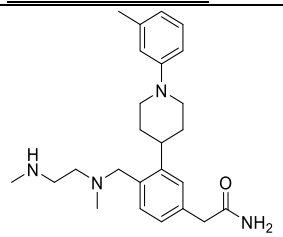
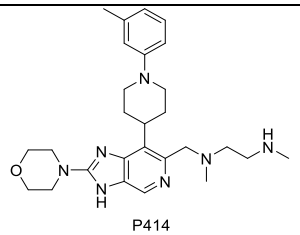
Patent ID	Structure	Patent ID	Structure
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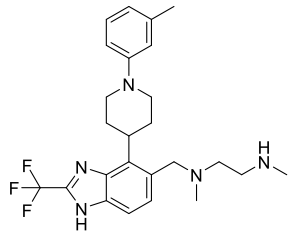
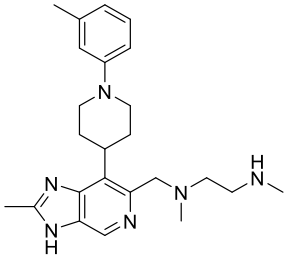
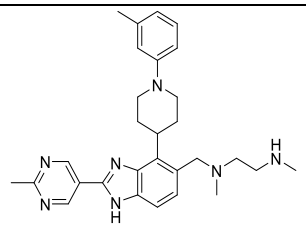
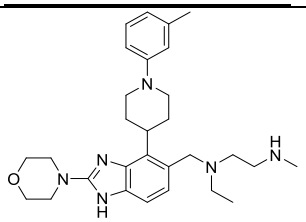
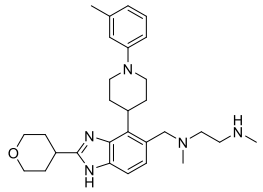
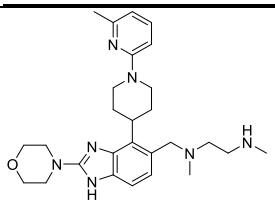
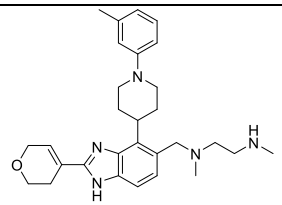
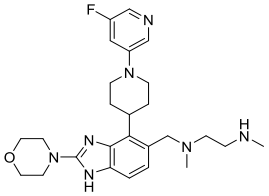
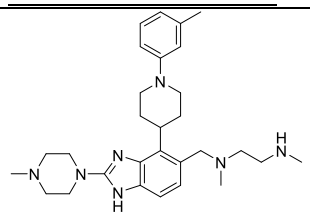
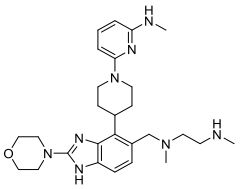
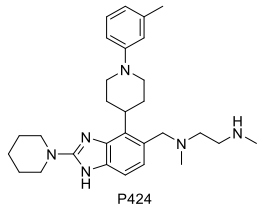
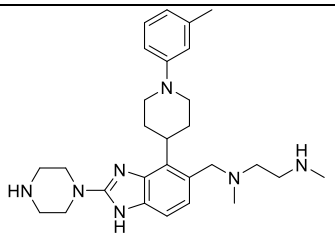
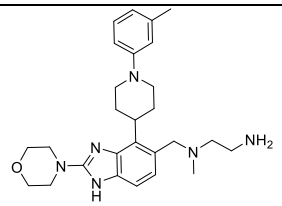
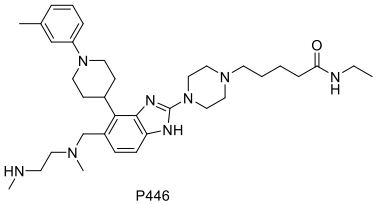
Patent ID	Structure	Patent ID	Structure
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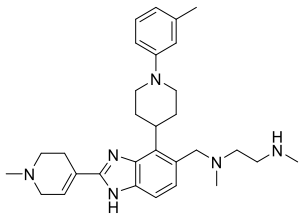
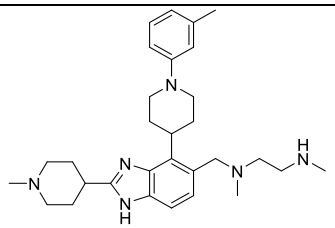
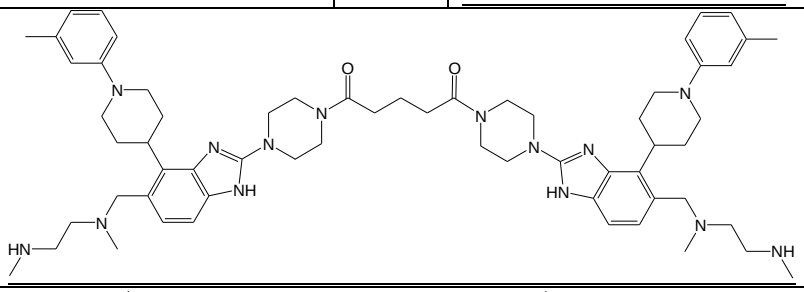
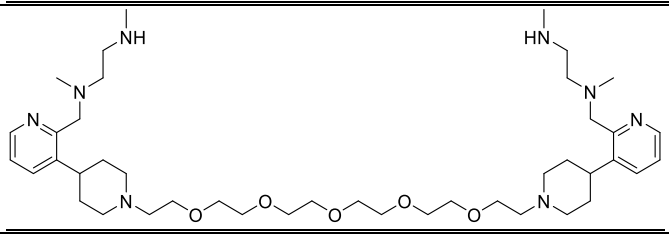
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P180		P402	
P183		P403	
P184		P404	
P185		P405	
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P190		P409	
P191		P410	
P192		P411	 P411
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P418	 P418	P426	 P426
P421	 P421	P428	 P428
P422	 P422	P429	 P429
P423	 P423	P438	 P438
P424	 P424	P440	 P440
P425	 P425	P446	 P446

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P442			
P257			

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13. A pharmaceutical composition, comprising a therapeutically effective amount of the compound of formula I according to claim 1, or a pharmaceutically acceptable salt thereof, and one or morepharmaceutically acceptable carriers, excipients, adjuvants, accessories and/or diluents.

~~15~~14. A use of a compound of formula I according to claim 1, or a pharmaceutically acceptable salt thereof, in the preparation of a pharmaceutical composition for the treatment or prevention of diseases associated with PRMT; preferably the PRMT is type I PRMT; more preferably, the disease is selected from the group consisting of tumor, cardiovascular disease, neurodegenerative disease, malaria, AIDS, gout, diabetes, renal failure, chronic lung disease, oculopharyngeal muscular dystrophy, cocaine addiction, pulmonary hypertension, amyotrophic lateral sclerosis, alcoholic cirrhosis, and viral infection.

15. The use of the claim 14, wherein the tumor is selected from any one of brain cancer, glioblastoma, leukemia, lymphoma, Bannayan-Zonana syndrome, Cowden disease, Lhermitte-Duclos disease, breast cancer, Wilms tumor, Ewing sarcoma, rhabdomyosarcoma, ependymoma, medulloblastoma, colon cancer, stomach cancer, bladder cancer, head and neck cancer, kidney cancer, lung cancer, liver cancer, melanoma, ovarian cancer, pancreatic cancer, prostate cancer, sarcoma, osteosarcoma, giant cell tumor of bone, and thyroid cancer.