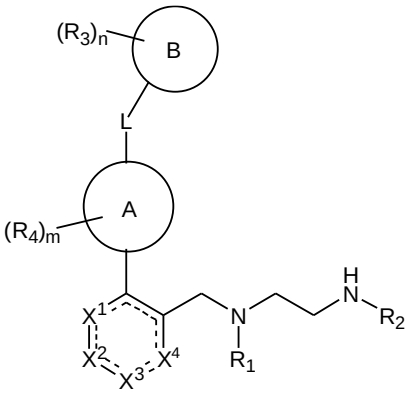
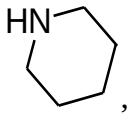
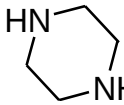
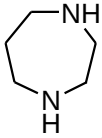
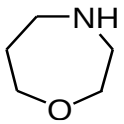
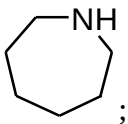
Claims

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' and N; the dash line is a chemical bond or absent;

ring A is 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;

ring B is selected from the group consisting of substituted or unsubstituted C_6-C_{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;

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-, S, -NH-, or L is absent;

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

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_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_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_1-C_6 amide, substituted or unsubstituted C_1-C_4 alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-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_6-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_6 alkyl-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_4 alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-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, or the carbocycle or heterocycle is a 5-9 membered carbocycle or heterocycle; and the carbocycle or heterocycle is saturated, partially unsaturated or aromatic;

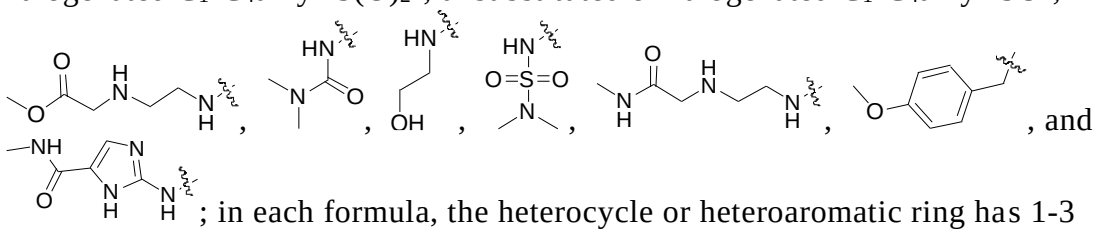
R^4 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6 alkyl, substituted or unsubstituted C_2-C_6 alkenyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted 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, C_1-C_6 alkyl;

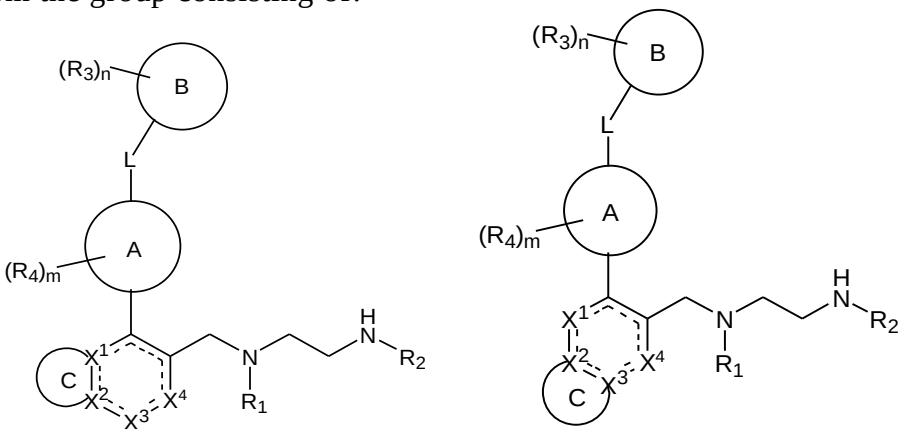
unless otherwise specified, in the above formulas, the “substituted” means that the hydrogen atom on the corresponding group is substituted by one or more substituents selected from the group consisting of: deuterium, tritium, halogen, hydroxyl, carboxyl, thiol, benzyl , oxo (=O), C_1-C_{12} alkoxycarbonyl, C_1-C_6 aldehyde group, amino, C_1-C_6 amide, nitro, cyano, unsubstituted or halogenated C_1-C_6 alkyl, C_2-C_{10} alkenyl, C_1-C_6 alkoxy, C_1-C_6 alkyl-amino, C_1-C_6 alkyl-sulfonamide, C_1-C_6 alkyl-ureido, C_1-C_6 alkyl-S-, C_6-C_{10} aryl, five- or six-membered heteroaryl, five- or six-membered non-aromatic heterocyclylC_1-C_{12} alkylaminocarbonyl, unsubstituted or halogenated C_2-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-,



; 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_6 alkoxy.

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_6 alkyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted C_1-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_8 carbocycle, substituted or unsubstituted C_2-C_6acyl, substituted or unsubstituted C_2-C_6 ester group, 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_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_6 alkyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted C_1-C_6 alkylamino, 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_1-C_6 alkyl-phenyl, substituted or unsubstituted C_3-C_8 carbocycle, substituted or unsubstituted C_2-C_6 acyl, substituted or unsubstituted C_2-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_6 alkyl-phenyl, substituted or unsubstituted C_1-C_4 alkyl-$S(O)_2$-, and substituted or unsubstituted C_1-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;

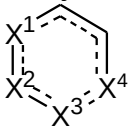
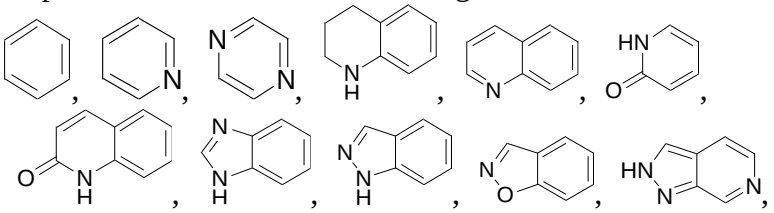
or two R located on adjacent ring atoms together with the carbon atoms to which they attached form a substituted or unsubstituted 5-9 membered carbocycle or heterocycle, and the ring is partially unsaturated, saturated or aromatic.

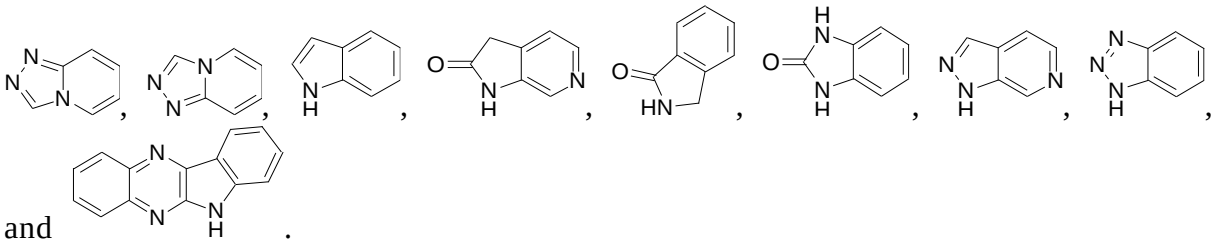
4. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein, ring B is selected from the group consisting of: substituted or unsubstituted phenyl, substituted or unsubstituted 5-10 membered heteroaromatic ring.

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_6 alkyl, substituted or unsubstituted C_1-C_6 alkoxy, substituted or unsubstituted C_1-C_6 alkylamino, substituted or unsubstituted C_2-C_6 acyl, substituted or unsubstituted C_2-C_6 ester group, 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_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.

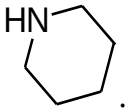
6. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein R^4 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6 alkyl.

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: 

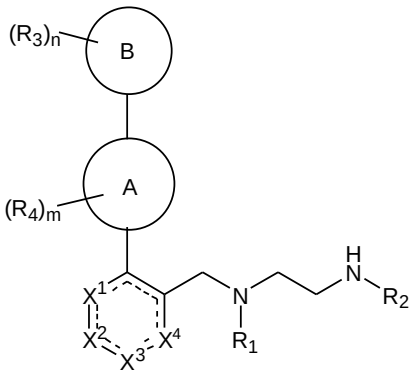

and .

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, 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.

9. The compound according to claim 1, or a pharmaceutically acceptable salt thereof, or a deuterated compound thereof, wherein ring A is a substituted or unsubstituted

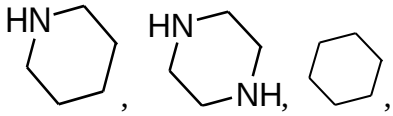
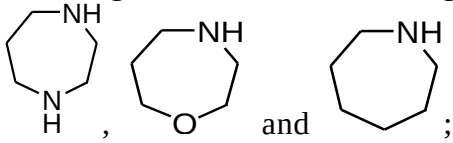
.

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,

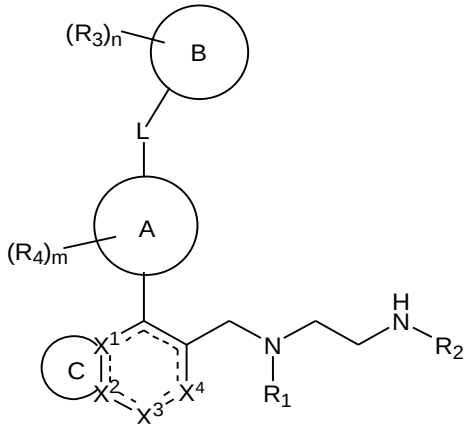
ring A is selected from the group consisting of , ; wherein, when the connection site connected to other structural fragments or substituents is NH, the hydrogen atom on NH is lost to form the connection site;

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.

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 V:

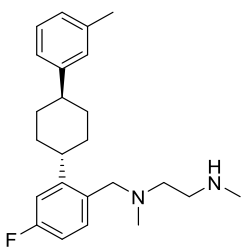
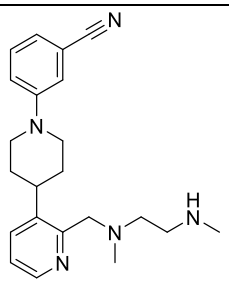


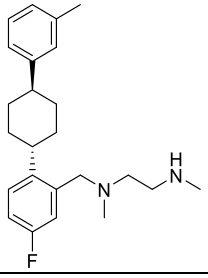
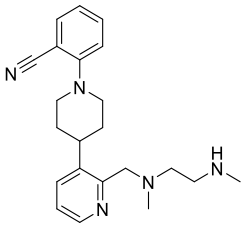
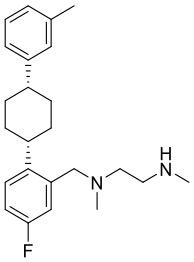
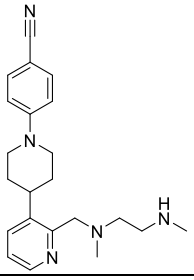
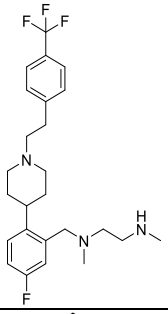
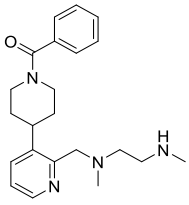
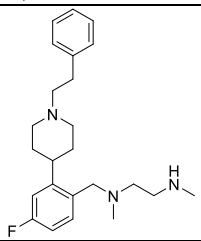
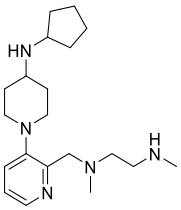
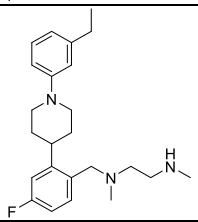
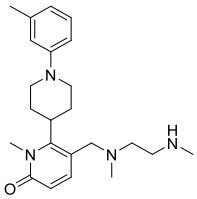
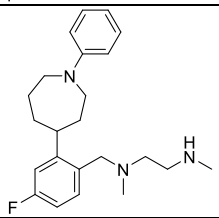
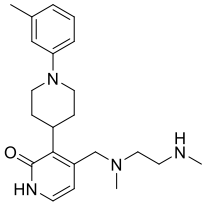
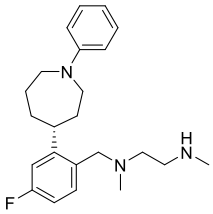
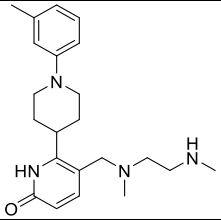
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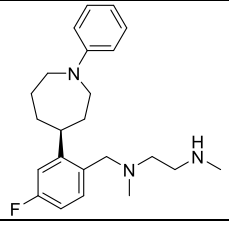
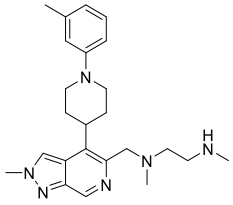
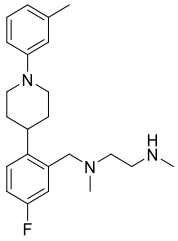
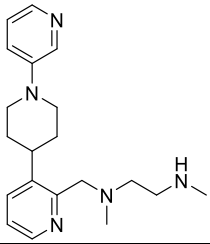
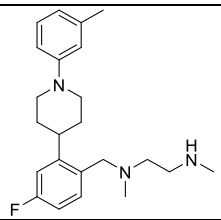
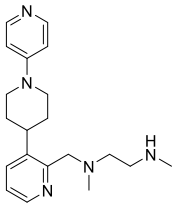
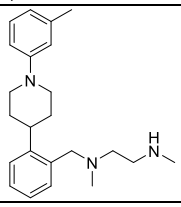
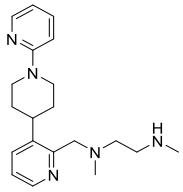
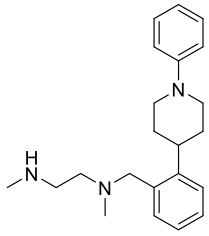
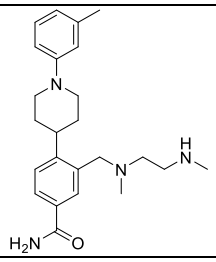
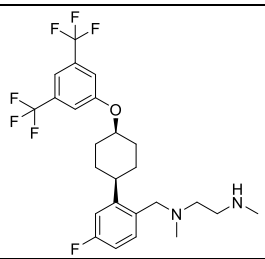
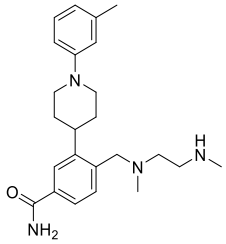
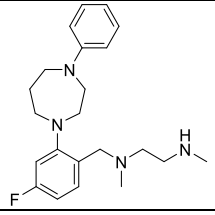
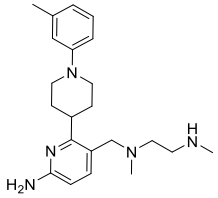
preferably, R^3 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino, substituted or 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-;

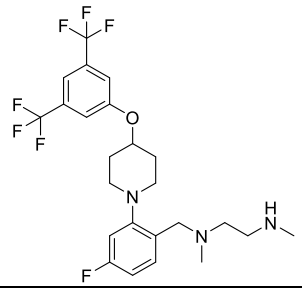
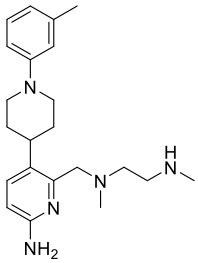
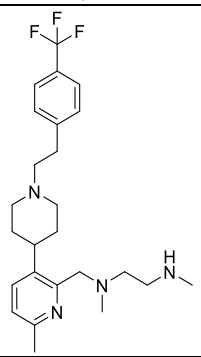
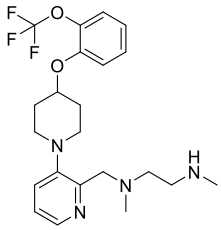
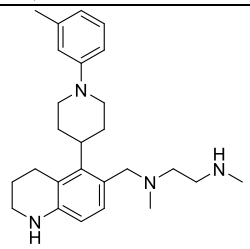
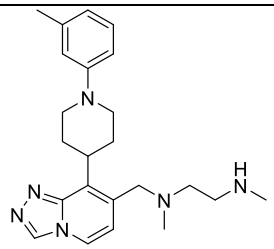
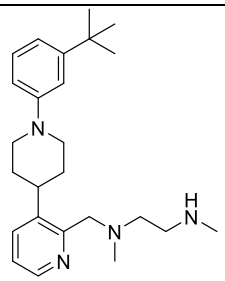
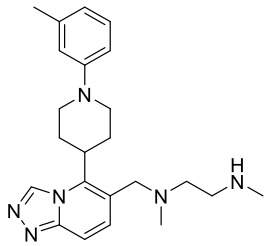
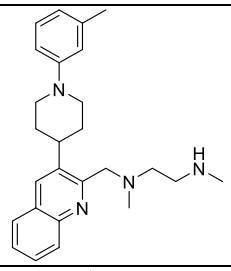
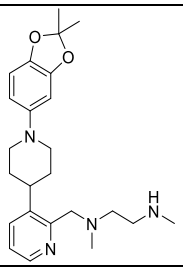
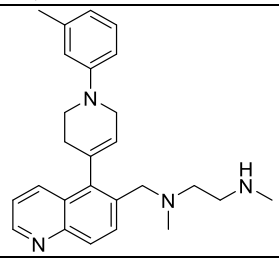
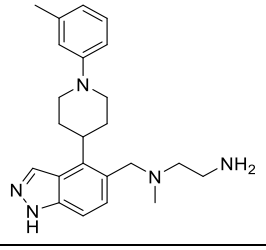
preferably, R^4 is a group selected from the group consisting of H, halogen, cyano, amino, nitro, hydroxyl, thiol, aldehyde group, carboxyl, sulfonyl, substituted or unsubstituted C_1-C_6alkyl, substituted or unsubstituted C_1-C_6alkoxy, substituted or unsubstituted C_1-C_6alkylamino.

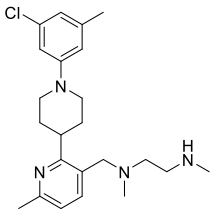
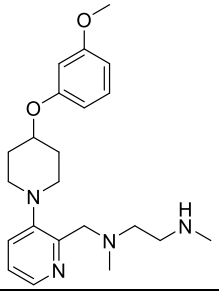
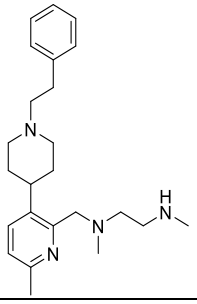
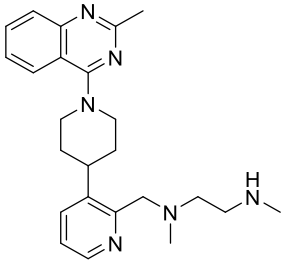
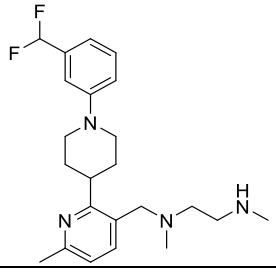
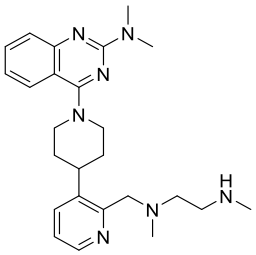
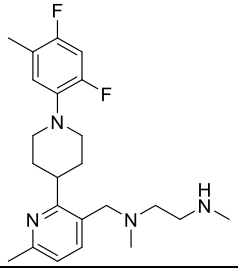
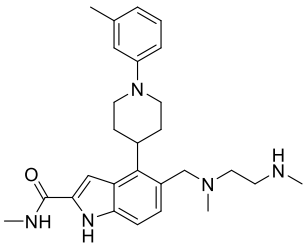
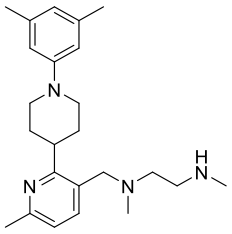
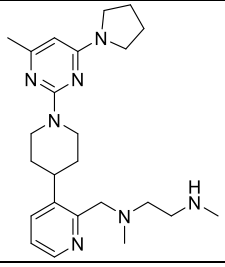
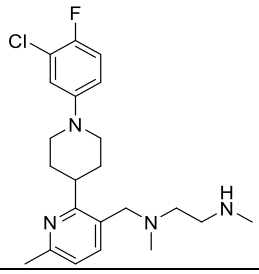
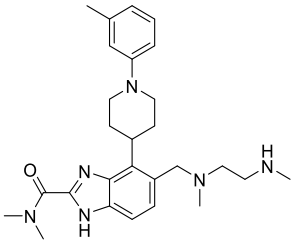
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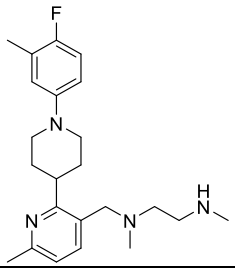
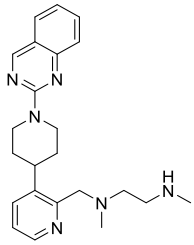
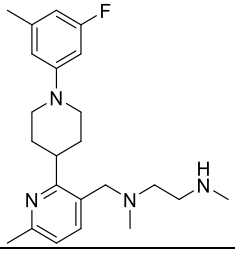
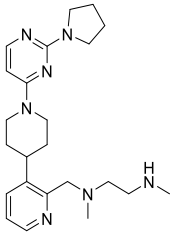
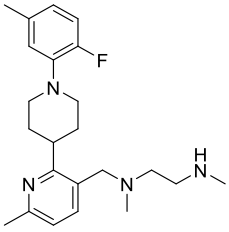
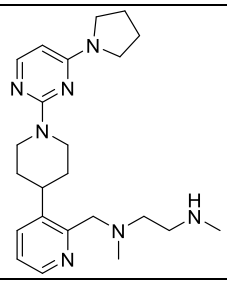
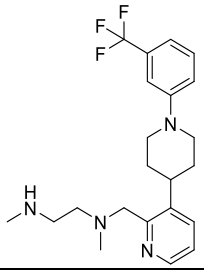
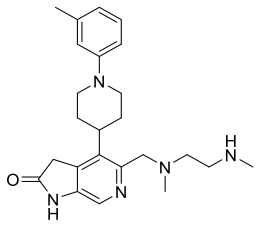
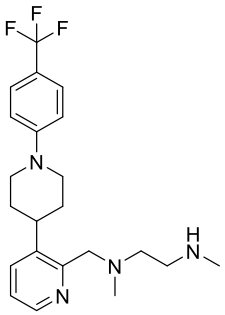
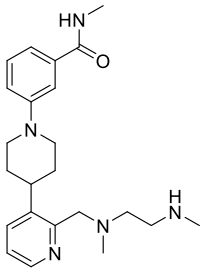
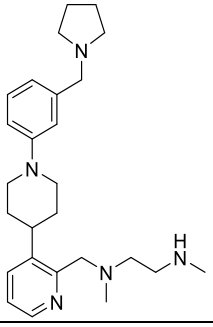
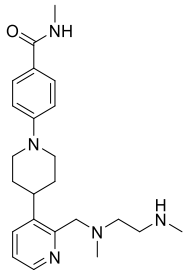
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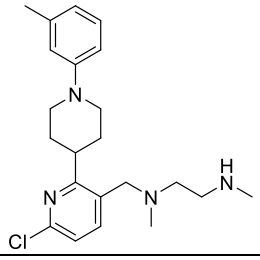
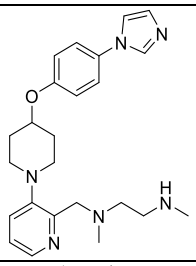
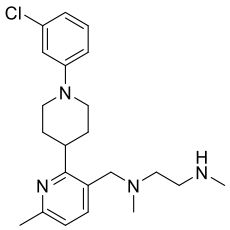
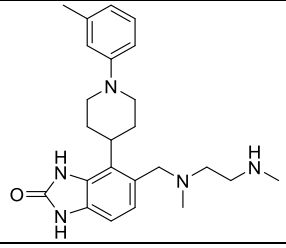
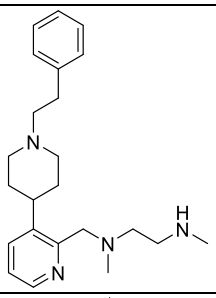
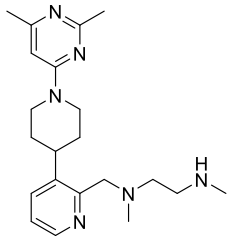
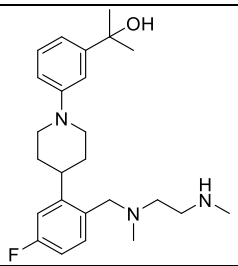
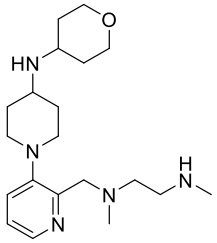
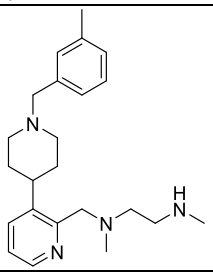
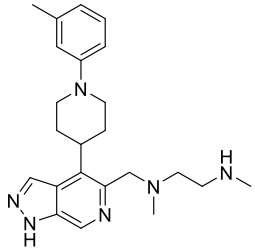
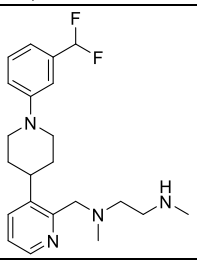
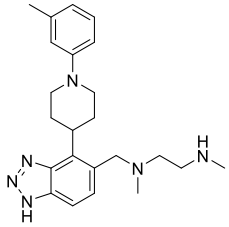
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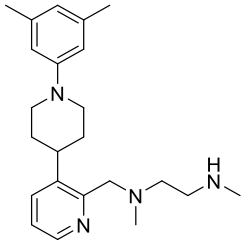
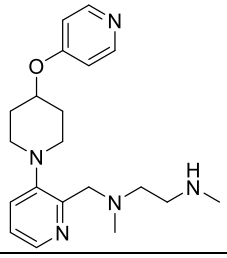
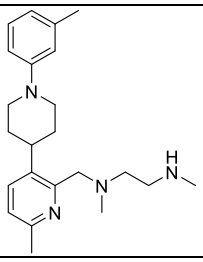
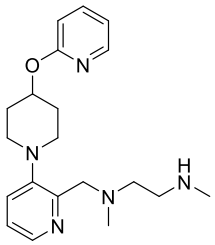
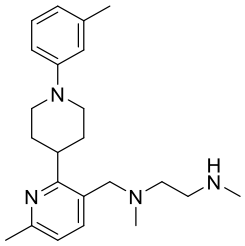
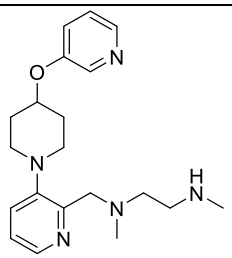
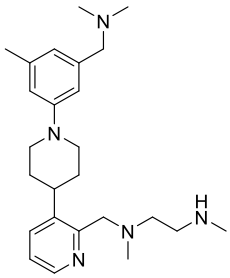
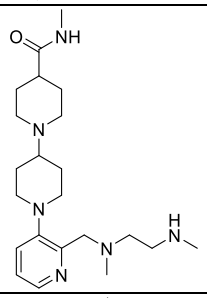
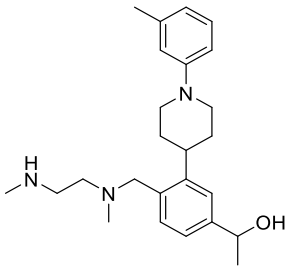
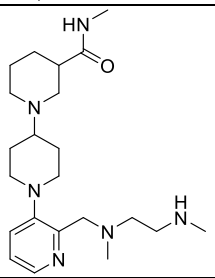
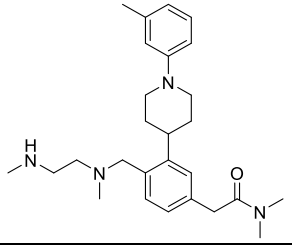
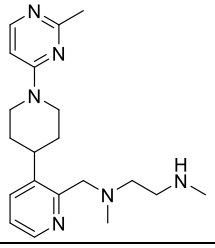
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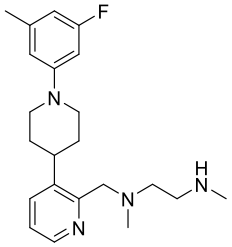
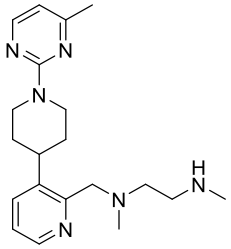
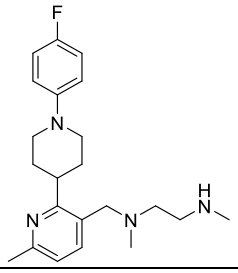
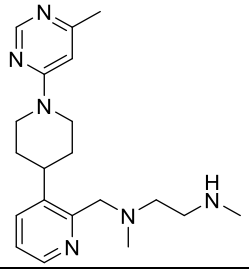
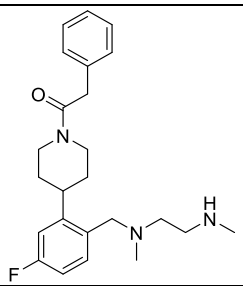
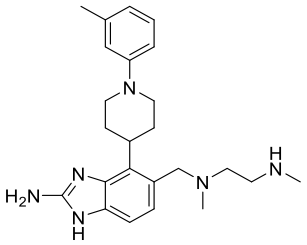
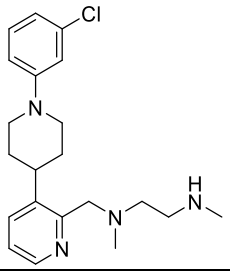
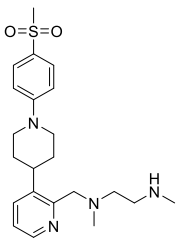
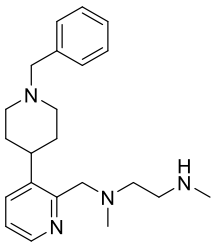
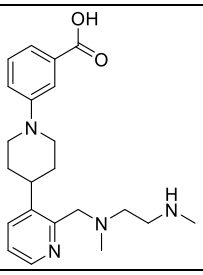
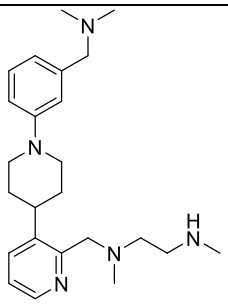
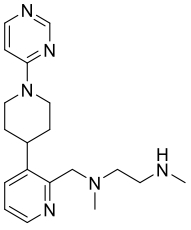
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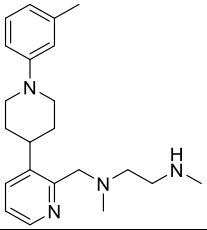
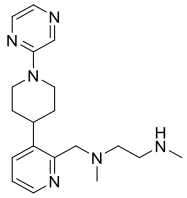
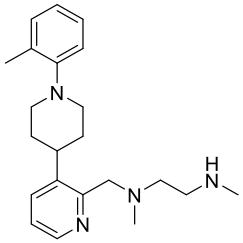
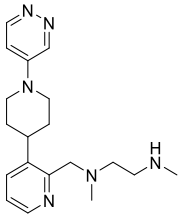
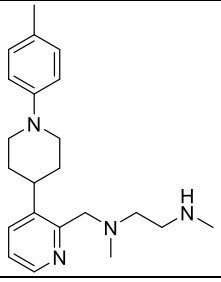
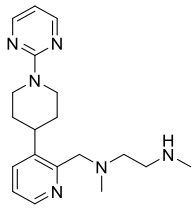
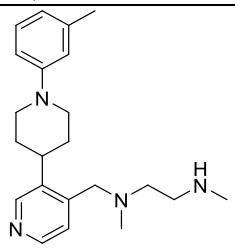
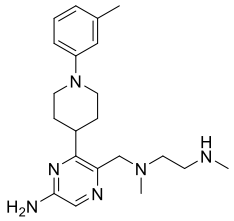
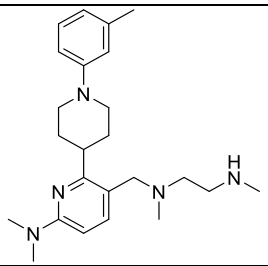
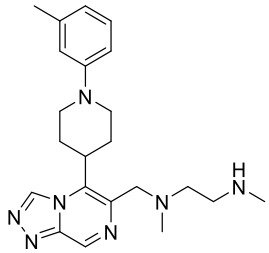
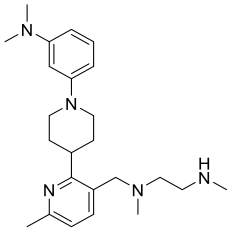
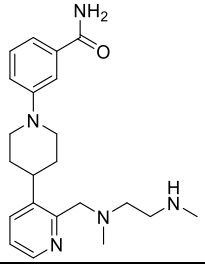
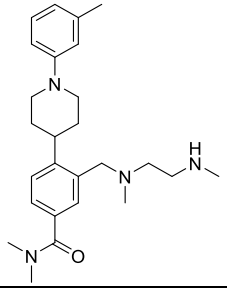
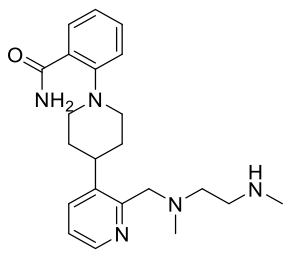
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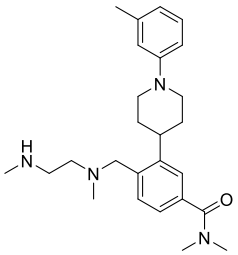
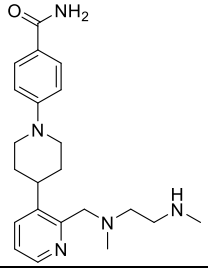
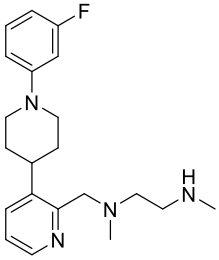
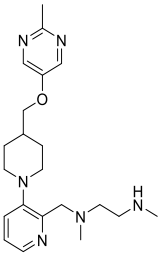
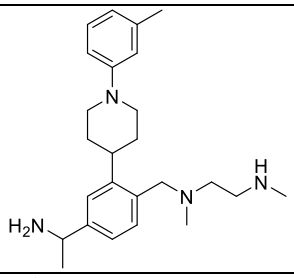
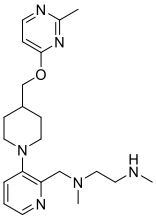
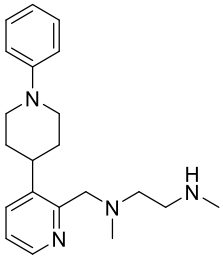
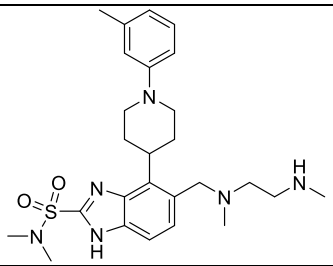
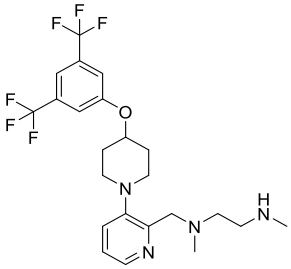
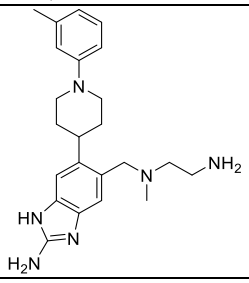
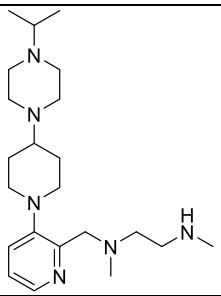
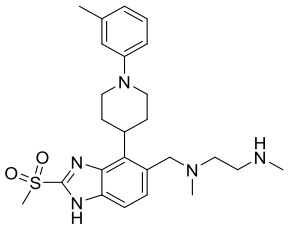
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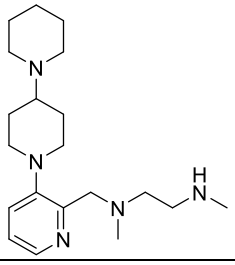
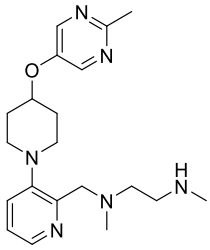
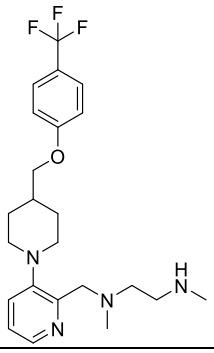
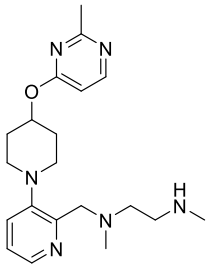
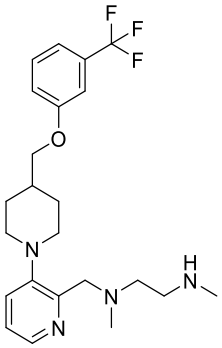
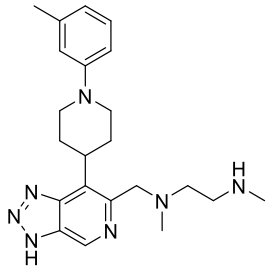
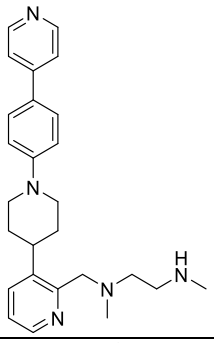
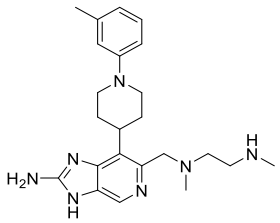
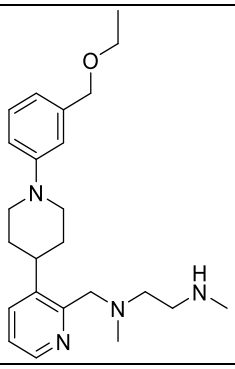
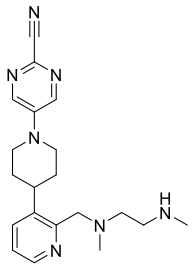
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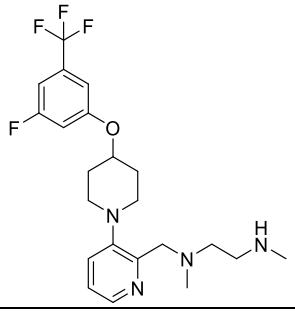
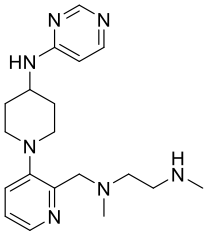
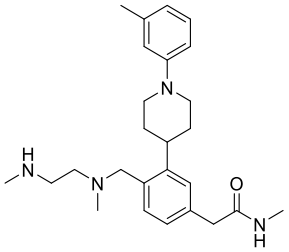
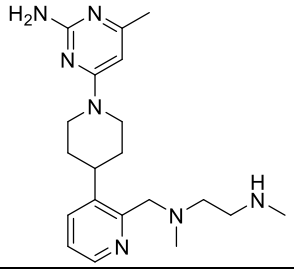
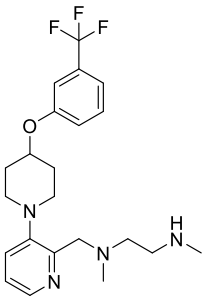
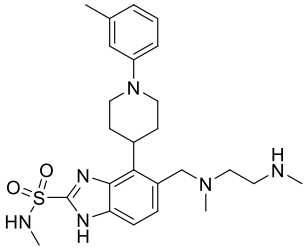
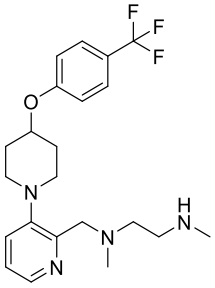
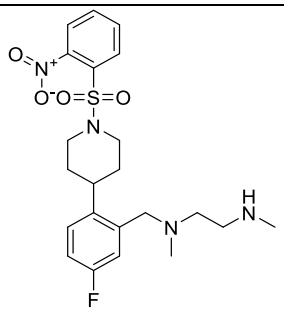
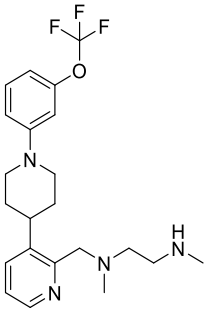
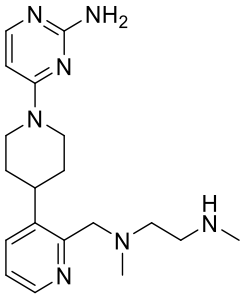
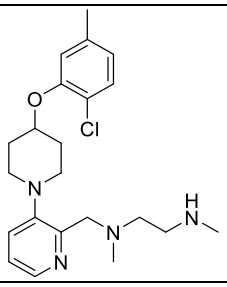
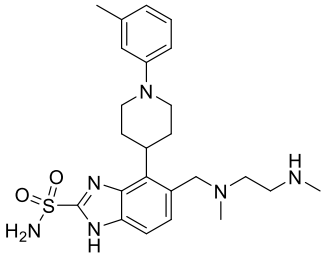
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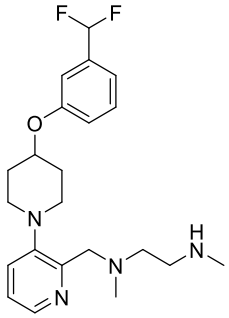
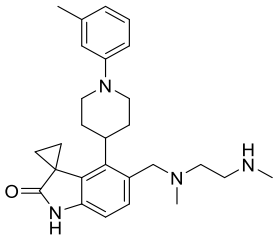
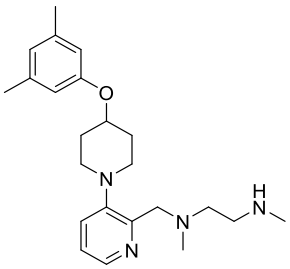
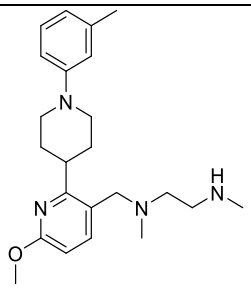
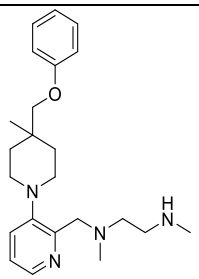
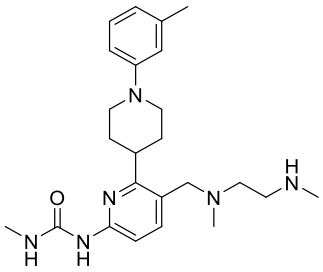
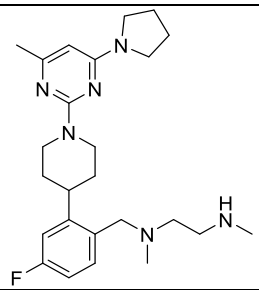
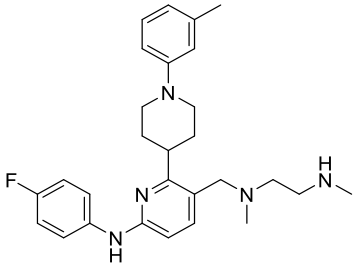
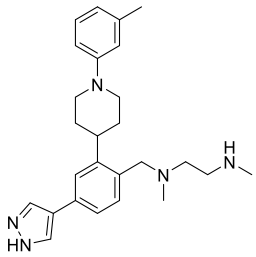
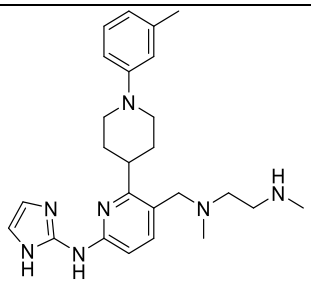
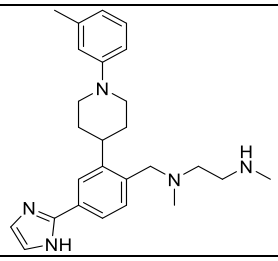
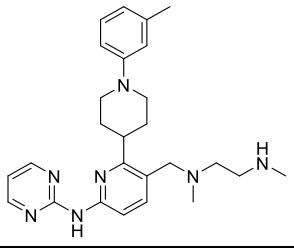
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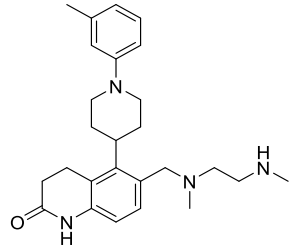
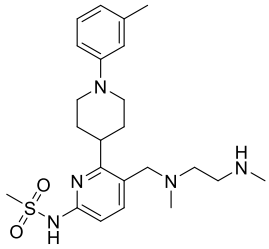
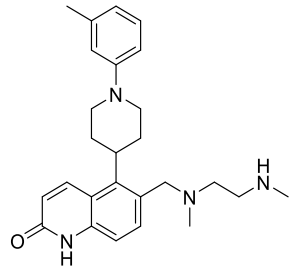
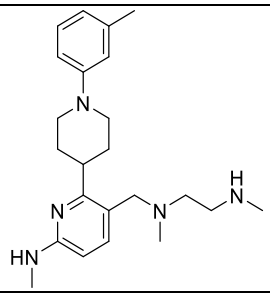
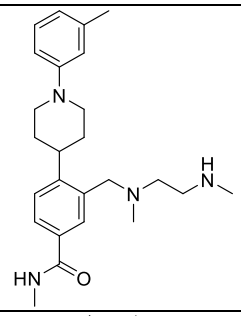
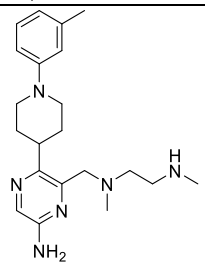
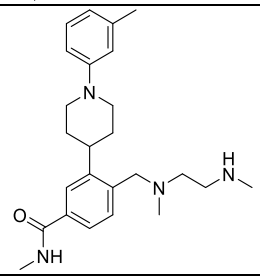
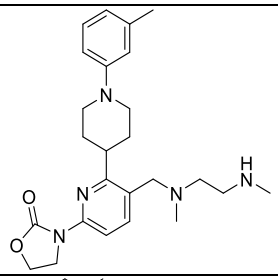
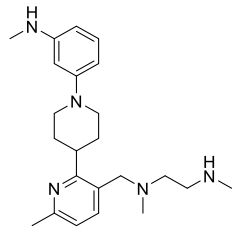
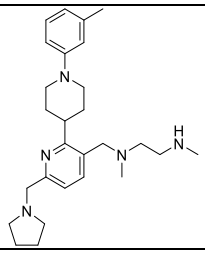
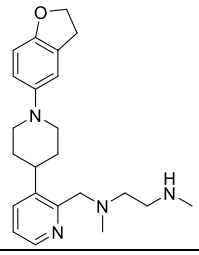
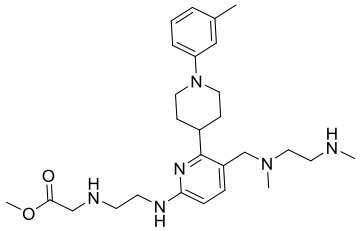
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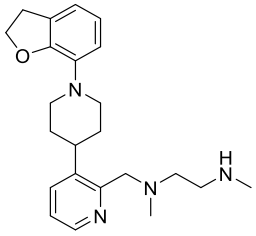
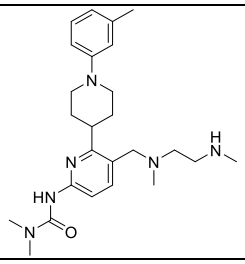
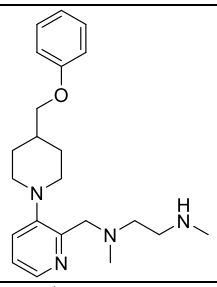
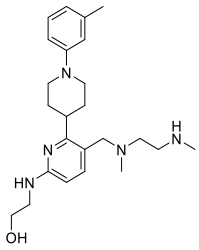
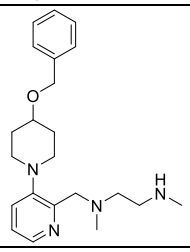
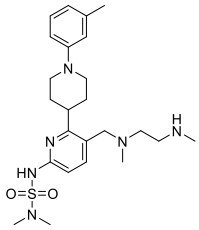
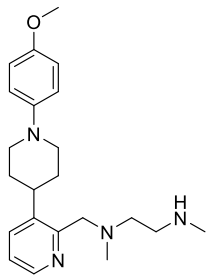
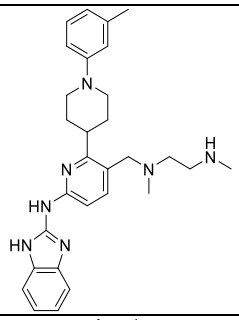
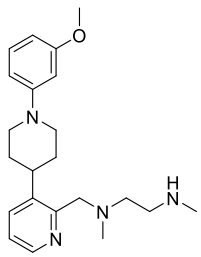
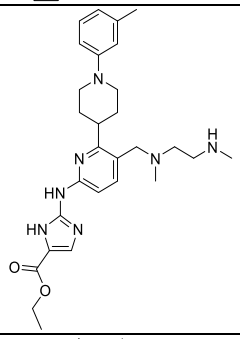
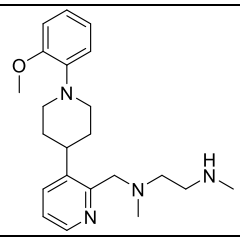
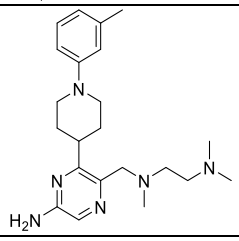
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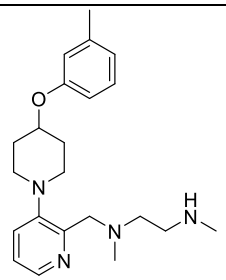
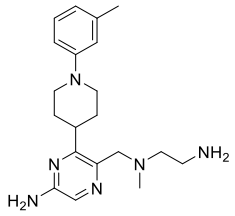
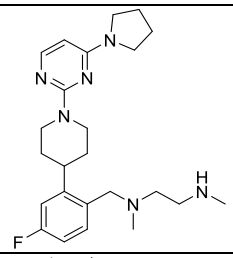
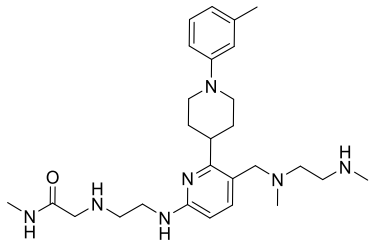
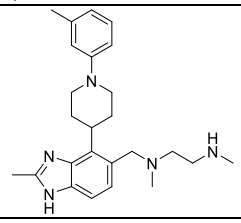
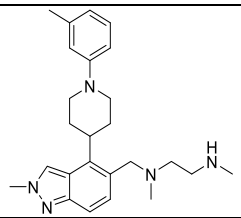
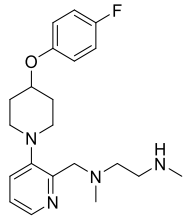
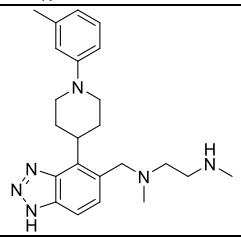
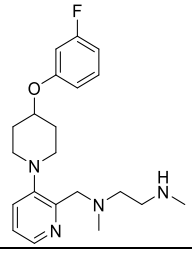
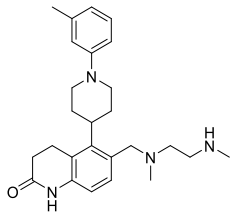
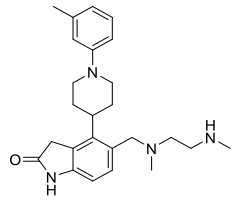
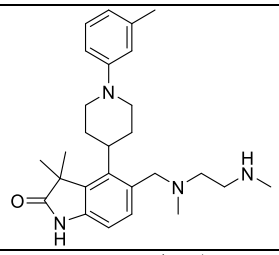
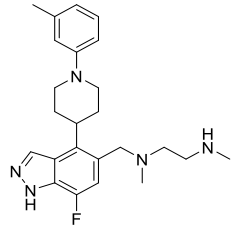
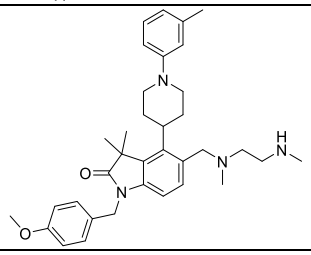
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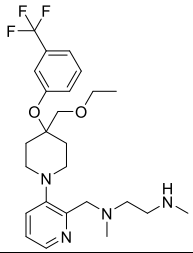
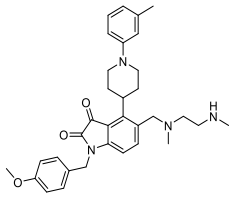
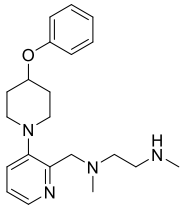
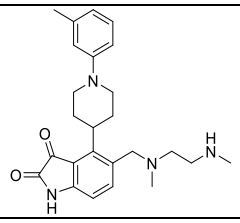
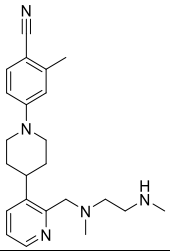
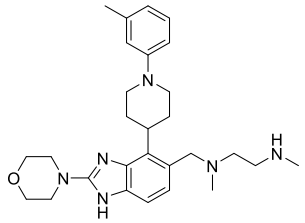
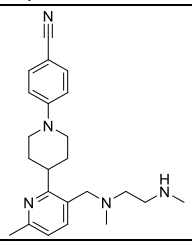
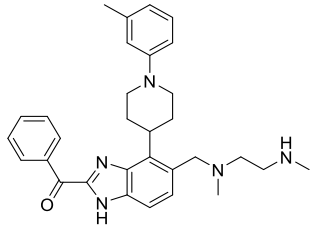
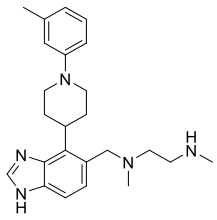
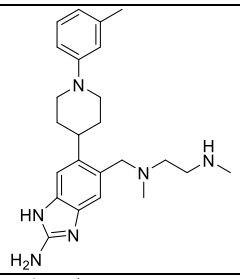
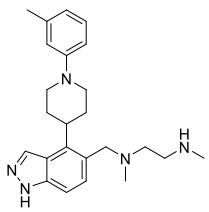
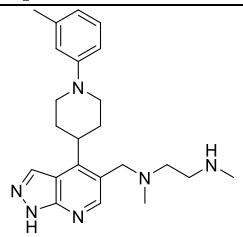
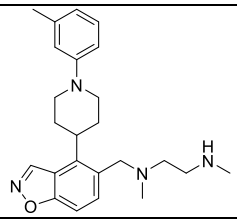
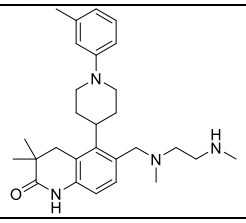
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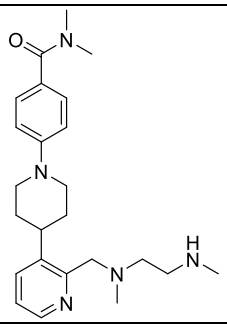
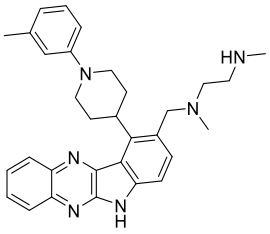
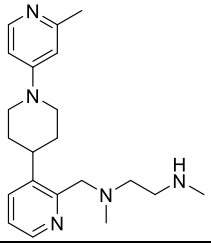
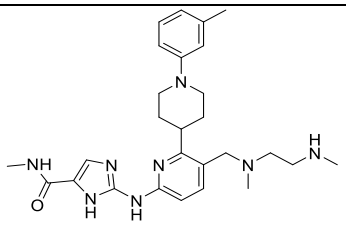
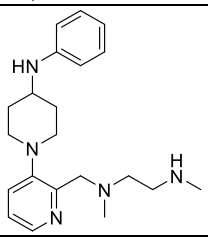
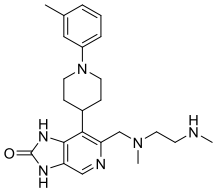
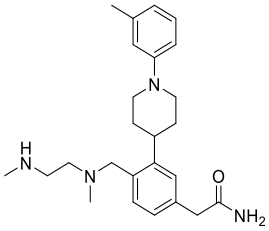
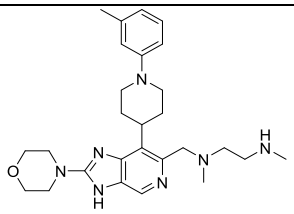
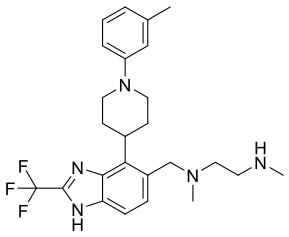
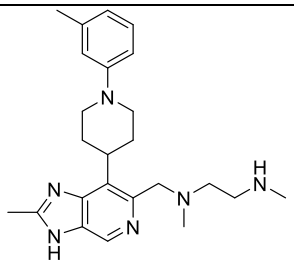
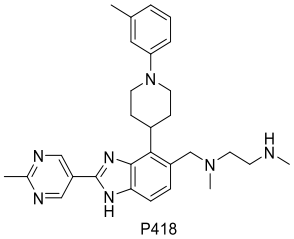
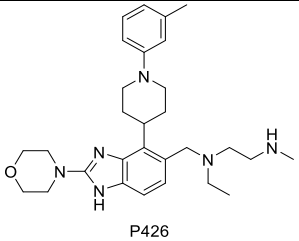
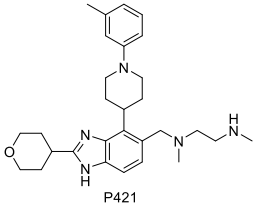
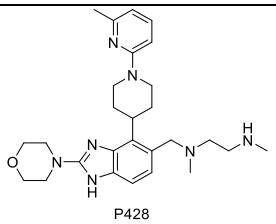
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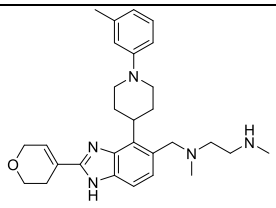
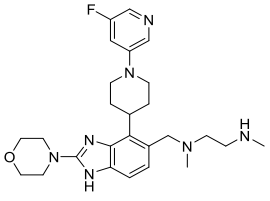
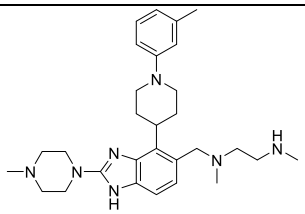
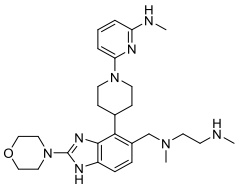
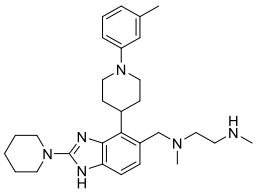
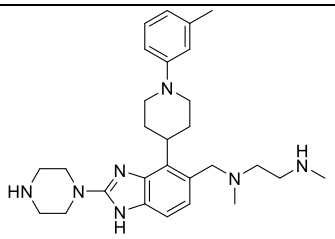
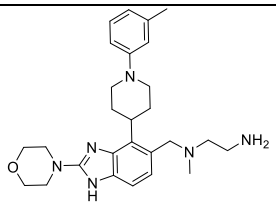
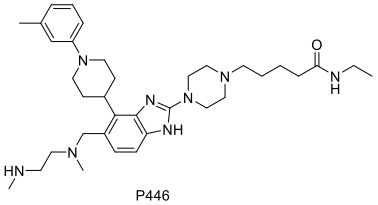
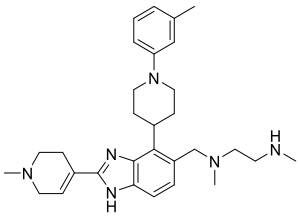
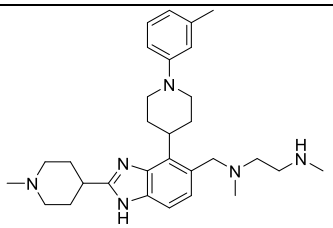
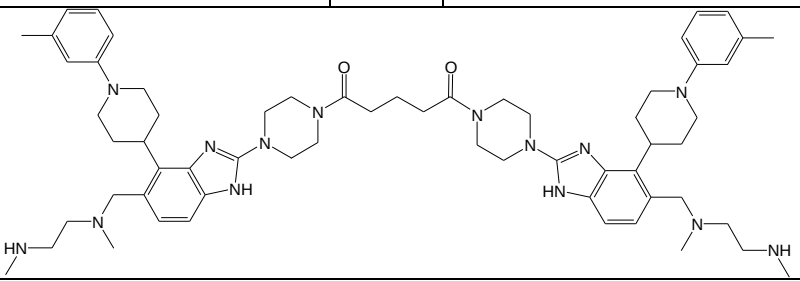
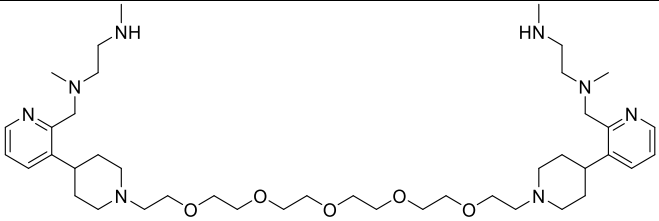
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Patent _ID	Structure	Patent _ID	Structure
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P176		P401	
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Patent _ID	Structure	Patent _ID	Structure
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Patent _ID	Structure	Patent _ID	Structure
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P195		P414	 P414
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P421	 P421	P428	 P428

Patent _ID	Structure	Patent _ID	Structure
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P423	 P423	P438	 P438
P424	 P424	P440	 P440
P425	 P425	P446	 P446
P447	 P447	P448	 P448
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.

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.