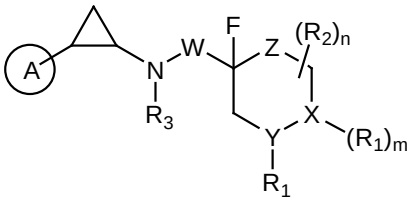
Claims

1. A fluorine-substituted cyclopropylamine compound having a structure represented by the following general formula I, and a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof:



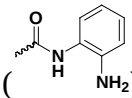
Formula I

wherein:

A is selected from the group consisting of a substituted or unsubstituted aromatic ring (preferably benzene ring), or a substituted or unsubstituted 5-12 membered aromatic heterocyclic ring containing 1 to 4 heteroatoms selected from the group consisting of oxygen, sulfur and nitrogen, wherein each of the substituted benzene ring or substituted aromatic heterocycles comprises 1 to 3 substituents;

Wherein the substituent on the substituted aromatic ring or substituted aromatic heterocyclic ring is independently selected from hydrogen, isotope of hydrogen, halogen, an unsubstituted or substituted C1-C12 straight or branched alkyl, unsubstituted or substituted C1-C12 straight or branched alkoxy, unsubstituted or substituted C2-C12 straight or branched unsaturated hydrocarbon group, unsubstituted C3-C6 cycloalkyl, C1-C6 straight or branched alkyl substituted by C1-C6 alkoxy, C1-C6 straight or branched alkyl substituted by C3-C6 cycloalkyl, hydroxy, cyano, nitro, C1-C6 straight or branched hydroxyalkyl or thiol, oxygen (=O), unsubstituted or substituted C6-C12 aryl (such as phenyl, naphthyl), unsubstituted or substituted C6-C12 aryloxy (such as phenyl, naphthyl), unsubstituted or substituted phenyloxy, carboxyl, acyl (such as acetyl), and sulfonyl (including phenylsulfonyl, alkylsulfonyl); the substituent is selected from the group consisting of halogen, a C1-C4 straight or branched alkyl, halogen-substituted C1-C4 straight or branched alkyl, C1-C4 alkyloxy, cyano-substituted phenyl;

or any two substituents on the substituted aromatic ring or substituted aromatic heterocyclic ring may be linked together with their adjacent carbon or hetero atom to form a 5-7 membered heterocyclic ring comprising 1 to 3 heteroatoms selected from N, O or S, and the 5-7 membered heterocyclic ring is optionally substituted by substituents selected from the group consisting of hydrogen, hydrogen isotope, halogen, C1-C6 straight or branched alkyl unsubstituted or substituted with 1-3 halogens, C1-C6 straight or branched alkoxy unsubstituted or substituted by 1 to 3 halogens, and hydroxyl;

each R_1 is independently selected from the group consisting of a substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, hydrogen, substituted or unsubstituted C1-C6 alkyl, $-SO_2Ra$, -NC(O)Ra, $-(CH_2)_mC(O)ORa$, $-C(O)O(CH_2)_m$ Ra, -C(O)ORa, -C(O)Ra, $-(CH_2)_mORa$, -C(O)NRaRb,- C(S)NRaRb, -CORa, -NRcRd, substituted or unsubstituted amino, substituted or unsubstituted urea, substituted or unsubstituted amide, substituted or unsubstituted sulfonamide, substituted or unsubstituted arylalkyl and substituted or unsubstituted heteroarylalkyl, wherein m is an integer from 1 to 3; the substituent is selected from the group consisting of halogen, hydroxy, carboxyl, cyano, amino, C1-C4 alkyl, halogen-substituted C1-C4 alkyl, C1-C4 alkyl ester group, C1-C4 alkylsulfonyl, aminophenylamide (), arylalkyl, and aryl;

each Ra is independently hydrogen, a substituted or unsubstituted phenyl, substituted or unsubstituted phenylmethyl, 3,5-dimethylisoxazol-4-yl, 1,2-dimethyl-1H-imidazol-4-yl, substituted or unsubstituted C3-C7 cycloalkyl, substituted or unsubstituted C3-C7 heterocyclic group, substituted or unsubstituted C3-C7 heterocycloalkyl, substituted or unsubstituted C1-C6 alkyl, substituted or unsubstituted C1-C6 alkenyl, substituted or unsubstituted C1-C4 alkoxy, substituted or unsubstituted C1-C3 alkylamino, -NHPh, substituted or unsubstituted 5-10 membered heteroaryl, substituted or unsubstituted arylalkyl, and substituted or unsubstituted heteroarylalkyl; the substituent is selected from the group consisting of : a C1-C4 alkyl, halogen-substituted C1-C4 alkyl, phenyl-substituted C1-C4 alkyl, C1-C4 alkyl ester group, C3-C7 cyclic group, C3-C7 cyclic group alkyl, C3-C7 heterocyclic group, benzyl-substituted C3-C7 heterocycloalkyl, aryl, halogen, C1-C4 alkoxy, C1-C4 halogenoalkyl, carboxyl, and a carboxyl-substituted benzyl group;

Rb is hydrogen or a C1-C3 alkyl, or when attached to the same atom,

Ra and Rb together form a 5- or 6-membered heterocycloalkyl ring;

Rc and Rd are each independently selected from hydrogen, a substituted or unsubstituted C1-C3 straight or branched alkyl, substituted or unsubstituted C3-C5 cycloalkyl, substituted or unsubstituted C1-C3 alkoxy, substituted or unsubstituted 4- to -6-membered heterocyclic group, substituted or unsubstituted C1-C3 alkylacyl, substituted or unsubstituted arylacyl, substituted or unsubstituted arylsulfonyl, substituted or unsubstituted benzyl, substituted or unsubstituted aryl; the C1-C3 straight or branched alkyl is optionally substituted by one or more selected from the group consisting of methylsulfonyl, a C1-C3 alkoxy, C1-C3 alkoxycarbonyl group, aryl; and the heterocyclic group contains one heteroatom selected from the group consisting of oxygen, sulfur and nitrogen; the substituent is selected from the group consisting of : C_{1-8} alkyl, C_{2-8} alkenyl, C_{1-8} alkylnyl, C_{3-8} cycloalkyl, 3- to 12-membered heterocyclic group, aryl, heteroaryl, halogen, hydroxy, carboxy (-COOH), C_{1-8} aldehyde group, C_{2-10} acyl, C_{2-10} ester group, amino, alkoxy, C_{1-10} sulfonyl;

R_2 is hydrogen or COOH;

R_3 is a C1-C4 alkyl, acyl, $-C(O)CF_3$ or hydrogen;

W is $-(CH_2)_{1-4}$ or $-CH(Re)(CH_2)_{0-3}$, wherein Re is CN or C1-C4 alkyl;

Y isCH;

X is N; m is 1;

Z is $(CH_2)_q$, wherein q is 0-2, and when q is 0, Z represents a bond;

n is 0-3.

2. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein A is a substituted or unsubstituted benzene ring, or a substituted or unsubstituted 5-12 membered aromatic heterocyclic ring containing 1 to 4 heteroatoms selected from the group consisting of oxygen, sulfur and nitrogen, wherein each of the substituted benzene ring or substituted aromatic heterocycles comprises 1 to 3 substituents;

wherein the substituent on the substituted aromatic ring or substituted aromatic heterocyclic ring is independently selected from the group consisting of hydrogen, hydrogen isotope, halogen, carboxyl, nitro, a C1-C4 alkyl, C1-C4 alkanoyl, C1-C4 alkoxy, cyano, oxygen (=O), sulfonyl.

3. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein each R_1 is independently selected from: a substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, hydrogen, substituted or unsubstituted C1-C4 alkyl, $-SO_2Ra$, $-NC(O)Ra$, $-(CH_2)_mC(O)ORa$, $-C(O)ORa$, $-C(O)Ra$, $-(CH_2)_mORa$, $-C(O)NRaRb$, $-NRcRd$, substituted or unsubstituted arylalkyl, and substituted or unsubstituted heteroarylalkyl, wherein m is an integer of 1-3;

each Ra is independently hydrogen, a substituted or unsubstituted phenyl, substituted or unsubstituted phenylmethyl, substituted or unsubstituted C3-C7 cycloalkyl, substituted or unsubstituted C1-C4 alkyl, substituted or unsubstituted C1-C4 alkenyl, substituted or unsubstituted C1-C4 alkoxy, substituted or unsubstituted C1-C3 alkylamino, -NHPh, or substituted or unsubstituted 5-10 membered heteroaryl;

Rb is hydrogen or C1-C3 alkyl;

Rc and Rd are each independently selected from hydrogen, a C1-C3 straight or branched alkyl, substituted or unsubstituted C3-C5 cycloalkyl, substituted or unsubstituted C1-C3 alkoxy, substituted or unsubstituted 4- to -6-membered heterocyclic group, substituted or unsubstituted C1-C3 alkylacyl, substituted or unsubstituted arylacyl, substituted or unsubstituted arylsulfonyl, substituted or unsubstituted benzyl, substituted or unsubstituted aryl; the heterocyclic group contains one heteroatom selected from the group consisting of oxygen, sulfur and nitrogen;

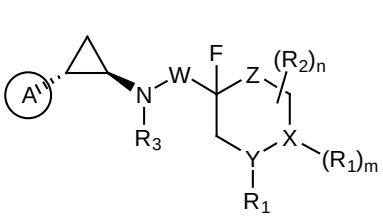
the substituent is selected from the group consisting of a C1-C8 alkyl, C2-C8 alkenyl, C2-C8 alkynyl, C3-C8 cycloalkyl, 3- to 12-membered heterocyclic group, aryl, heteroaryl, halogen, hydroxy, carboxyl (-COOH), C1-C8 aldehyde group, C2-C10 acyl, C2-C10 ester group, amino, and alkoxy.

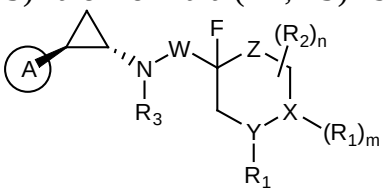
4. The fluorine-substituted cyclopropylamine compound, or the racemate, R-isomer, S-isomer, pharmaceutically acceptable salts thereof, or the mixtures thereof of claim 1, wherein X is N, and R_1 attached to X is selected from a substituted or unsubstituted: aryl, heteroaryl, aralkyl, and heteroarylalkyl, wherein the substituent is selected from the group consisting of a C1-C8 alkyl, C2-C8 alkenyl, C2-C8 alkynyl, C3-C8 cycloalkyl, 3- to 12-membered heterocyclic group, aryl, heteroaryl, halogen, hydroxy, carboxyl (-COOH), C1-C8 aldehyde group, C2-C10 acyl, C2-C10 ester group, amino, and alkoxy.

5. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein X is N, and R_1 attached to X is selected from a substituted or unsubstituted: aryl C1-C4 alkyl, and heteroaryl C1-C4 alkyl, wherein the substituent is selected from the group consisting of C1-C8 alkyl, C2-C8 alkenyl, C2-C8 alkynyl, C3-C8 cycloalkyl, 3- to 12-membered heterocyclic group, aryl, heteroaryl, halogen, hydroxy, carboxyl (-COOH), C1-C8 aldehyde group, C2-C10 acyl, C2-C10 ester group, amino, and alkoxy.

6. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein W is $-(CH_2)_{1\text{-}2}$.

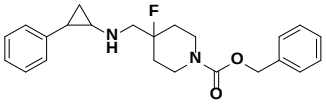
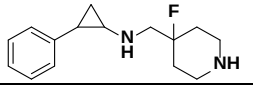
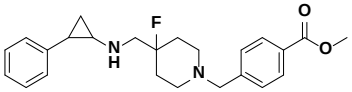
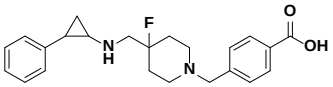
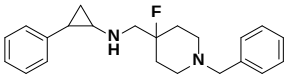
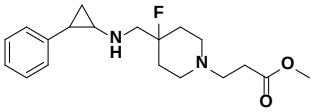
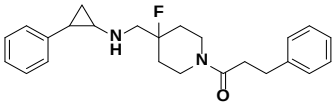
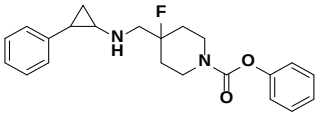
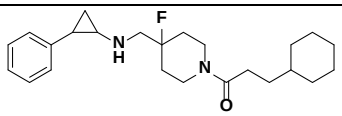
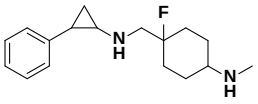
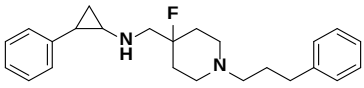
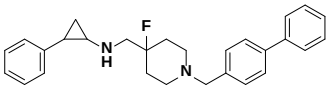
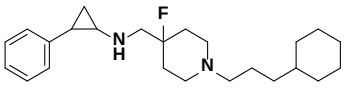
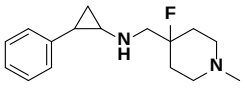
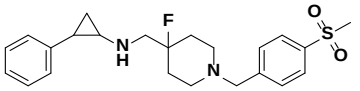
7. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein the structure of compound is shown in formula (1R, 2S)-Ia or formula (1R, 2S)-Ib.

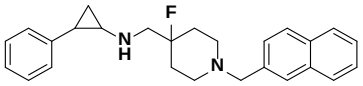
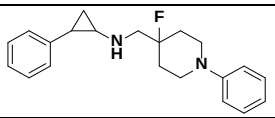
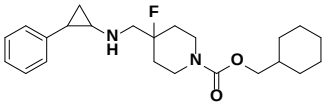
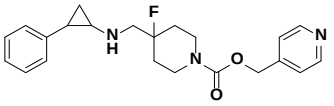
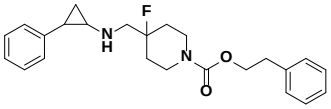
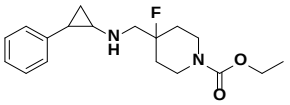
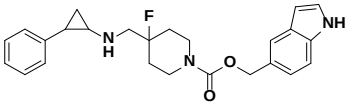
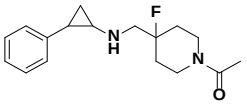
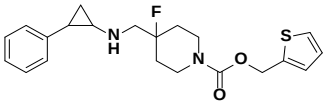
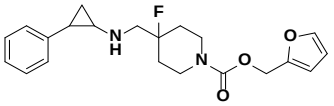
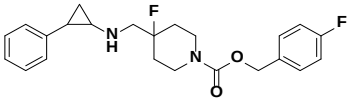
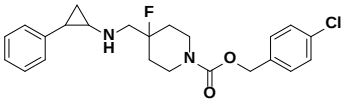
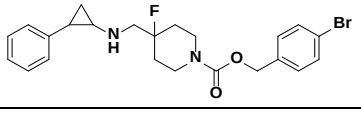
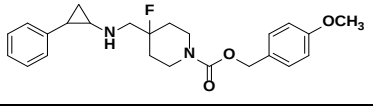
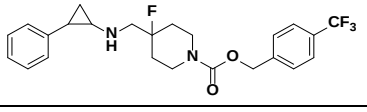


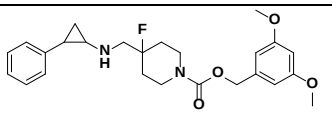
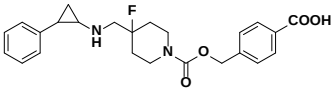
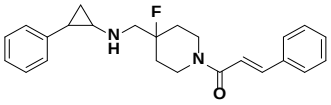
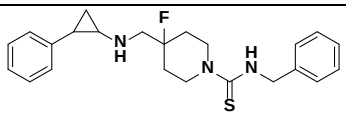
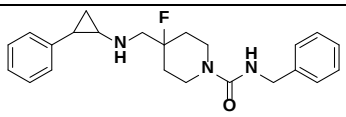
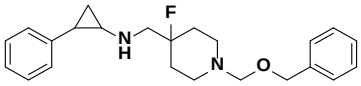
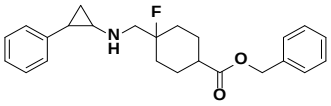
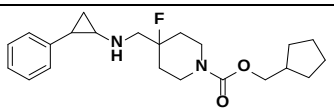
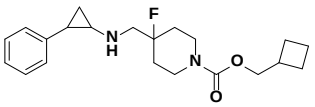
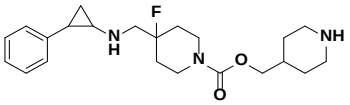
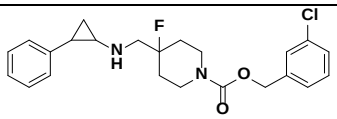
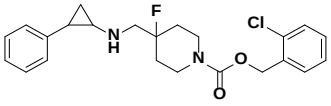
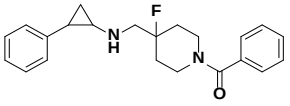
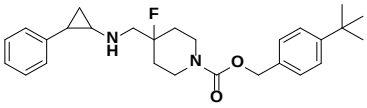
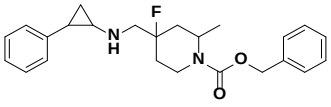
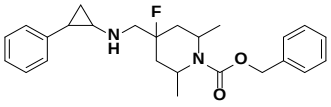


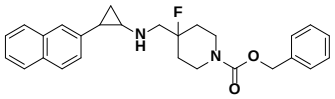
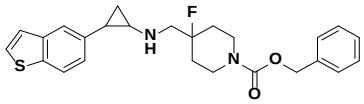
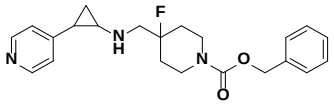
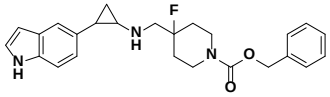
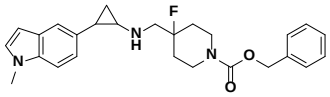
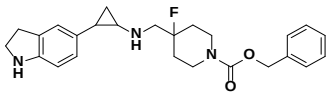
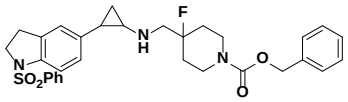
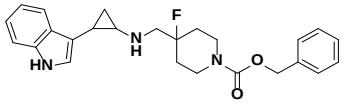
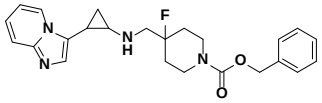
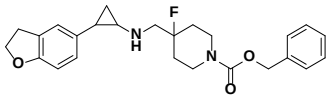
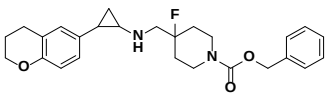
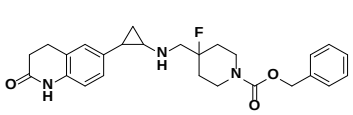
formula (1*R*, 2*S*)-Ia or formula (1*S*, 2*R*)-Ia

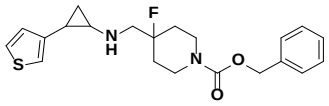
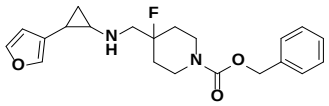
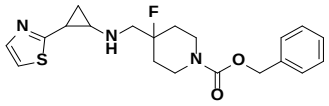
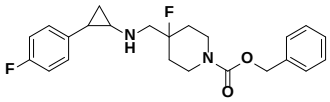
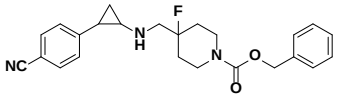
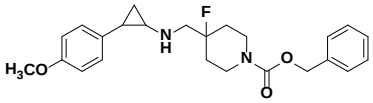
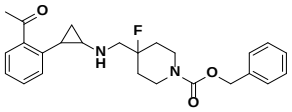
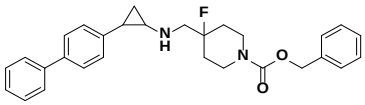
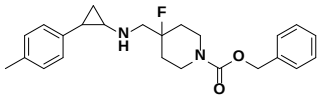
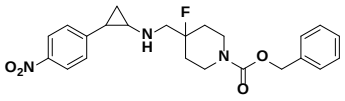
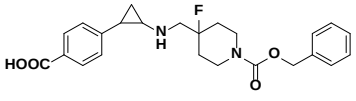
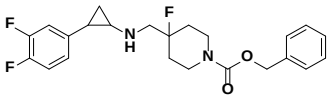
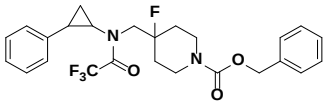
8. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein the fluorine-substituted cyclopropylamine compound is selected from the following compounds:

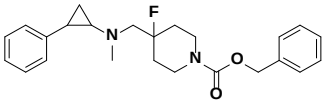
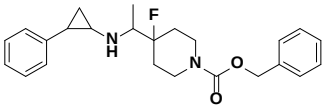
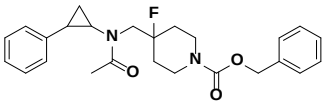
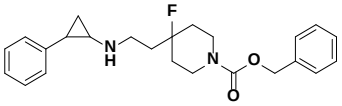
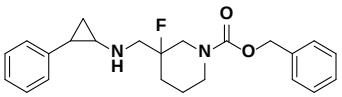
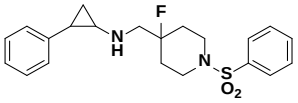
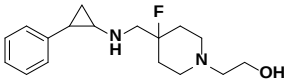
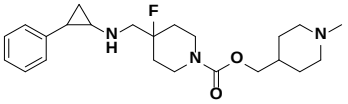
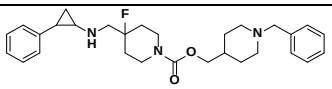
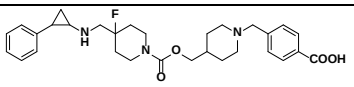
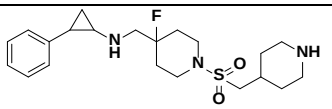
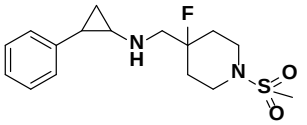
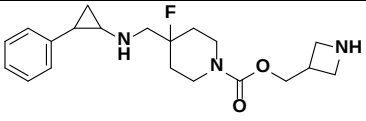
No.	Name	Structure
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A2	*N*-((4-fluoropiperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A3	Methyl 4-((4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoate	
A5	4-((4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoic acid	
A6	*N*-((1-benzyl-4-fluoropiperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A7	Methyl 3-(4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)-propionate	
A8	1-(4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)-3-phenyl-1-propanone	
A9	Phenyl 4-fluoro-4-((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A10	3-cyclohexyl-1-(4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)-1-propanone	
A11	4-fluoro-*N*-methyl-4-(((trans-2-phenylcyclopropyl)amino)methyl)cyclohexane-1-amine	
A12	*N*-((4-fluoro-1-(3-phenylpropyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A13	*N*-((1-([1,1'-biphenyl]-4-methyl)-4-fluoropiperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A14	*N*-((1-(3-cyclohexylpropyl)-4-fluoropiperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A15	*N*-((4-fluoro-1-methylpiperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A16	*N*-((4-fluoro-1-(4-(methylsulfonyl)benzyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	

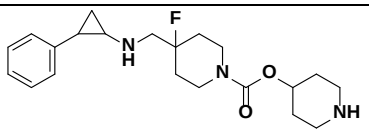
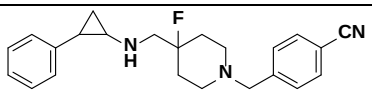
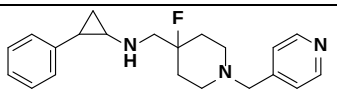
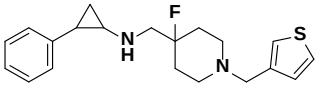
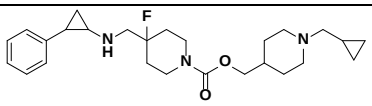
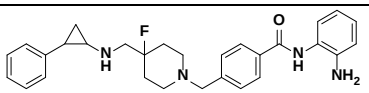
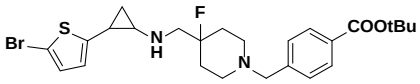
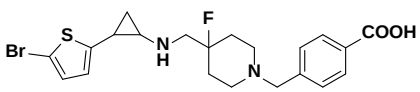
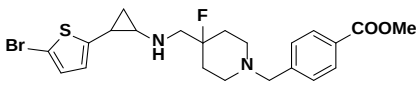
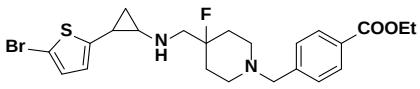
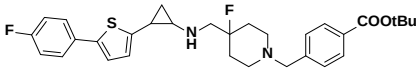
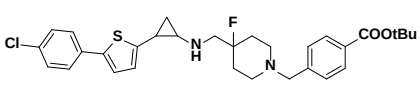
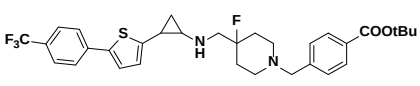
A17	*N*-((4-fluoro-1-(naphthyl-2-methyl) piperidin-4-yl)methyl)-trans-2-phen ylcyclopropylamine	
A20	*N*-((4-fluoro-1-phenylpiperidin-4-yl)methyl)-trans-2-phenylcyclopropyl amine	
A21	Cyclohexylmethyl 4-fluoro-4-(((trans-2-phenylcyclopr opyl)amino)methyl)piperidine-1-car boxylate	
A22	Pyridin-4-ylmethyl 4-fluoro-4-(((trans-2-phenylcyclopr opyl)amino)methyl)piperidine-1-car boxylate	
A23	Phenethyl 4-fluoro-4-(((trans-2-phenylcyclopr opyl)amino)methyl)piperidine-1-car boxylate	
A24	Ethyl 4-fluoro-4-(((trans-2-phenylcyclopr opyl)amino)methyl)piperidine-1-car boxylate	
A25	(1H-indol-5-yl)methyl 4-fluoro-4-(((trans-2-phenylcyclopr opyl)amino)methyl)piperidine-1-car boxylate	
A26	1-(4-Fluoro-4-(((trans-2-phenylcycl opropyl)amino)methyl)pyridin-1-yl) -1-ethanone)	
A27	Thiophen-2-ylmethyl-4-fluoro-4-(((t rans-2-phenylcyclopropyl)amino)me thyl)piperidine-1-carboxylate	
A28	Furan-2-ylmethyl-4-fluoro-4-(((tran s-2-phenylcyclopropyl)amino)methy l)piperidine-1-carboxylate	
A29	4-fluorobenzyl-4-fluoro-4-(((trans-2 -phenylcyclopropyl)amino)methyl)p iperidine-1-carboxylate	
A30	4-chlorobenzyl-4-fluoro-4-(((trans-2 -phenylcyclopropyl)amino)methyl)p iperidine-1-carboxylate	
A31	4-bromobenzyl-4-fluoro-4-(((trans-2 -phenylcyclopropyl)amino)methyl)p iperidine-1-carboxylate	
A32	4-methoxybenzyl-4-fluoro-4-(((tran s-2-phenylcyclopropyl)amino)methy l)piperidine-1-carboxylate	
A33	4-trifluoromethylbenzyl-4-fluoro-4- (((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	

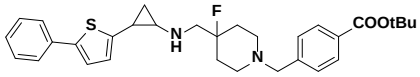
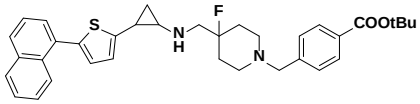
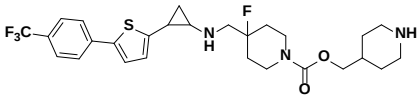
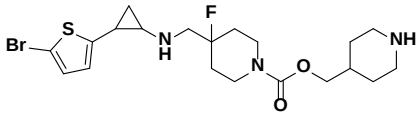
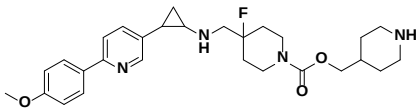
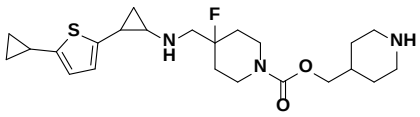
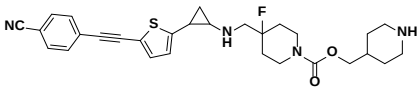
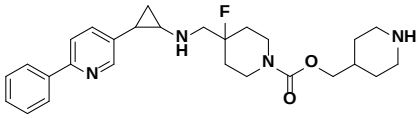
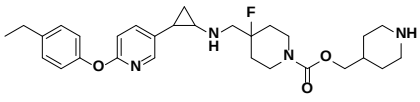
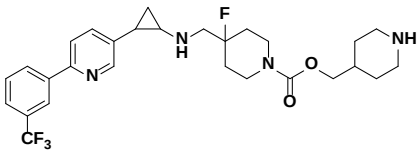
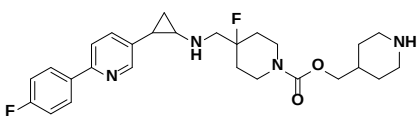
A34	3,5-Dimethoxybenzyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A35	4-((4-Fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carbonyloxy)methyl)benzoic acid	
A36	(E)-1-(4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)-3-phenyl-2-ene-1-propanone	
A37	*N*-benzyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-thioamide	
A38	*N*-benzyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxamide	
A39	*N*-((1-((benzyloxy)methyl)-4-fluoropiperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A40	Benzyl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)cyclohexane-1-carboxylate	
A41	Cyclopentylmethyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A42	Cyclobutylmethyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A43	Piperidin-4-ylmethyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A44	3-chlorobenzyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A45	2-chlorobenzyl-4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A46	(4-fluoro-4-((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)(phenyl)methanone	
A47	4-tert-butylbenzyl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A48	Benzyl 4-fluoro-2-methyl-4-((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A49	Benzyl 4-fluoro-2,6-dimethyl-4-((trans-2-phenylcyclopropyl)amino)methyl)pip	

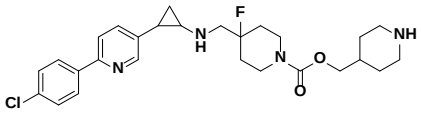
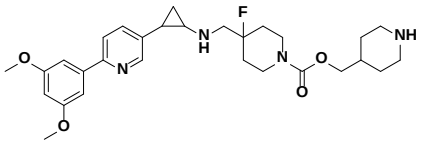
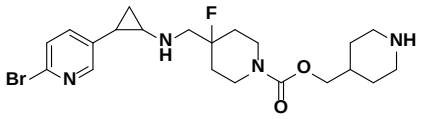
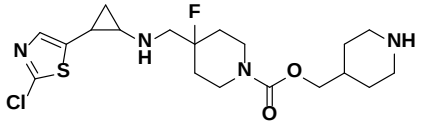
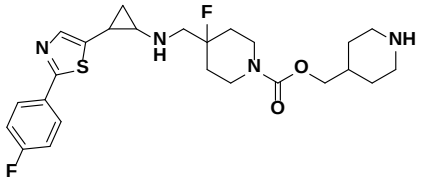
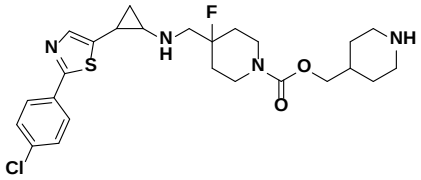
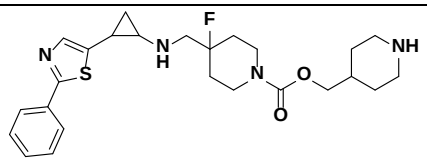
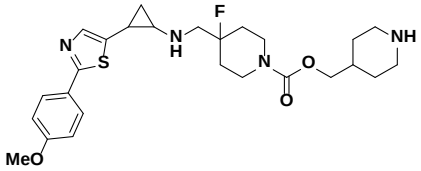
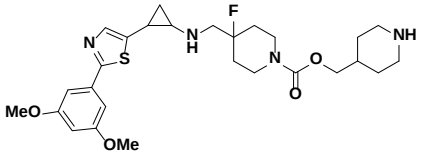
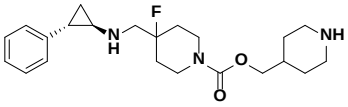
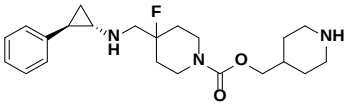
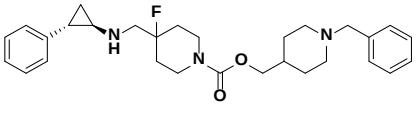
	eridine-1-carboxylate	
A50	Benzyl 4-fluoro-4-((trans-2-(naphthalen-2-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A51	Benzyl 4-fluoro-4-((trans-2-(benzothiophen-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A52	Benzyl 4-fluoro-4-((trans-2-(pyridin-4-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A53	Benzyl 4-fluoro-4-((trans-2-(1H-indol-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A54	Benzyl 4-fluoro-4-((trans-2-(1-methyl-1H-indol-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A55	Benzyl 4-fluoro-4-((trans-2-(indoline-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A56	Benzyl 4-fluoro-4-((trans-2-(1-(phenylsulfonyl)indoline-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A57	Benzyl 4-fluoro-4-((trans-2-(1H-indol-3-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A58	Benzyl 4-fluoro-4-((trans-2-(imidazo[1,2-α]pyridin-3-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A59	Benzyl 4-fluoro-4-((trans-2-(2,3-dihydrobenzofuran-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A60	benzyl 4-fluoro-4-((trans-2-(chroman-6-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A61	benzyl 4-fluoro-4-(((trans-2-(2-oxo-1,2,3,4-tetrahydroquinolin-6-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	

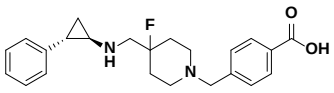
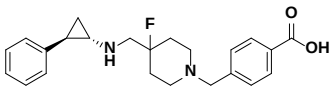
A62	Benzyl 4-fluoro-4-((trans-2-(thiophen-3-yl) cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A63	Benzyl 4-fluoro-4-((trans-2-(furan-3-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A64	Benzyl 4-fluoro-4-((trans-2-(thiazol-2-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A65	Benzyl 4-fluoro-4-((trans-2-(4-fluorophenyl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A66	Benzyl 4-fluoro-4-((trans-2-(4-cyanophenyl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A67	Benzyl 4-fluoro-4-((trans-2-(4-methoxyphenyl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A68	Benzyl 4-fluoro-4-((trans-2-(2-acetylphenyl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A69	Benzyl 4-fluoro-4-((trans-2-([1,1'-biphenyl]-4-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A70	Benzyl 4-fluoro-4-((trans-2-(4-methylphenyl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A71	Benzyl 4-fluoro-4-((trans-2-(4-nitrophenyl) cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A72	4-(trans-2-((1-((benzyloxy))carbonyl)-4-fluoropiperidin-4-yl)methyl)amino)cyclopropyl)benzoic acid	
A73	Benzyl 4-fluoro-4-((trans-2-(3,4-difluorophenyl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A74	Benzyl 4-fluoro-4-((2,2,2-trifluoro-*N*-(trans-2-phenylcyclopropyl)acetamido)methyl)piperidine-1-carboxylate	

A75	Benzyl 4-fluoro-4-((methyl(trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A76	Benzyl 4-fluoro-4-(1-((trans-2-phenylcyclopropyl)amino)ethyl)piperidine-1-carboxylate	
A77	Benzyl 4-fluoro-4-((*N*-(trans-2-phenylcyclopropyl)acetamido)methyl)piperidine-1-carboxylate	
A80	Benzyl 4-fluoro-4-(2-((trans-2-phenylcyclopropyl)amino)ethyl)piperidine-1-carboxylate	
A81	Benzyl 3-fluoro-3-((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A82	*N*-((4-fluoro-1-(phenylsulfonyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A83	2-(4-Fluoro-4-(((trans-2-phenylcyclohexyl)amino)methyl)piperidin-1-yl)ethanol	
A89	(1-methylpiperidin-4-yl)methyl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A90	(1-benzylpiperidin-4-yl)methyl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A91	4-((4-(((4-Fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carbonyl)oxo)methyl)piperdin-1-yl)methyl)benzoic acid	
A92	*N*-((4-fluoro-1-(piperidin-4-ylmethyl)sulfonyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A93	*N*-((4-fluoro-1-(methylsulfonyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A94	Azetidin-3-ylmethyl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	

A95	Piperidin-4-yl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A96	4-((4-Fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzonitrile	
A97	*N*-((4-fluoro-1-(piperidin-4-ylmethyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A98	*N*-((4-fluoro-1-(thien-3-ylmethyl)piperidin-4-yl)methyl)-trans-2-phenylcyclopropylamine	
A99	(1-(cyclopropylmethyl)piperidin-4-yl)methyl 4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
A100	*N*-(2-Aminophenyl)-4-((4-fluoro-4-(((trans-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzamide	
A101	tert-Butyl 4-((4-((2-(5-bromothien-2-yl))cyclopropyl)amino)methyl)-4-fluoropiperidin-1-yl)methyl)benzoate	
A102	4-((4-(((2-(5-Bromothiophen-2-yl))cyclopropyl)amino)methyl)-4-fluoropiperidin-1-yl)methyl)benzoic acid	
A103	Methyl 4-((4-(((2-(5-bromothiophen-2-yl))cyclopropyl)amino)methyl)-4-fluoropiperidin-1-yl)methyl)benzoate	
A104	Ethyl 4-((4-(((2-(5-bromothiophen-2-yl))cyclopropyl)amino)methyl)-4-fluoropiperidin-1-yl)methyl)benzoate	
A105	tert-Butyl 4-((4-fluoro-4-(((2-(5-(4-fluorophenyl)thiophen-2-yl)cyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoate	
A106	tert-Butyl 4-((4-(((2-(5-(4-chlorophenyl)thiophen-2-yl)cyclopropyl)amino)methyl)-4-fluoropiperidin-1-yl)methyl)benzoate	
A107	tert-Butyl 4-((4-fluoro-4-(((2-(5-(4-(trifluoromethyl)phenyl)thiophen-2-yl)cyclopropyl)amino)methyl)piperidine-1-yl)m	

	ethyl)benzoate	
A108	tert-Butyl 4-((4-fluoro-4-(((2-(5-phenylthiophen-2-yl)cyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoic acid	
A109	tert-Butyl 4-((4-fluoro-4-(((2-(5-(naphthalen-1-yl)thiophen-2-yl)cyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoate	
A110	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(5-(4-(trifluoromethyl)phenyl)thiophen-2-yl)cyclopropyl)amino)methyl)piperdine-1-carboxylate	
A111	Piperidin-4-ylmethyl 4-(((2-(5-bromothien-2-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A112	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(6-(4-methoxyphenyl)pyridin-3-yl)cyclopropyl)amino)methyl)piperidin-1-carboxylate	
A113	Piperidin-4-ylmethyl 4-(((2-(5-cyclopropylthiophen-2-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A114	Piperidin-4-ylmethyl 4-(((2-(5-((4-cyanophenyl)ethynyl)thiophen-2-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A115	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(6-phenylpyridin-3-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A116	Piperidin-4-ylmethyl 4-(((2-(6-(4-ethylphenoxy)pyridin-3-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A117	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(6-(3-(trifluoromethyl)phenyl)pyridin-3-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A118	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(6-(4-fluorophenyl)pyridin-3-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	

A119	Piperidin-4-ylmethyl 4-(((2-(6-(4-chlorophenyl)pyridin-3-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A120	Piperidin-4-ylmethyl 4-(((2-(6-(3,5-dimethoxyphenyl)pyridin-3-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine 1-carboxylate	
A121	Piperidin-4-ylmethyl 4-(((2-(6-bromopyridin-3-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A122	Piperidin-4-ylmethyl 4-(((2-(2-chlorothiazol-5-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A123	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(2-(4-fluorophenyl)thiazol-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A124	Piperidin-4-ylmethyl 4-(((2-(2-(4-chlorophenyl)thiazol-5-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
A125	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(2-phenylthiazol-5-yl)cyclopropyl)amino)methyl)piperidine-1-carboxylate	
A126	Piperidin-4-ylmethyl 4-fluoro-4-(((2-(2-(4-methoxyphenyl)thiazol-5-yl)cyclopropyl)amino)methyl)piperidin-1-carboxylate	
A127	Piperidin-4-ylmethyl 4-(((2-(2-(3,5-dimethoxyphenyl)thiazol-5-yl)cyclopropyl)amino)methyl)-4-fluoropiperidine-1-carboxylate	
(1*R*,2*S*)-A43	Piperidin-4-ylmethyl 4-fluoro-4-((((1R,2S)-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
(1*S*,2*R*)-A43	Piperidin-4-ylmethyl 4-fluoro-4-((((1S,2R)-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	
(1*R*,2*S*)-A90	(1-Benzylpiperidin-4-yl)methyl 4-fluoro-4-((((1R,2S)-2-phenylcyclopropyl)amino)methyl)piperidine-1-carboxylate	

(1*R*,2*S*)-A5	4-((4-fluoro-4-((((1*R*,2*S*)-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoic acid	
(1*S*,2*R*)-A5	4-((4-fluoro-4-((((1*S*,2*R*)-2-phenylcyclopropyl)amino)methyl)piperidin-1-yl)methyl)benzoic acid	

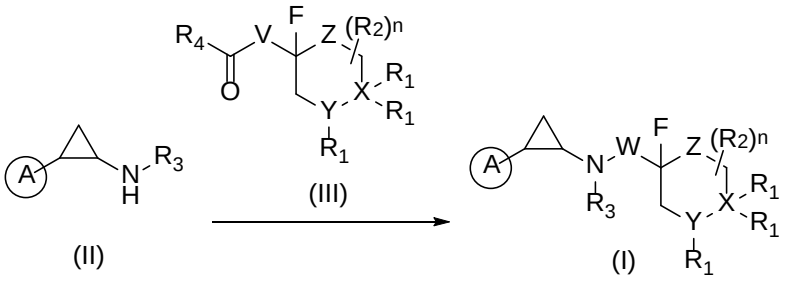
9. The fluorine-substituted cyclopropylamine compound, or a racemate, R-isomer, S-isomer, pharmaceutically acceptable salt, or a mixture thereof of claim 1, wherein,

the pharmaceutically acceptable salt is prepared by reacting a compound of formula I with an inorganic or organic acid, the inorganic acid is hydrochloric acid, hydrobromic acid, sulfuric acid, nitric acid, aminosulfonic acid or phosphoric acid, and the organic acid is citric acid, tartaric acid, lactic acid, pyruvic acid, acetic acid, benzenesulfonic acid, p-toluenesulfonic acid, methanesulfonic acid, naphthalenesulfonic acid, ethanesulfonic acid, naphthalene disulfonic acid, maleic acid, malic acid, malonic acid, fumaric acid, succinic acid, propionic acid, oxalic acid, trifluoroacetic acid, stearic acid, pamoic acid, hydroxymaleic acid, phenylacetic acid, benzoic acid, salicylic acid, glutamic acid, ascorbic acid, p-anilinesulfonic acid, 2-acetoxybenzoic acid or isethionic acid; or sodium, potassium, calcium, aluminum or ammonium salts fromed from the compound of formula I with an inorganic base; or a salt formed from the compound of formula I with an organic base, such as methanamine salt, ethylamine salt or ethanolamine salt.

10. A process for the preparation of a fluorine-substituted cyclic amine compound of claim 1, wherein the process is selected from the following Scheme 1 or Scheme 2:

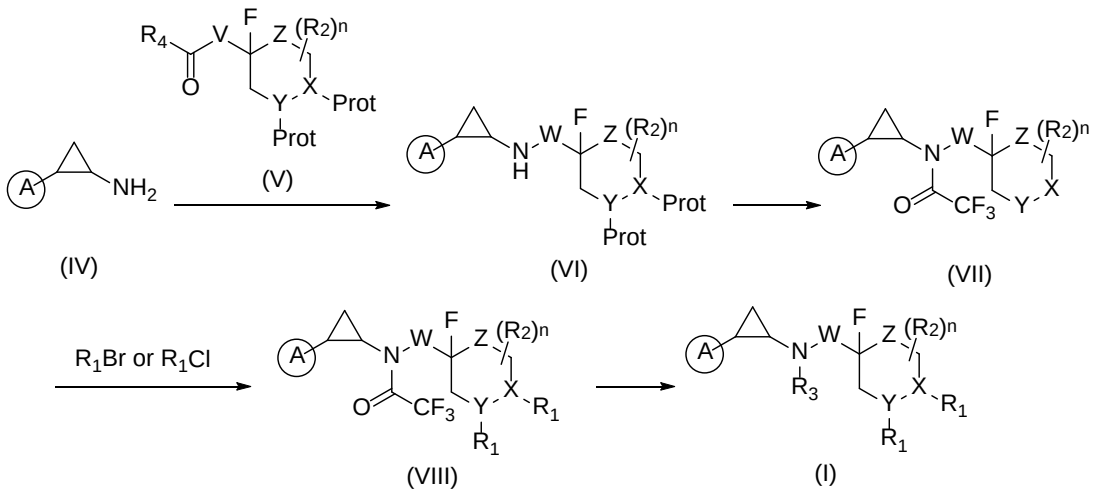
Scheme 1

Reacting a compound of formula (II) and (III) under reductive amination conditions to provide a compound of formula (I).



Scheme 2

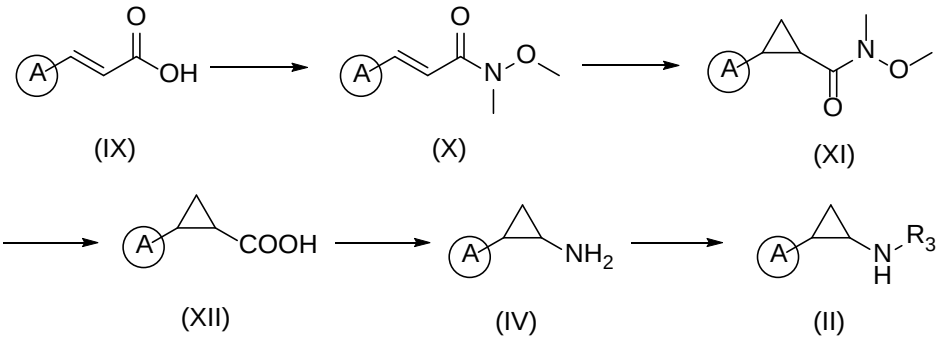
reacting a compound of formula (IV) with compound of formula (V) to afford a compound of formula (VI), and then the amino can be protected, and a compound of formula (VII) was obtained by removing the protecting group of the X and/or Y group. The compound of formula (VII) is functionalized with R_1 substituent to give a compound of formula (VIII), the amine deprotecting group is removed and the compound of formula (VIII) is functionalized with an R_3 group to give a compound of formula (I);



Wherein A, W, X, Y, Z, R_1, R_2, and R_3 are as described above, respectively, and R_4 is selected from the group consisting of H and methyl, and V is $-CH_2-W-$ or $-W-CH_2-$.

11. The method of claim 10 wherein the method for preparing the compound of formula (II) comprises the step:

a cinnamic acid compound of formula (IX) is condensed with dimethylhydroxylamine in the presence of a condensing agent and a base to obtain a amide compound of formula (X), which is then subjected to cyclopropylation to obtain a compound of formula (XI); the compound of formula (XI) is hydrolyzed to give a compound of formula (XII), which is then subjected to a reaction under Curtius rearrangement conditions to provide a compound of formula (IV), and then the compound of formula (IV) is functionalized with R_3 group to provide a compound of formula (II);



scheme 3 .

12. A pharmaceutical composition comprising one or more of a therapeutically effective amount of the fluorine-substituted cyclic amine compound, or the pharmaceutically acceptable salt, racemate, R-isomer or S-isomer of claim 1, and optionally one or more pharmaceutically acceptable carriers, excipients, adjuvants, auxiliary substances, and/or diluents.

13. A lysine-specific demethylase 1 (LSD1) inhibitor comprising a therapeutically effective amount of the fluorine-substituted cyclopropylamine compound, pharmaceutically acceptable salt, racemic, R-isomer, S-isomer thereof of claim 1.

14. The fluorine-substituted cycloamine compound, racemate, R-isomer, S-isomer or pharmaceutically acceptable salt thereof of claim 1 for use in the treatment or prevention of malignant tumor disease associated with methylase 1 (LSD1).

15. The fluorine-substituted cycloamine compound, racemate, R-isomer, S-isomer or pharmaceutically acceptable salt thereof for use of claim 14, wherein disease is a cancer associated with lysine-specific demethylase 1 (LSD1), wherein the cancer is selected from the group consisting of brain cancer (glioma), glioblastoma, leukemia, Bannayan-Zonana syndrome, Cowden's disease, cerebellar dysplastic ganglioneuroma, breast cancer, inflammatory breast cancer, Wilms' tumor, Ewing Sarcoma, rhabdomyosarcoma, ependymoma, medulloblastoma, colon cancer, head and neck cancer, kidney cancer, lung cancer, liver cancer, melanoma, kidney cancer, ovarian cancer, pancreatic cancer, prostate cancer, sarcoma, osteosarcoma, giant cell tumor of thyroid gland and bone.