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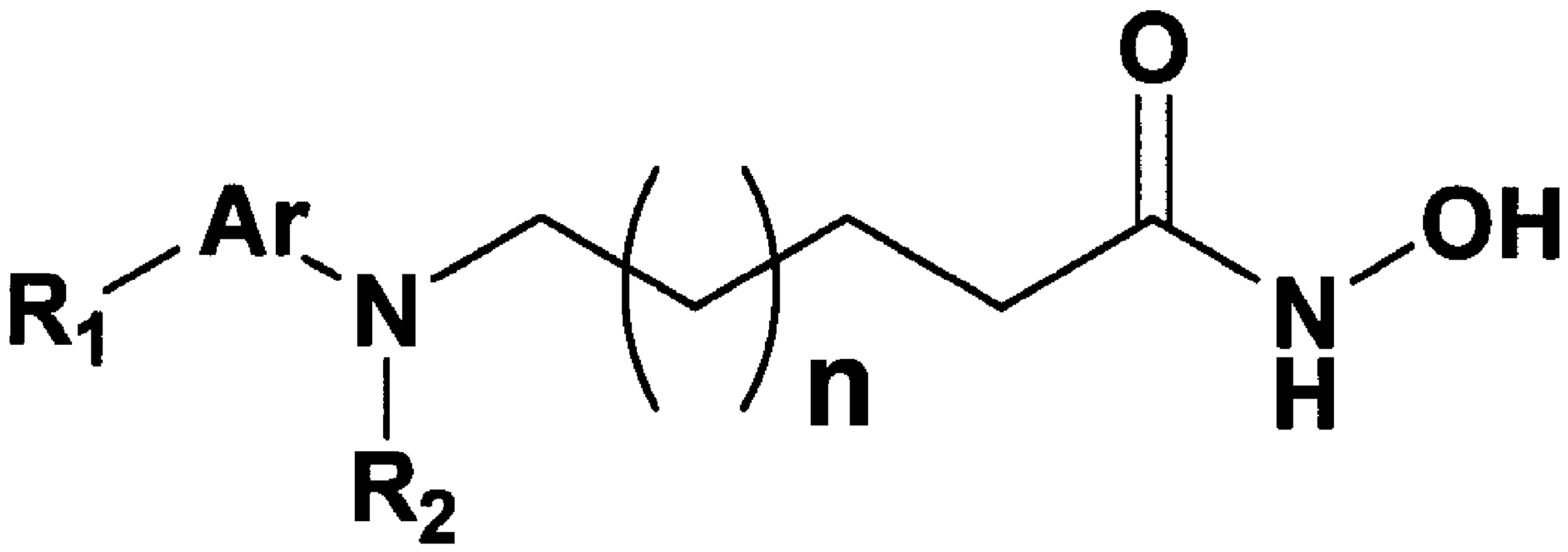
(54) Titre : NOUVEAU DERIVE HYDROXAMATE, PROCEDE DE PRODUCTION ASSOCIE, ET COMPOSITION PHARMACEUTIQUE COMPRENANT LE DERIVE

(54) Title: NOVEL HYDROXAMATE DERIVATIVE, A PRODUCTION METHOD FOR THE SAME, AND A PHARMACEUTICAL COMPOSITION COMPRISING THE SAME

[Formula I]



(57) Abrégé/Abstract:
The present invention relates to hydroxamate derivatives, isomers thereof pharmaceutically acceptable salts thereof hydrates thereof or solvates thereof: (see formula 1] the use thereof for preparing pharmaceutical compositions, pharmaceutical compositions containing the same, a method of treating disease using the compositions, and a method for preparing the hydroxamate derivatives.

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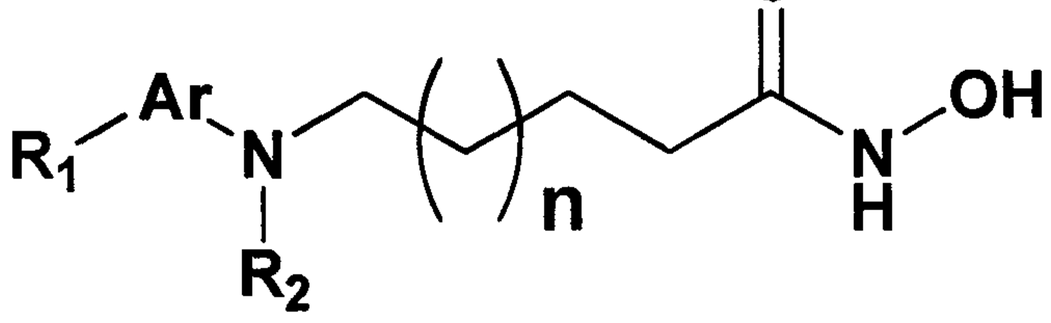
ABSTRACT

The present invention relates to hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof:

[Formula I]



the use thereof for preparing pharmaceutical compositions, pharmaceutical compositions containing the same, a method of treating disease using the compositions, and a method for preparing the hydroxamate derivatives.

Novel hydroxamate derivative, a production method for the same, and a pharmaceutical composition comprising the same

Technical Field

The present invention relates to novel hydroxamate derivatives, and more particularly to novel hydroxamate derivatives having histone deacetylase inhibitory activity, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof, the use thereof for preparing pharmaceutical compositions, pharmaceutical compositions containing the same, a method of treating disease using the compositions, and a method for preparing novel hydroxamate derivatives.

Background Art

Histone deacetylase (HDAC) activity is involved in a number of disease states, for example, cancer (Marks et al., Nature Reviews, 1, 194-202, 2001), cystic fibrosis (Li. S. et al, J. Biol. Chem., 274, 7803-7815, 1999), Huntington's chorea (Steffan, J. S. et al., Nature, 413, 739-743, 2001), and sickle cell anaemia (Gabbianelli. M. et al., Blood, 95, 3555-3561, 2000).

Thus, studies on the regulation of transcription of histone acetylases (HATs) and histone deacetylases (HDACs), which are involved in chromatin structure, have been actively conducted. It is known that histone acetylases are enzymes that catalyze the acetylation of N-terminal histone tails to cause an unstable chromatin structure, whereas histone deacetylases remove acetyl groups from histones to stabilize chromatin structure so as to interfere with the accession of transcription factors to target genes, thereby inhibiting transcriptional activity. Acetylation of histones is regulated by histone deacetylases that catalyze the removal of acetyl groups from the lysine residues of histones. If acetyl groups are attached to histone proteins, the expression of proteins that are involved in the suppression of cancer will be stimulated, but if the acetyl groups are removed from histone proteins, the expression of proteins that are involved in the suppression of cancer will be inhibited. Thus, inhibition of histone deacetylase (HDAC) activity leads to arrest of the cell cycle, inhibition of blood vessel formation, immune regulation, cell death, etc. Namely, if the enzymatic activity of histone deacetylases is

inhibited, the activity of factors associated with the survival of cancer cells *in vivo* will be inhibited, and the activity of factors associated with the death of cancer cells will be increased, whereby the death of cancer cells will be induced. Recent studies on histone modification enzymes revealed that histone deacetylases play an important role in tumor formation. 11 members-cloned HDAC, which is expressed from humans, is over-expressed in several tumor cells, and in this state, the expression of tumor suppressors such as p53 and p21 is inhibited, but tumor activators, such as hypoxia-induced factor-1 and vascular endothelial growth factor (VEGF), are up-regulated. Particularly, a decrease in tubulin acetylation that is mediated by histone deacetylases was observed in patients suffering from neurodegenerative diseases such as Alzheimer's disease.

Thus, it has been recognized that inhibition of histone deacetylase activity can be applied for the treatment of cancer and other diseases. In fact, inhibition of histone deacetylase activity by a specific inhibitor results in changes in the acetylation of proteins at the molecular and cellular levels, the expression of a specific gene, and the morphology, proliferation and migration of cells.

Histone deacetylase inhibitors found to date can be divided, according to their structure, into four categories: 1) short-chain fatty acids (e.g., butyric acid and valproic acid); 2) hydroxamic acids (e.g., trichostatin A, SAHA and oxamflatin); 3) cyclic peptides (e.g., depsipeptide and Trapoxin); and 4) benzamides (e.g., MS-275, MGCD 0103, and CI-994) (International Journal of oncology 33, 637-646, 2008). These histone deacetylase inhibitors (SAHA, pyroxamide, scriptide, oxamflatin, NVP-LAQ-824, CHAPs and MS-275) effectively induce the growth inhibition, differentiation and apoptosis of various transformed cells in animal models and media (Marks, P.A et al., Curr Opin. oncol. 2001, 13, 477-483), and HDAC inhibitors, such as SAHA, NVP-LAQ-824 and MS-275, have been evaluated in clinical trials for the treatment of various cancer diseases (Johnstone. R.W Nat. Rev. Drug Discov. 2002, 1, 287-299). Typical examples of HDAC inhibitor compounds that are currently known include hydroxamate compounds, such as SAHA (US 771760, Zolinza, vorinostat), PXD101 (WO 02/30879, Belinostat) and LBH589 (WO 02/22577, Panobinostat), and benzamide compounds, such as MS275 (EP 847992) and MGCD0103 (WO 04/69823). Of these compounds, SAHA, a typical HDAC inhibitor, was approved in October 2006 by the US FDA and has been used for the treatment of cutaneous T-cell lymphoma (CTCL). The range of diseases to which SAHA can be

applied is being additionally expanded, but it is known that the effect of SAHA is insufficient (Cancer Res 2006, 66, 5781-5789).

Although many HDAC inhibitors have been reported to date, there has been a continuous need for a more selective, more effective HDAC inhibitor which overcomes the above-described disadvantage (Mol Cancer Res, 5, 981, 2007).

The present inventors have conducted many studies to develop agents for treating the above-mentioned diseases and, as a result, have developed derivatives which are completely different from known compounds, thereby completing the present invention.

Disclosure

Technical Problem

It is an object of the present invention to provide novel hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof.

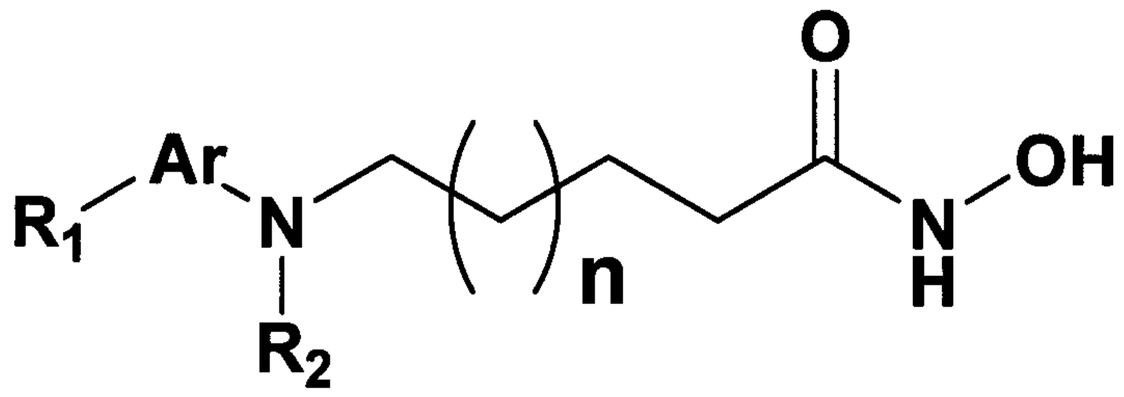
Another object of the present invention is to provide pharmaceutical compositions for prevention or treatment of diseases associated with histone deacetylase activity, which contain novel hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof, and methods of preventing or treating the diseases using the compositions.

Still another object of the present invention is to provide a method for preparing novel hydroxamate derivatives.

Technical Solution

In accordance with one aspect of the present invention, there are provided hydroxamate derivatives represented by the following formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof:

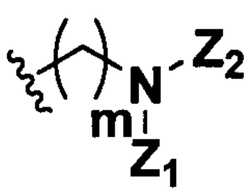
[Formula I]



wherein n is an integer of 2, 3 or 4;

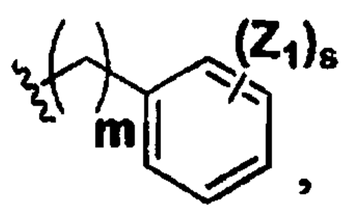
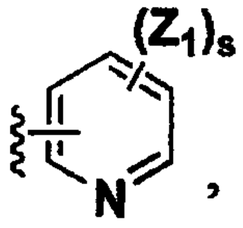
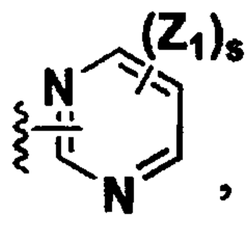
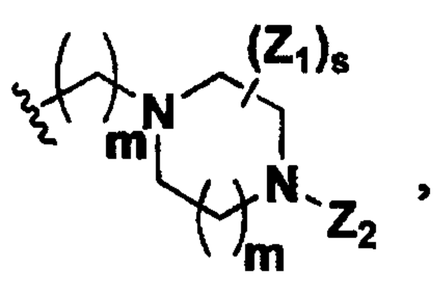
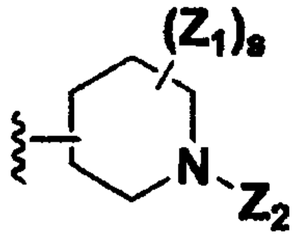
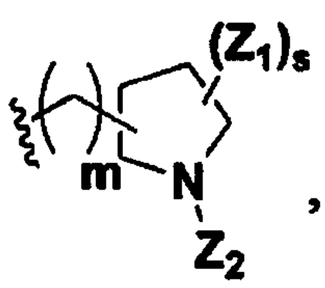
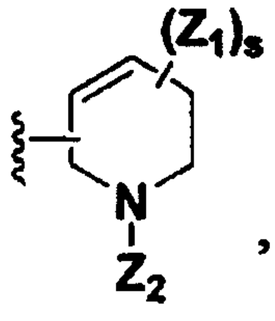
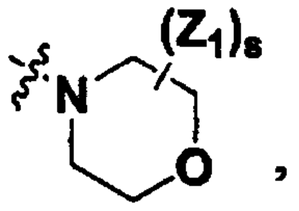
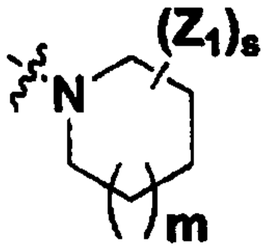
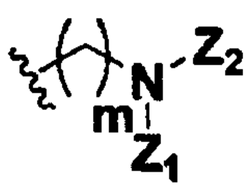
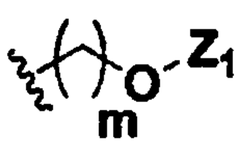
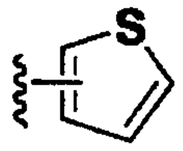
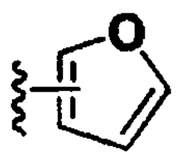
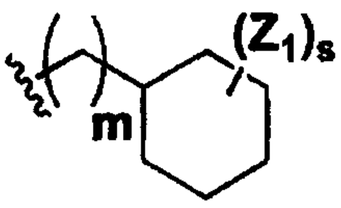
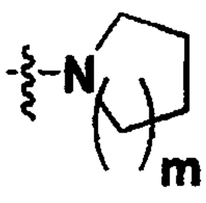
Ar is a phenylene, pyridinene or pyrimidinene group which is unsubstituted or substituted with one or more substituents selected from the group consisting of C_{1-6} alkyl, amino, nitro, thiomethyl, hydroxyl, nitrile, carboxyl, C_{1-4} alkyloxy, aryl C_{1-4} alkyloxy, halogen, trifluoromethyl, -O-CF_3, phenyl and phenoxy groups;

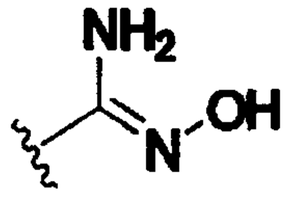
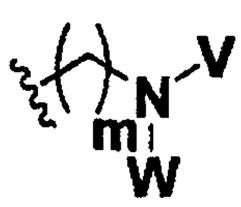
R_1 is an indole, indazole or benzimidazole group which is unsubstituted or substituted with one or more substituents selected from the groups consisting of C_{1-6} alkyl, formyl, amino, nitro, thiomethyl, hydroxyl, C_{1-6} alkoxy, nitrile, carboxyl, halogen, trifluoromethyl, -O-CF_3, -C(O)-R_5, -S(O_2)-R_5 and



; and

R_2 is hydrogen, hydroxy C_{1-6} alkyl, C_{1-8} alkyl, -C(O)-R_5, -C(O)NH-R_5, -S(O_2)-R_5, -C(S)-R_5 or -C(O_2)-R_5, in which R_5 is

naphthyl, C_{1-8} alkyl or C_{1-4} alkyloxy group, Z_1 and Z_2 are each independently hydrogen, C_{1-6} alkyl, amino, -O-C_{1-4} alkyl, -S(O_2)C_{1-4} alkyl, -C(O)C_{1-4} alkyl, -S-C_{1-4} alkyl, halogen, trifluoromethyl, -O-CF_3, phenyl, -O-phenyl, -O-C_{1-4} alkylaryl,  or 

V and W are each independently hydrogen or C_{1-6} alkyl,

each s is independently an integer of 0, 1, 2, 3, 4 or 5, and

each m is independently an integer of 0, 1, 2 or 3.

Advantageous Effects

The hydroxamate derivatives according to the present invention have histone deacetylase inhibitory activity and kill the actively proliferating cells of malignant tumors. Thus, the hydroxamate derivatives of the present invention can be used as agents for treating malignant tumors, viral and bacterial infections, vascular restenosis, inflammatory diseases, autoimmune diseases, and psoriasis.

Brief Description of Drawings

FIGs. 1, 2, 3, 4 and 5 show the results of measuring the anticancer effects of compounds according to the present invention in xenograft animal models.

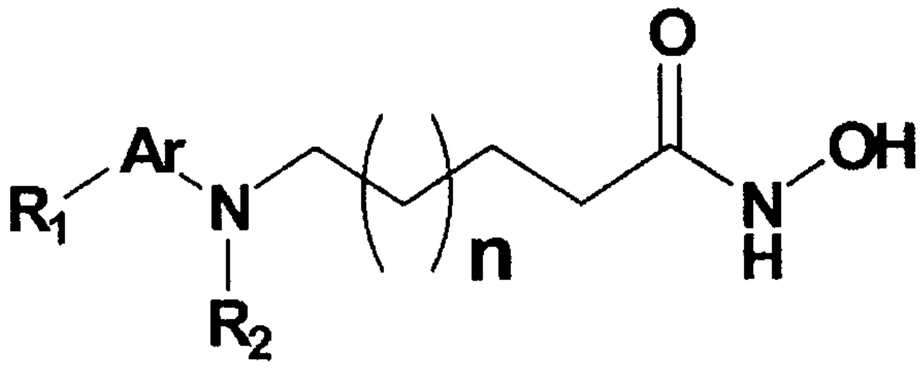
FIG. 6 shows the results of measuring the P450 (CYP3A4) inhibitory activity of a compound according to the present invention.

Best Mode

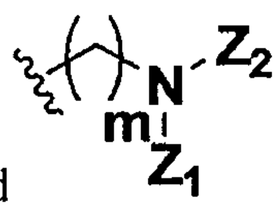
The present invention provides the following (1) to (12):

(1) Hydroxamate derivatives represented by the following formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof:

[Formula I]



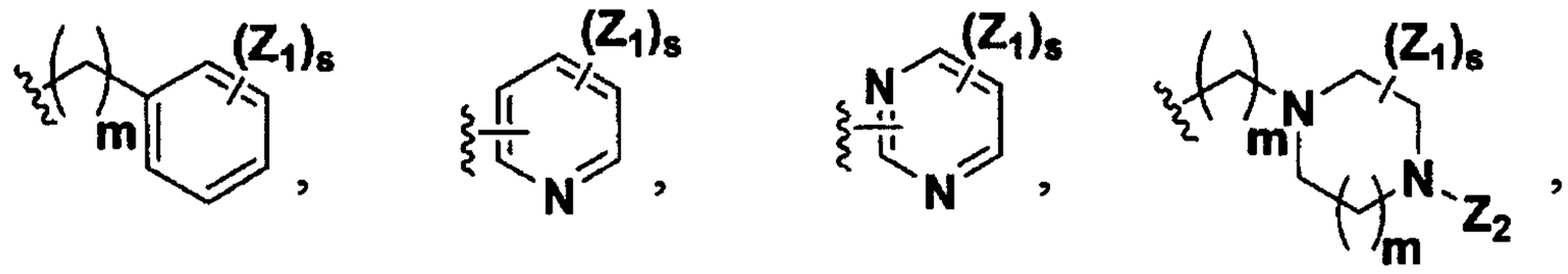
wherein n, Ar, R_1 and R_2 are as defined above;

(2) The hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof, or solvates thereof according to (1), wherein R_1 in formula I is an indole or indazole group which is unsubstituted or substituted with one or more substituents selected from the group consisting of C_{1-6} alkyl, formyl, amino, nitro, thiomethyl, hydroxy, C_{1-6} alkoxy, nitrile, carboxy, halogen, trifluoromethyl, -O-CF_3 , -C(O)-R_5, -S(O_2)-R_5 and  ;

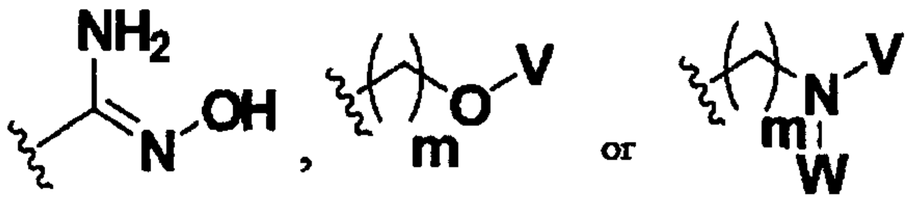
(3) The hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to (2), wherein Ar is a phenyl group which is unsubstituted or substituted with one or more substituents selected from the group consisting of C_{1-6}

alkyl, amino, nitro, thiomethyl, hydroxyl, nitrile, carboxyl, C_{1-4}alkyloxyl, aryl C_{1-4}alkyloxy, halogen, trifluoromethyl, -O-CF_3, phenyl and phenoxy groups;

(4) The hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to (3), wherein n is 3, Ar is an unsubstituted phenyl group, R_1 is an indole or indazole group which is substituted with hydrogen or one or more C_{1-6}alkyl groups, and R_2 is hydrogen, -C(O)-R_5 or -S(O_2)-R_5, in which R_5 is



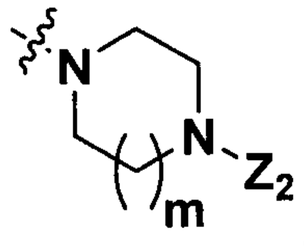
Z_1 and Z_2 are each independently hydrogen, C_{1-6}alkyl, amino, -O-C_{1-4}alkyl, -S(O_2)C_{1-4}alkyl, -C(O)C_{1-4} alkyl, -S-C_{1-4} alkyl, halogen, trifluoromethyl, -O-CF_3, phenyl, -O-phenyl, -O-C_{1-4} alkylaryl,



V and W are each independently hydrogen or C_{1-6}alkyl,

each s is independently an integer of 0, 1, 2, 3, 4 or 5, and

each m is independently an integer of 0, 1, 2 or 3;

(5) The hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to (4), wherein n is 3, Ar is an unsubstituted phenyl group, R_1 is an indole or indazole group which is substituted with hydrogen or one or more C_{1-6} alkyl groups, and R_2 is hydrogen, -C(O)-R_5 or -S(O_2)-R_5, in which R_5 is  , in which Z_2 is hydrogen or C_{1-6} alkyl, and m is an integer of 0, 1, 2 or 3.

The hydroxamate derivatives of formula I may contain one or more asymmetric carbon atoms, and thus may exist as mixtures of two or more stereoisomers.

Such steroisomers, for example, a stereoisomer mixture of each of the hydroxamate derivatives of formula I or pharmaceutically acceptable appropriate salts thereof can be separated by a conventional resolution technique such as fractional crystallization, column chromatography, or HPLC. The enantiomer of each of the compounds of formula I can be separated by HPLC separation of a corresponding racemate using a chiral support. Alternatively, a mixture formed by allowing the corresponding racemate to react with an appropriate optically active acid or base can be separated by fractional crystallization or column chromatography. All isomers are included in the scope of the present invention.

The hydroxamate derivatives of formula I according to the present invention are generally used in the form of pharmaceutically acceptable salts. Pharmaceutically acceptable salts include appropriate pharmaceutically acceptable base-addition or acid-addition salts, for example, metal salts such as alkali metal salts or alkaline earth metal salts, ammonium salts, organic amine salts, amino acid salts, sulfonates, etc. Acid addition salts include inorganic acid salts, such as hydrochloride, sulfate or phosphate, and organic acid salts, such as alkyl sulfonate, aryl sulfonate, acetate, malate, fumarate, tartrate, citrate or lactate. Examples of metal salts include alkali metal salts, such as lithium salt, sodium salt or potassium salt, and examples of alkaline earth metal salts include magnesium salt, calcium salt, aluminum salt and zinc salt. Examples of ammonium salt include ammonium salt and tetramethylammonium salt. Examples of organic amine salts include morpholine or piperidine salt.

Examples of amino acid salts include glycine, phenylalanine, glutamic acid and lysine salts. Examples of sulfonates include mesylate, tosylate, and benzene sulfonate.

(6) Preferred examples of the hydroxamate derivatives of formula I according to the present invention are as follows:

7-(4-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide;

N-hydroxy-7-(4-(1-methyl-1H-indol-5-yl) phenylamino) hydroxyheptanamide;

7-(3-(1H-indol-6-yl)phenylamino)-N-hydroxyheptanamide;

7-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyheptanamide;

7-(3-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide;

7-(4-(1H-indol-4-yl)phenylamino)-N-hydroxyheptanamide;

7-(2-(1H-indol-5-yl)phenylamino)-N- hydroxyheptanamide;

7-(5-(1H-indol-6-yl)pyridin-2-ylamino)-N-hydroxyheptanamide;

7-(6-(1H-indol-6-yl)pyridin-3-ylamino)-N-hydroxyheptanamide;

7-(3-(1H-indol-7-yl)phenylamino)-N-hydroxyheptanamide;

7-(5-(1H-indol-6-yl)pyrimidin-2-ylamino)-N- hydroxyheptanamide;

7-(4-(1H-indol-7-yl)phenylamino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-phenylacetamido)-N-hydroxyheptanamide;

phenyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

benzyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

7-((4-(1H-indol-6-yl)phenyl)(2-hydroxyethyl)amino)-N-hydroxyheptanamide;

N-hydroxy-7-(4-(1-(phenylsulfonyl)-1H-indol-2-yl)phenylamino)heptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)thiophene-2-sulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)furan-2-carboxamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methoxyphenylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylbenzamide;

7-(N-(4-(1H-indol-6-yl)phenyl)phenylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)picolinamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3-methoxybenzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3,4,5-trimethylbenzamide;

N-(4-(1H-indol-6-yl)phenyl)-4-(dimethylamino)-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-aminoacetamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-6-chloro-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamnide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)isonicotinamide;

(Z)-N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(N'-hydroxycarbamimidoyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-2,6-difluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-4-fluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-6-(trifluoromethyl)nicotinamide;

6-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyhexanamide;

8-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyoctanamide;

N-(4-(1H-indol-6-yl)phenyl)-4-ethoxy-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

7-((4-(1H-indol-6-yl)phenyl)(benzyl)amino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-2,4,6-trifluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-4-amino-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)piperidin-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxy-3-(trifluoromethyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(trifluoromethyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3,4-dimethoxybenzamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-3,4-dimethoxyphenylsulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-(methylsulfonyl)phenylsulfonamido)-N-hydroxyheptanamide;

7-(4-(1H-indol-6-yl)-3-(trifluoromethyl)phenylamino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)-3-(trifluoromethyl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide;

7-(N-(4-(1H-indol-6-yl)phenyl)naphthalene-2-sulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)-3-methylphenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(4-methoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3-methoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)acetamido)-N-hydroxyheptanamide;

methyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(2-methoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3,5-dimethoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-5-amino-2-methoxyphenylsulfonamido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(thiophen-2-yl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)pyridine-3-sulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(dimethylamino)acetamido)-N-hydroxyheptanamide;

4-methoxyphenyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

ethyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

7-(1-(4-(1H-indol-6-yl)phenyl)-3,3-dimethylureido)-N-hydroxyheptanamide;

2-methoxyethyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)nicotinamide;

N-hydroxy-7-(4-(1-methyl-1H-indazol-6-yl)phenylamino)heptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)propionamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-1-methyl-1,2,5,6-tetrahydropyridine-3-carboxamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(pyridin-3-yl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-methylureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)ethylsulfonamido)-N-hydroxyheptanamide;

7-((4-(1H-indol-6-yl)phenyl)(N,N-dimethylsulfamoyl)amino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)cyclohexanecarboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)cyclopropanecarboxamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-morpholinoacetamido)-N-hydroxyheptanamide;

(S)-N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)pyrolidine-2-carboxamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-isopropylureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-isobutylureido)-N-hydroxyheptanamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indazol-6-yl)phenyl)methylsulfonamido)heptanamide;

7-((4-(1H-indol-6-yl)phenyl)(propyl)amino)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(4-methylpiperazin-1-yl)acetamido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-butylureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(4-methylpentyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3-(dimethylamino)propyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(cyclohexylmethyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)pentanamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)isobutyramido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(4-(2-methoxyethyl)piperazin-1-yl)acetamido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3,3-diethylureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-ethylureido)-N-hydroxyheptanamide;

N-hydroxy-7-(N-(4-(2-methyl-1H-indol-5-yl)phenyl)methylsulfonamido)heptanamide;

isobutyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)thiophene-2-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)picolinamide;

7-(N-(4-(1H-indol-5-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-1-methylpiperidine -4-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)picolinamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)morpholine-4-caqrboxamide;

7-(N-(4-(1,2-dimethyl-1H-indol-5-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine -1-carboxamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indazol-6-yl)phenyl)ethylsulfonamido)heptanamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide;

7-(N-(4-(1H-indol-5-yl)phenyl)ethylsulfonamido)-N-hydroxyheptanamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)morpholine-4-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)morpholine-4-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethylmorpholine-4-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)morpholine-4-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethylmorpholine-4-carboxamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indol-5-yl)phenyl)methylsulfonamido)heptanamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indol-6-yl)phenyl)methylsulfonamido)heptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-isopropylpiperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)pyrrolidine-1-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)isonicotinamide;

7-(N-(6-(1H-indol-6-yl)pyridin-3-yl)methylsulfonamido)-N-hydroxyheptanamide;

N-hydroxy-7-(N-(6-(1-methyl-1H-indazol-6-yl)pyridin-3-yl)methylsulfonamido)heptanamide;

7-(N-(6-(1H-indol-5-yl)pyridin-3-yl)methylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-4-acetyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-1,4-diazepane-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indol-6-yl)phenyl)piperazine-1-carboxamide;

7-(N-(4-(1H-indol-2-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

tert-butyl 2-(4-(N-(7-(hydroxyamino)-7-oxoheptyl)methylsulfonamido)phenyl)-1H-indole-1-carboxylate;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(2-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-4-benzyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazole-6-yl)phenyl)piperazine-1-carboxamide;

7-(N-(4-(5-bromo-1H-indol-2-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

tert-butyl 5-bromo-2-(4-(N-(7-(hydroxyamino)-7-oxoheptyl)methylsulfonamido)phenyl)-1H-indazole-1-carboxylate;

N-(4-(1H-indol-6-yl)phenyl)-4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide;

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-sulfonamide)heptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(2-methoxyphenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(3-methoxyphenyl)piperazine-1-carboxamide;

N-(4-(3H-benzo[d]imidazol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(2-hydroxyethyl)piperazine-1-carboxamide;

7-(3-(2-(dimethylamino)ethyl)-1-(4-(1-methyl-1H-indazol-6-yl)phenyl)ureido)-N-hydroxyheptanamide;

N-hydroxy-7-(1-(4-(1-methyl-1H-indazol-6-yl)phenyl)-3-(2-(1-methylpyrolidin-2-yl)ethyl)ureido)heptanamide;

N-(4-(1H-indol-6-yl)phenyl)-4-butyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carboxamide;

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-4-(2-(dimethylamino)ethyl)-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

7-(3-((1-ethylpyrolidin-2-yl)methyl)-1-(4-(1-methyl-1H-indazol-6-yl)phenyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methylpiperazine-1-sulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-5-yl)phenyl)-4-methylpiperazine-1-sulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methylpiperazine-1-carbothioamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-5-yl)phenyl)-4-methylpiperazine-1-carbothioamido)-N-hydroxyheptanamide; or

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carbothioamido)heptaneamide.

(7) Particularly preferred examples of the hydroxamate derivatives of formula I according to the present invention are as follows:

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(2-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide;

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide; or

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-sulfonamido)heptanamide.

(8) Use of hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to any one of (1) to (6) for preparing pharmaceutical compositions.

(9) Pharmaceutical compositions comprising hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to any one of (1) to (6) together with pharmaceutically acceptable carriers.

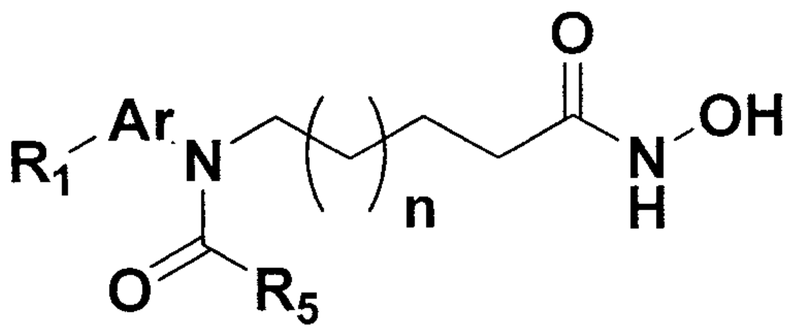
(10) The pharmaceutical compositions according to (9), wherein the compositions are used for prevention or treatment of a disease associated with histone deacetylase activity.

(11) The pharmaceutical compositions of (10), wherein the disease associated with histone deacetylase activity is malignant tumor, viral and bacterial infection, vascular restenosis, inflammatory disease, autoimmune disease or psoriasis.

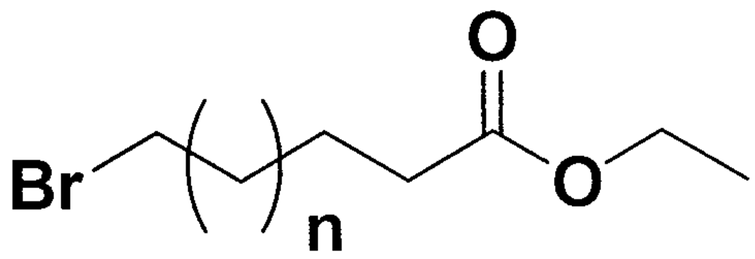
(12) A method for prevention or treatment of disease, the method comprising administering the pharmaceutical compositions according to any one of (9) to (11).

(13) A method for preparing hydroxamate derivatives, the method comprising the steps of: allowing a compound of the following formula II to react with bromoaniline in the presence of an inorganic salt so as to prepare a compound of the following formula III; allowing the compound of formula III to react with 4-nitrophenylchloroformate so as to prepare a compound of the following formula VI; subjecting the compound of formula VI to the Suzuki reaction with boronic acid in the presence of palladium to prepare a compound of the following formula VII; allowing the compound of formula VII to react with an amine in the presence of an inorganic salt so as to prepare a compound of the following formula VIII; and treating the compound of formula VIII with a hydroxide salt, thus preparing hydroxamate derivatives of the following formula I-2:

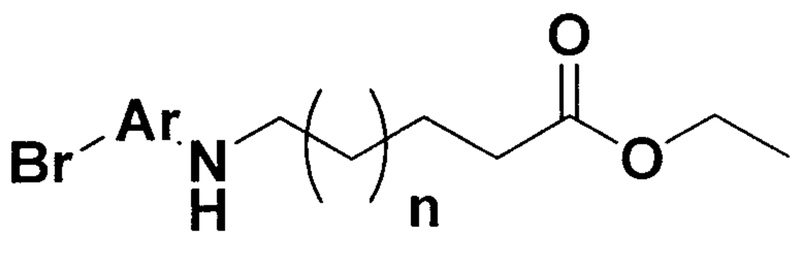
[Formula I-2]



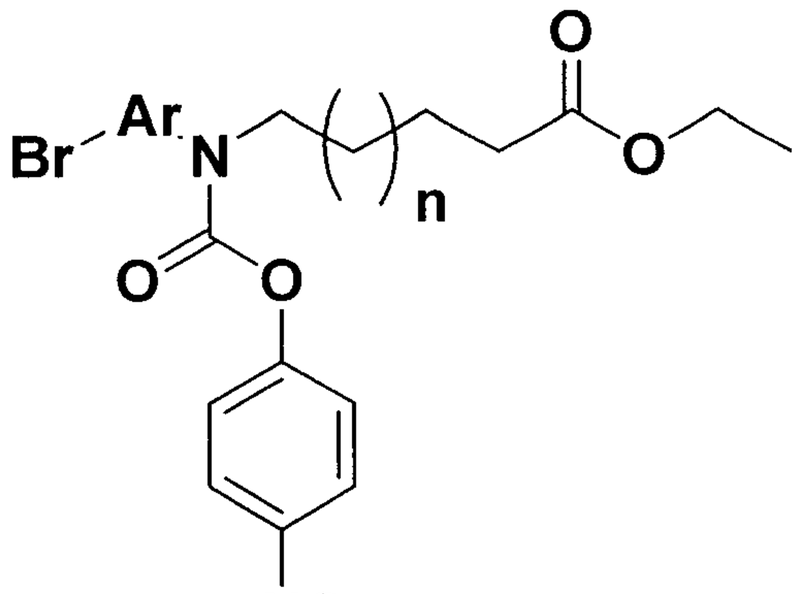
[Formula II]



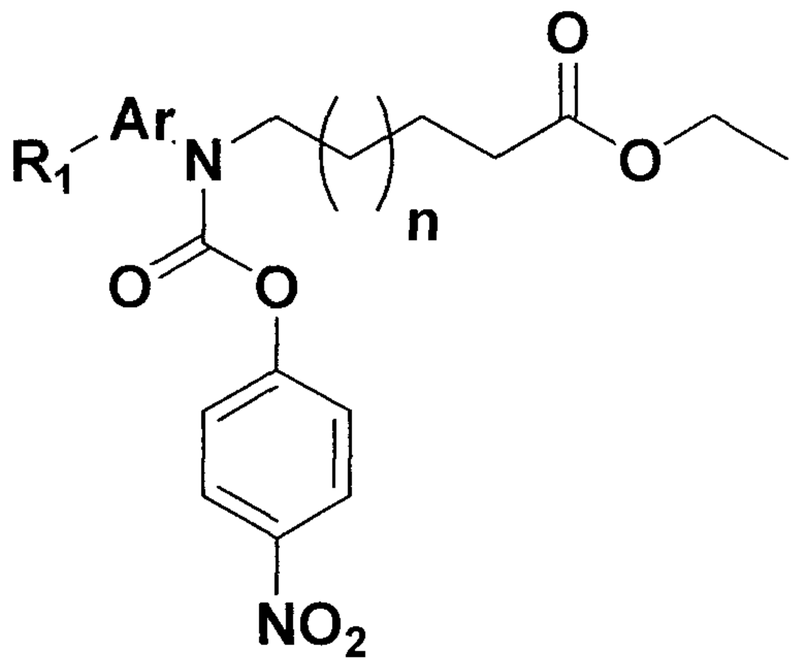
[Formula III]



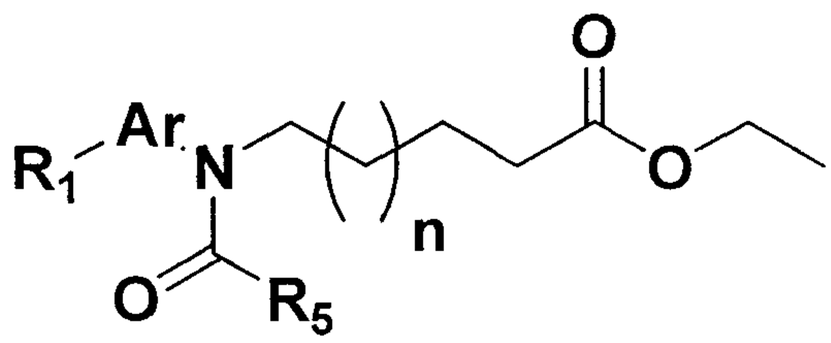
[Formula VI]



[Formula VII]



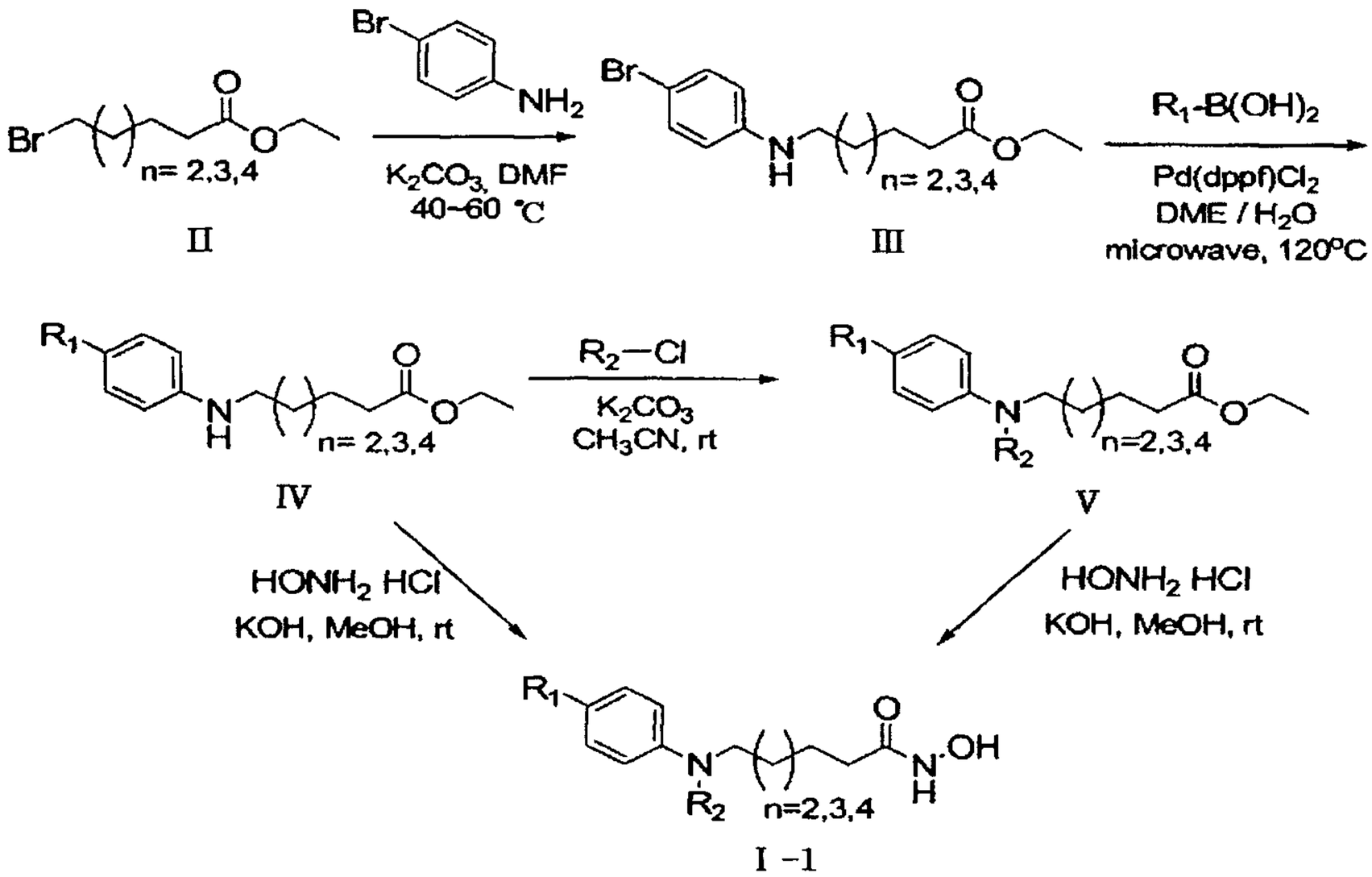
[Formula VIII]



wherein n is 3, Ar is phenyl, R_1 is 1H-indol-5-yl, 1-methyl-1H-indazol-6-yl, 1-methyl-1H-indazol-5-yl, 3H-benzo[d]imidazol-5-yl, or 1H-indol-6-yl, and R_5 is 1-methylpiperazine, morpholine, 2,6-dimethylmorpholine, 1-ethylpiperazine, N,N-dimethylethane-1,2-diamine, 2-(1-methylpyrrolidin-2-yl)ethanamine, (1-ethylpyrrolidin-2-yl)methanamine, 4-methoxy benzenamine, 3-methoxy benzenamine, 2-methoxy benzenamine, 3,5-dimethoxy benzenamine, thiophen-2-amine, dimethylamine, pyridine-3-amine, methylamine, isopropylamine, isobutylamine, butylamine, 4-methylpentylamine, N,N-dimethylpropane-1,3-diamine, cyclohexylmethylamine, diethylamine, ethylamine, 1-isopropylpiperazine, pyrrolidine, 1-(piperazin-1-yl)ethanone, 1-methylhomopiperazine, 1-benzylpiperazine, 1-(2-methoxyphenyl)piperazine, 1-(3-methoxyphenyl)piperazine, 2-(piperazin-1-yl)ethanol, 1-butylpiperazine, N,N-dimethyl-2-(piperazin-1-yl)ethanamine, or 4-methylpiperidine.

The hydroxamate derivatives of formula I of the present invention can be prepared according to the following reaction scheme 1:

[Reaction Scheme 1]



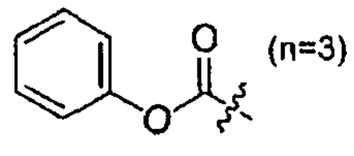
R_1 = 1H-indol-6-yl

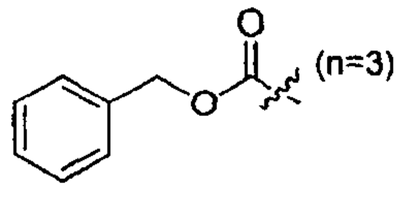
Compound 167. R_2 = hydrogen (n=3)

Compound 180. R_2 = 4-methoxybenzoyl (n=3)

Compound 181. R_2 = nicotinoyl (n=3)

Compound 184. R_2 = 2-phenylacetyl (n=3)

Compound 185. R_2 = 

Compound 189. R_2 = 

Compound 190. R_2 = hydroxyethyl (n=3)

Compound 203. R_2 = thiophene-2-sulfonyl (n=3)

Compound 204. R_2 = furan-2-carbonyl (n=3)

Compound 207. R_2 = 4-methoxybenzene sulfonyl (n=3)

Compound 209. R_2 = 4-methylbenzoyl (n=3)

Compound 210. R_2 = benzenesulfonyl (n=3)

Compound 211. R_2 = picolinoyl (n=3)

Compound 212. R_2 = 3-methoxybenzoyl (*n*=3)

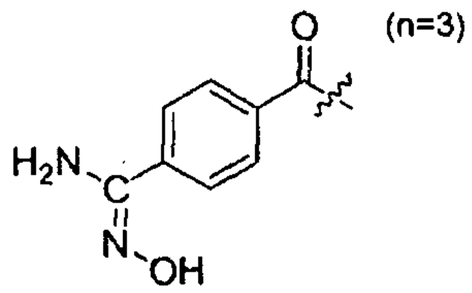
Compound 214. R_2 = 3,4,5-trimethoxybenzoyl (n=3)

Compound 215. R_2 = 4-dimethylaminobenzoyl (n=3)

Compound 218. R_2 = 2-aminoacetyl (*n*=3)

Compound 221. R_2 = 6-chloronicotinoyl (n=3)

Compound 222. R_2 = isonicotinoyl (n=3)

Compound 228. R_2 = 

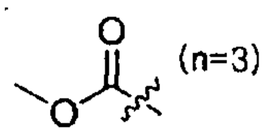
Compound 229. R_2 = 2,6-difluorobenzoyl (n=3)

Compound 230. R_2 =4-fluorobenzoyl (n=3)

Compound 231. R_2 = 6-(trifluoromethyl)nicotinoyl (n=3)

Compound 234. R_2 = hydrogen (n=2)

R_1 = 1H-indol-6-yl

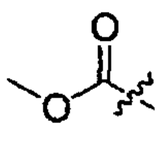
Compound 258. R_2 = 

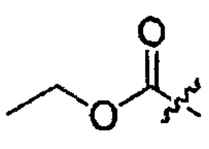
Compound 261. R_2 = 5-amino-2-methoxybenzene-1-sulfonyl (n=3)

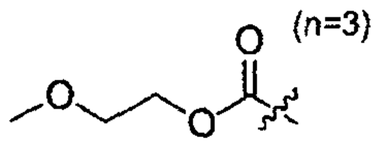
Compound 263. R_2 = pyridine-3-sulfonyl (n=3)

Compound 264. R_2 = methanesulfonyl (n=3)

Compound 265. R_2 = 2-(dimethylamino)acetyl (n=3)

Compound 266. R_2 = 

Compound 267. R_2 = 

Compound 269. R_2 = 

Compound 272. R_2 = propionyl (n=3)

Compound 273. R_2 = 1-methyl-1,2,5,6-tetrahydropyridine-3-carbonyl (n=3)

Compound 276. R_2 = ethanesulfonyl (n=3)

Compound 277. R_2 = dimethylsulfamoyl (n=3)

Compound 278. R_2 = cyclohexanecarbonyl (n=3)

Compound 279. R_2 = cyclopropanecarbonyl (n=3)

Compound 280. R_2 = 2-morpholinoacetyl (n=3)

Compound 281. R_2 = (S)-pyrrolidine-2-carbonyl (n=3)

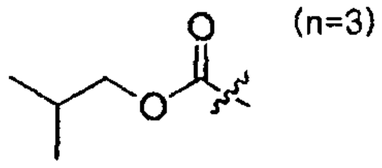
Compound 285. R_2 = propane (n=3)

Compound 286. R_2 = 2-(4-methylpiperazin-1-yl)acetyl (n=3)

Compound 291. R_2 = pentanoyl (n=3)

Compound 292. R_2 = isobutyryl (n=3)

Compound 293. R_2 = 2-(4-(2-methoxyethyl)piperazin-1-yl)acetyl (n=3)

Compound 299. R_2 = 

Compound 300. R_2 = thiophene-2-carbonyl (n=3)

Compound 304. R_2 = 1-methylpiperidine-4-carbonyl (n=3)

Compound 354. R_2 = 4-methylpiperazine-1-sulfonyl (n=3)

R_1 = 1H-indol-6-yl

Compound 235. R_2 = hydrogen (n=4)

Compound 236. R_2 = 4-methoxybenzoyl (n=3)

Compound 237. R_2 = benzyl (n=3)

Compound 239. R_2 = 2,4,6-trifluorobenzoyl (n=3)

Compound 242. R_2 = 4-aminobenzoyl (n=3)

Compound 243. R_2 = piperidine-1-carbonyl (n=3)

Compound 244. R_2 = 4-methoxy-3-(trifluoromethyl)benzoyl (n=3)

Compound 245. R_2 = 4-(trifluoromethyl)benzoyl (n=3)

Compound 246. R_2 = 3,4-dimethoxybenzoyl (n=3)

Compound 249. R_2 = 3,4-dimethoxybenzene-1-sulfonyl (n=3)

Compound 250. R_2 = 4-(methanesulfonyl)benzene-1-sulfonyl (n=3)

Compound 253. R_2 = naphthalene-2-sulfonyl (n=3)

Compound 257. R_2 = acetyl (n=3)

R_1 = 1H-methyl-1H-indol-5-yl

Compound 158. R_2 = hydrogen (n=3)

R_1 = 1H-methyl-1H-indol-5-yl

R_1 = 1H–indol-5-yl

Compound 150. R_2 = hydrogen (n=3)

Compound 208. R_2 = 4-methoxybenzoyl (n=3)

Compound 303. R_2 = methanesulfonyl (n=3)

Compound 305. R_2 = picolinoyl (n=3)

Compound 311. R_2 = nicotinoyl (n=3)

Compound 314. R_2 = ethanesulfonyl (n=3)

Compound 325. R_2 = isonicotinoyl (n=3)

Compound 355. R_2 = 4-methylpiperazine-1-sulfonyl (n=3)

R_1 = 1-methyl-1H-indazol-6-yl

Compound 270. R_2 = nicotinoyl (n=3)

Compound 271. R_2 = hydrogen (n=3)

Compound 284. R_2 = methanesulfonyl (n=3)

Compound 302. R_2 = picolinoyl (n=3)

Compound 310. R_2 = ethanesulfonyl (n=3)

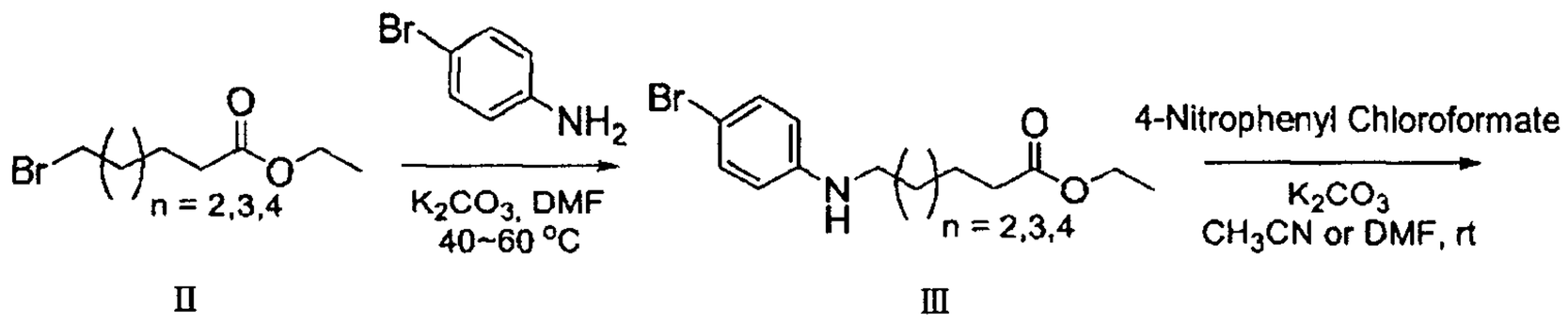
Compound 342. R_2 = 4-methylpiperazine-1-sulfonyl (n=3)

As shown reaction scheme 1 above, potassium carbonate (K_2CO_3) and dimethylformamide (DMF) are added to the compound of formula II that is the starting material, and then a bromoaniline compound is added dropwise thereto, after which the mixture is allowed to react at a temperature of 40~60 °C, thus synthesizing the compound of formula III. As shown in reaction scheme 1, the obtained compound of formula III is subjected to the Suzuki reaction (Morris, G. A., et al., Tetrahedron Lett., 2001, 42, 2093) using boronic acid, thus preparing the compound of formula IV. Where R_2 is H, potassium hydroxide (KOH), methanol and hydroxylamine hydrochloride ($HONH_2$ HCl) are sequentially added dropwise to the compound of formula IV, and then allowed to react at room temperature, thus synthesizing desired final compounds 150, 167, 234, 235 and 271.

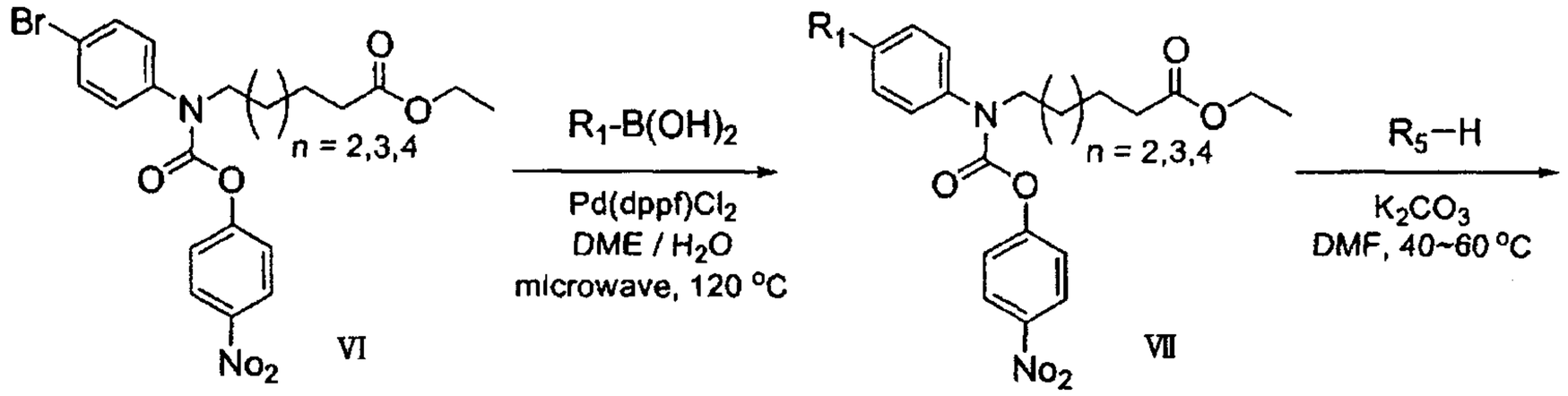
Where R_2 is not H, acid chloride is added to the compound of formula IV, and potassium carbonate (K_2CO_3) and acetonitrile (CH_3CN) are added dropwise thereto, after which the mixture is acylated at room temperature, thus preparing an amide derivative of formula V. To the amide derivative, potassium hydroxide (KOH), methanol and hydroxylamine hydrochloride ($HONH_2$ HCl) are sequentially added dropwise, and the mixture is allowed to react at room temperature, thus preparing desired final compounds 158, 180, 181, 184, 185, 189, 190, 203, 204, 207, 208, 209, 210, 211, 212, 214, 215, 218, 221, 222, 228, 229, 230, 231, 236, 237, 239, 242, 243, 244, 245, 246, 249, 250, 253, 257, 258, 261, 263, 264, 265, 266, 267, 269, 270, 272, 273, 276, 277, 278, 279, 280, 281, 284, 285, 286, 291, 292, 293, 299, 300, 302, 303, 304, 305, 310, 311, 314, 325, 342, 354 and 355.

Also, the hydroxamate derivatives of formula I can be prepared according to the following reaction scheme 2:

[Reaction Scheme 2]



II III



VI VII VIII I -2

R_1 = 1H-indol-5-yl

Compound 313. R_5 = 1-methylpiperazine (n=3)

Compound 316. R_5 = morpholine (n=3)

Compound 319. R_5 = 2,6-dimethylmorpholine (n=3)

Compound 340. R_5 = 1-ethylpiperazine (n=3)

R_1 = 1-methyl-1H-indazol-6-yl

Compound 312. R_5 = 1-methylpiperazine (n=3)

Compound 315. R_5 = morpholine (n=3)

Compound 318. R_5 = 2,6-dimethylmorpholine (n=3)

Compound 336. R_5 = 1-ethylpiperazine (n=3)

Compound 347. R_5 = N,N-dimethylethane-1,2-diamine (n=3)

Compound 348. R_5 = 2-(1-methylpyrrolidin-2-yl)ethanamine (n=3)

Compound 353. R_5 = (1-ethylpyrrolidin-2-yl)methanamine (n=3)

R_1 = 1-methyl-1H-indazol-5-yl

Compound 350. R_5 = 1-methylpiperazine (n=3)

Compound 351. R_5 = 1-ethylpiperazine (n=3)

R_1 = 3H-benzo[d]imidazol-5-yl

Compound 345. R_5 = 1-methylpiperazine (n=3)

R_1 = 1H-indol-6-yl

Compound 255. R_5 = 4-methoxybenzeneamine (n=3)

Compound 256. R_5 = 3-methoxybenzeneamine (n=3)

Compound 259. R_5 = 2-methoxybenzeneamine (n=3)

Compound 260. R_5 = 3,5-dimethoxybenzeneamine (n=3)

Compound 262. R_5 = thiophene-2-amine (n=3)

Compound 268. R_5 = dimethylamine (n=3)

Compound 274. R_5 = pyridine-3-amine (n=3)

Compound 275. R_5 = methylamine (n=3)

Compound 282. R_5 = isopropylamine (n=3)

Compound 283. R_5 = isobutylamine (n=3)

Compound 287. R_5 = butylamine (n=3)

Compound 288. R_5 = 4-methylpentylamine (n=3)

Compound 289. R_5 = N,N-dimethylpropane-1,3-diamine (n=3)

Compound 290. R_5 = cyclohexylmethylamine (n=3)

Compound 294. R_5 = diethylamine (n=3)

Compound 295. R_5 = ethylamine (n=3)

Compound 306. R_5 = morpholine (n=3)

Compound 309. R_5 = 1-methylpiperazine (n=3)

Compound 317. R_5 = 2,6-dimethylmorpholine (n=3)

Compound 323. R_5 = 1-isopropylpiperazine (n=3)

Compound 324. R_5 = pyrrolidine (n=3)

Compound 329. R_5 = 1-(piperazin-1-yl)ethanone (n=3)

Compound 330. R_5 = 1-methylhomopiperazine (n=3)

Compound 335. R_5 = 1-benzylpiperazine (n=3)

Compound 339. R_5 = 1-ethylpiperazine (n=3)

Compound 343. R_5 = 1-(2-methoxyphenyl)piperazine (n=3)

Compound 344. R_5 = 1-(3-methoxyphenyl)piperazine (n=3)

Compound 346. R_5 = 2-(piperazin-1-yl)ethanol (n=3)

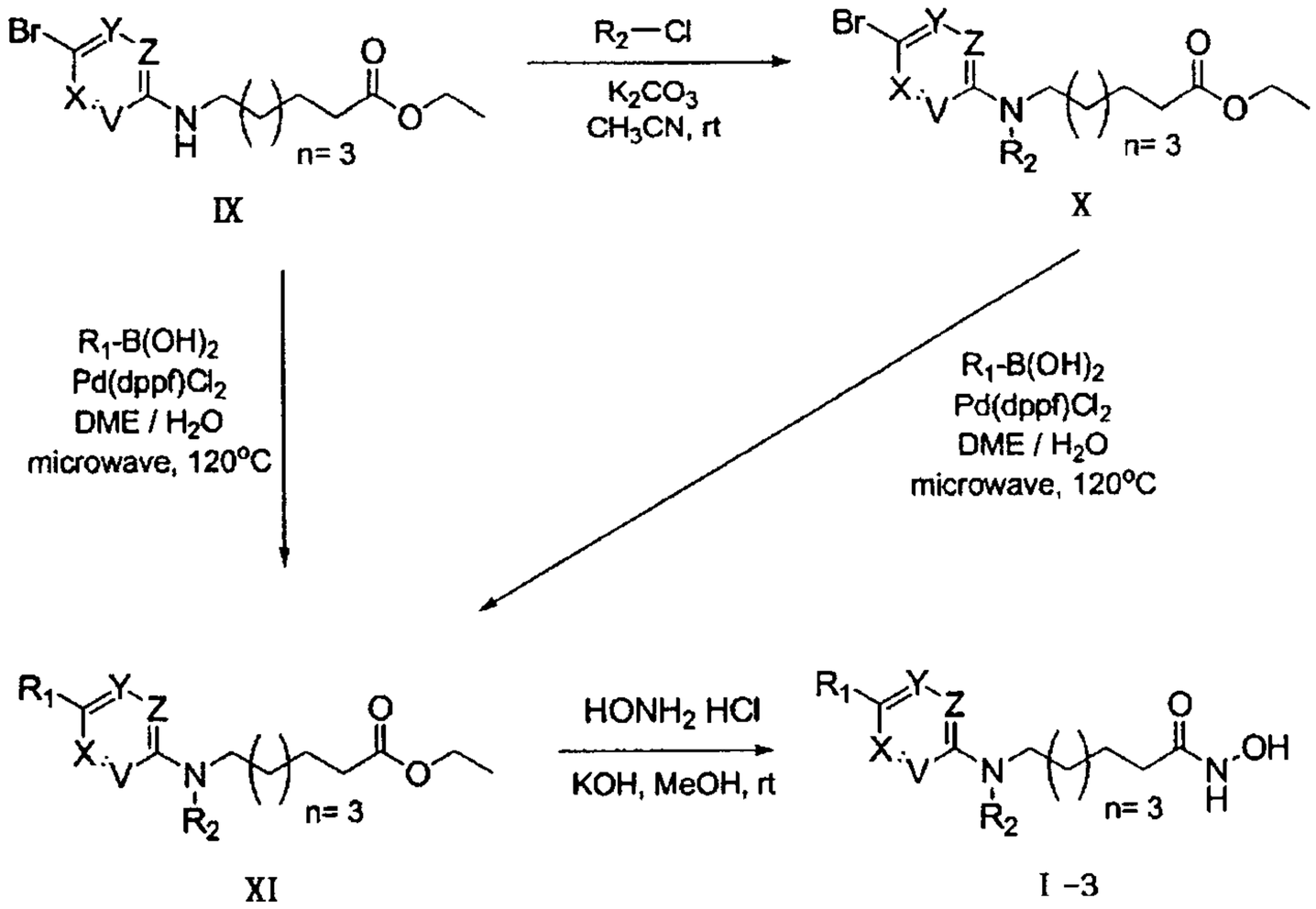
Compound 349. R_5 = 1-butylpiperazine (n=3)

Compound 352. R_5 = N,N-dimethyl-2-(piperazin-1-yl)ethanamine (n=3)

Compound 356 R_5 = 4-methylpiperidine (n=3)

As shown in reaction scheme 2 above, the compound of formula III is synthesized in the same manner as reaction scheme 1, and then allowed to react 4-nitrophenylchloroformate so as to synthesize the compound of formula VI, which is then subjected to the Suzuki reaction (Morris, G. A., et al., Tetrahedron Lett., 2001, 42, 2093) using boronic acid, thus synthesizing the compound of formula VII. Various substituents are added to the compound of formula VII, thus synthesizing the compound of formula VIII. To the compound of formula VIII, potassium hydroxide (KOH), methanol and hydroxyamine hydrochloride ($HONH_2$ HCl) are sequentially added dropwise, and the mixture is allowed to react at room temperature, thus preparing desired final compounds. Reaction scheme 2 shows a general process for synthesizing inventive compounds 255, 256, 259, 260, 262, 268, 274, 275, 282, 283, 287, 288, 289, 290, 294, 295, 306, 309, 312, 313, 315, 316, 317, 318, 319, 323, 324, 329, 330, 335, 336, 339, 340, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353 and 356. Other compounds of the present invention can also be prepared according to reaction scheme 2.

[Reaction Scheme 3]



V, X, Y and Z = CH

Compound 170. R_1 = 1H-indol-4-yl, R_2 = hydrogen

Compound 179. R_1 = 1H-indol-7-yl, R_2 = hydrogen

Compound 191. R_1 = 1-(phenylsulfonyl)-1H-indol-2-yl, R_2 = hydrogen

Compound 332. R_1 = 1H-indol-2-yl, R_2 = methanesulfonyl

Compound 333. R_1 = 1-(tert-butoxycarbonyl)-1H-indol-2-yl,

R_2 = methanesulfonyl

Compound 337. R_1 = 5-bromo-1H-indol-2-yl, R_2 = methanesulfonyl

Compound 338. R_1 = 5-bromo-1-(tert-butoxycarbonyl)-1H-indol-2-yl,

R_2 = methanesulfonyl

V= N, and X, Y and Z = CH

Compound 174. R_1 = 1H-indol-6-yl, R_2 = hydrogen

V, Y and Z = CH, and X =N

Compound 175. R_1 = 1H-indol-6-yl, R_2 = hydrogen

Compound 326. R_1 = 1H-indol-6-yl, R_2 = methanesulfonyl

Compound 327. R_1 = 1-methyl-1H-indazol-6-yl, R_2 = methanesulfonyl

Compound 328. R_1 = 1H-indol-5-yl, R_2 = methanesulfonyl

V and Z = N, and X and Y = CH

Compound 178. R_1 = 1H-indol-6-yl, R_2 = hydrogen

V, Y and Z = CH, and X = CCF_3

Compound 251. R_1 = 1H-indol-6-yl, R_2 = hydrogen

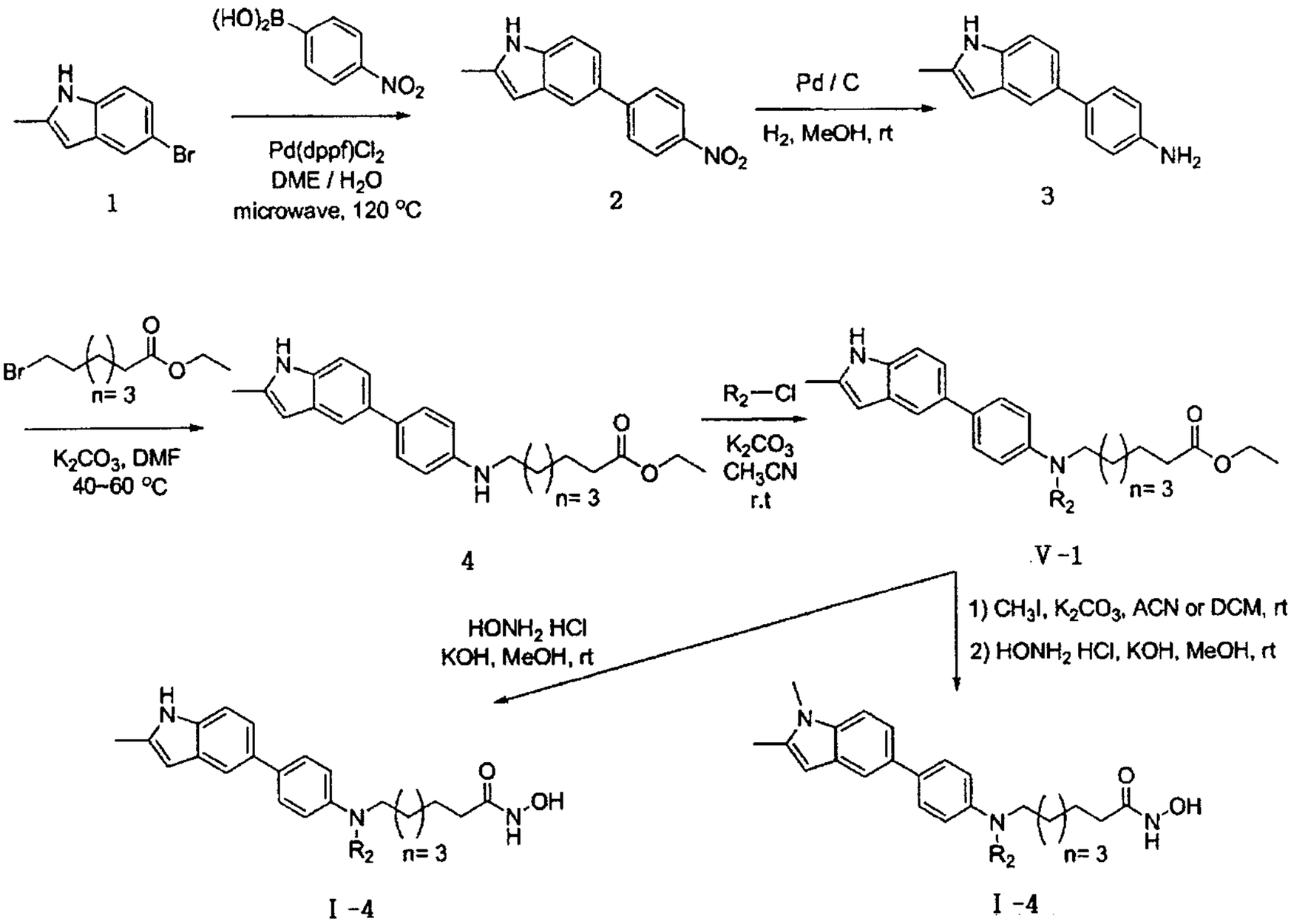
Compound 252 . R_1 = 1H-indol-6-yl, R_2 = nicotinoyl

V, Y and Z = CH, and X = CCH_3

Compound 254 . R_1 = 1H-indol-6-yl, R_2 = 4-methoxybenzoyl

Reaction scheme 3 above shows a general process for synthesizing inventive compounds 170, 174, 175, 178, 179, 191, 251, 252, 254, 326, 327, 328, 332, 333, 337 and 338. As shown in reaction scheme 3, the compound of formula IX or X is used as a starting material and subjected to the Suzuki reaction (Morris, G. A., et al., Tetrahedron Lett., 2001, 42, 2093) using boronic acid, thus synthesizing the compound of formula XI. To the compound of formula XI, potassium hydroxide (KOH), methanol and hydroxylamine hydrochloride ($HONH_2$ HCl) are sequentially added dropwise, and the mixture is allowed to react at room temperature, thus preparing desired final compounds.

[Reaction Scheme 4]

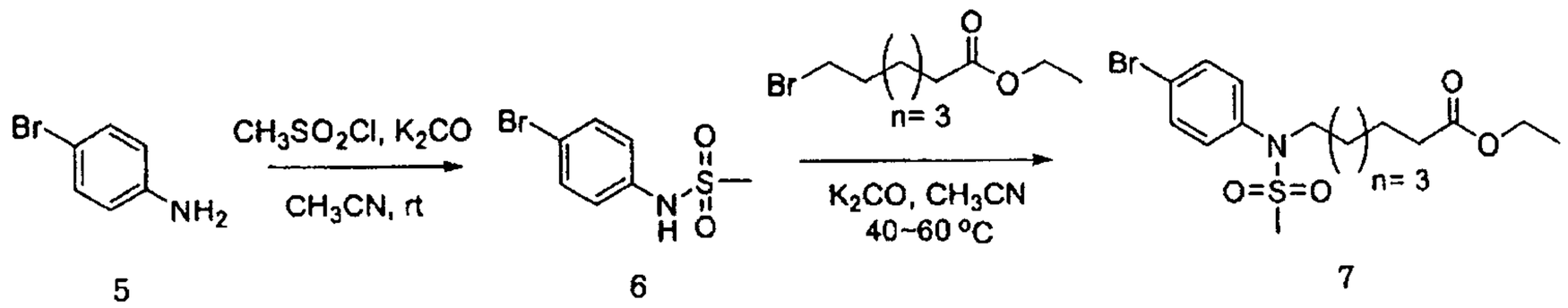


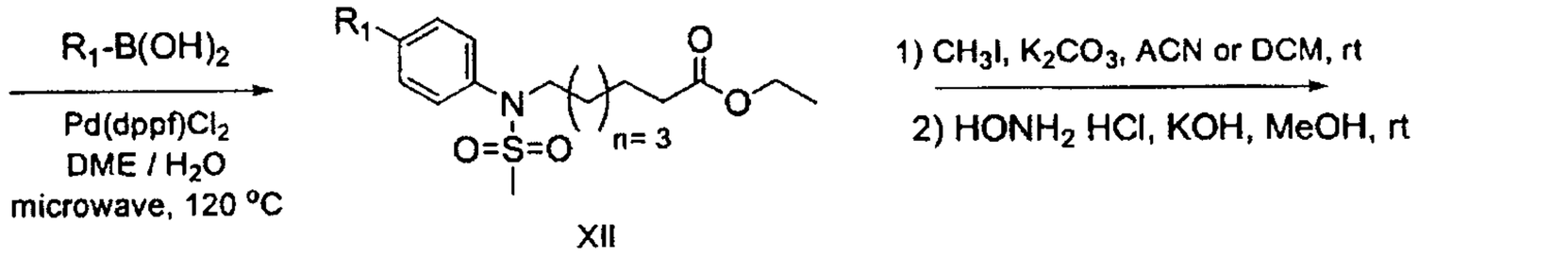
Compound 296. R_2 = methanesulfonyl
Compound 334. R_2 = 4-methylpiperazine-1-carbonyl

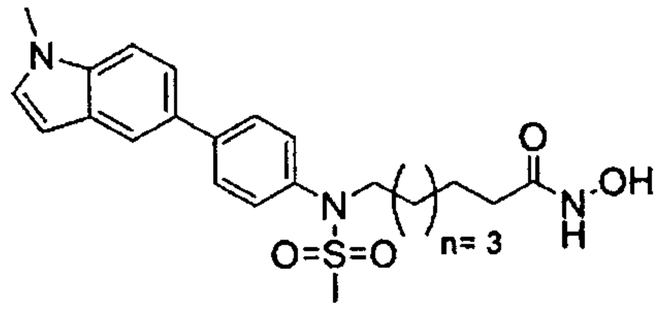
Compound 307. R_2 = methanesulfonyl

Reaction scheme 4 above shows a general process of preparing inventive compounds 296, 307 and 334, and other compounds of the present invention can also be prepared according to reaction scheme 4. As shown in reaction scheme 4, compound 1 is subjected to the Suzuki coupling reaction to prepare compound 2, and the nitro group of compound 2 is reduced to obtain compound 3, which is then allowed to react with ethyl 7-bromoheptanoate, thus synthesizing compound 4. Then, compound 4 is sulfonylated or acylated to prepare the compound of formula V-1, after which potassium hydroxide (KOH), methanol and hydroxylamine hydrochloride ($HONH_2$ HCl) are sequentially added dropwise thereto, or compound 4 is methylated, after which potassium hydroxide (KOH), methanol and hydroxylamine hydrochloride ($HONH_2$ HCl) are sequentially added dropwise thereto, thus preparing a final compound.

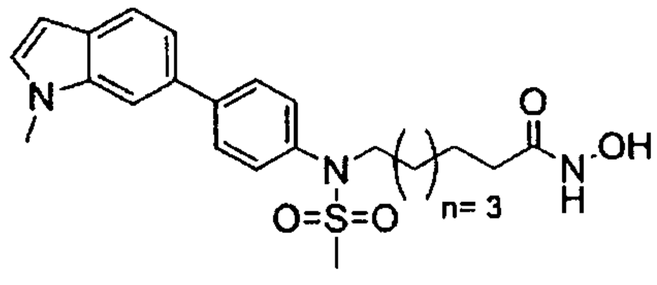
[Reaction Scheme 5]







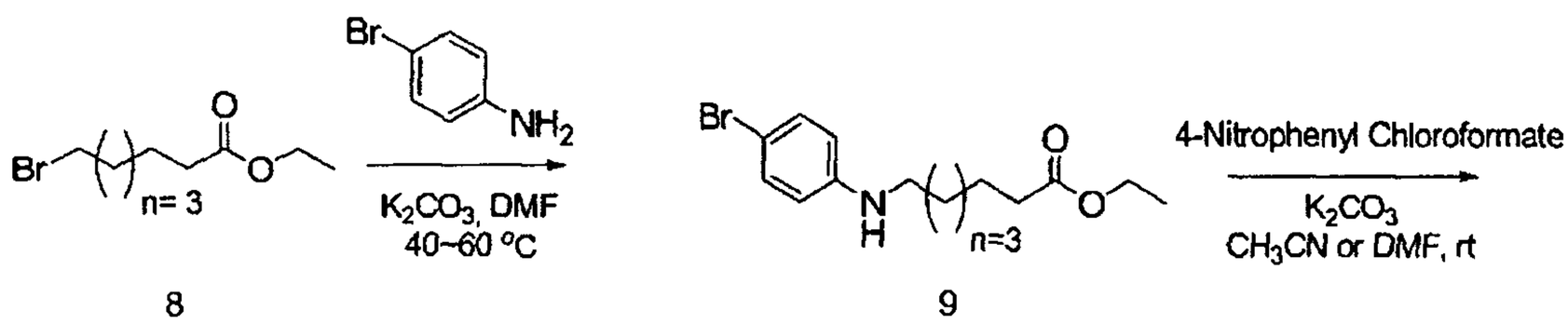
Compound 320. R_1=1H-indol-5-yl



Compound 321. R_1=1H-indol-6-yl

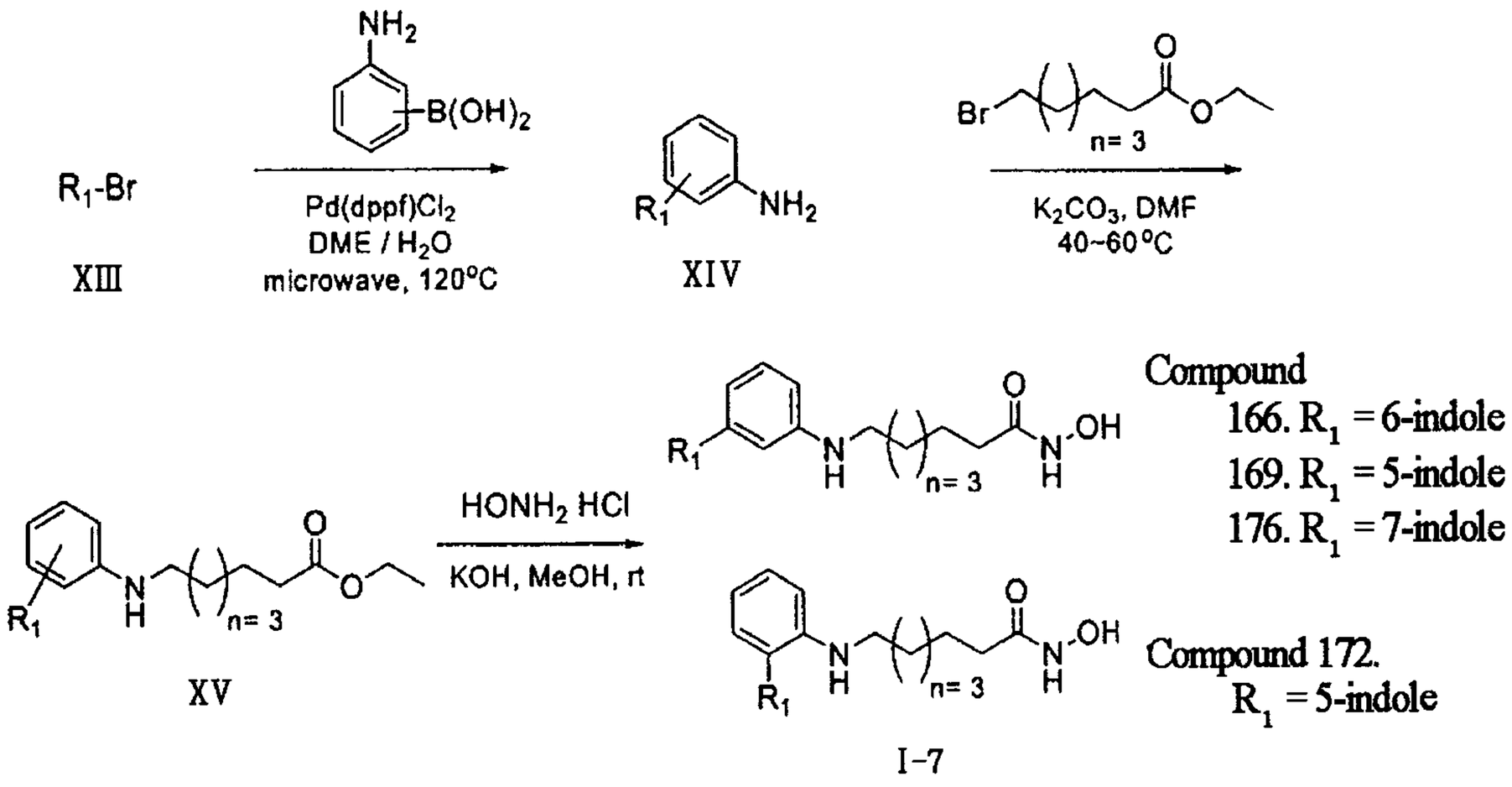
Reaction scheme 5 above shows a general process of synthesizing compounds by introducing methanesulfonyl into compound 5, and other compounds of the present invention can also be prepared according to reaction scheme 5. As shown in reaction scheme 5, the starting material is allowed to react with methanesulfonyl and ethyl 7-bromoheptanoate sequentially, and the resulting product is subjected to the Suzuki reaction to synthesize the compound of formula XII, which is then N-methylated and hydroxamated, thus synthesizing final compounds 320 and 321.

[Reaction Scheme 6]



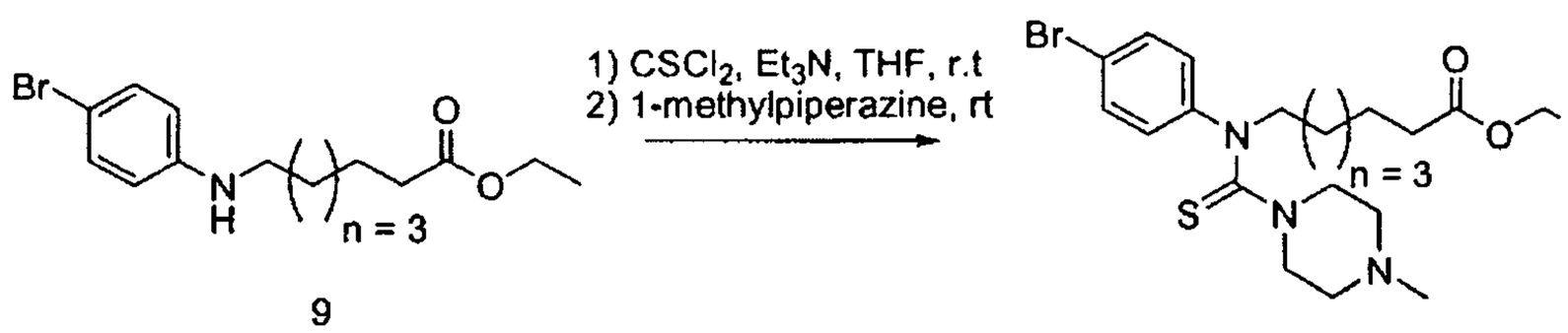
Reaction scheme 6 above shows a general process of synthesizing inventive compounds 331 and 341, and other compounds of the present invention can also be prepared according to reaction scheme 6. As shown in Reaction Scheme 6, the compound of formula VII-1 is synthesized in the same manner as in reaction scheme 2, after which the compound of formula VII-1 is N-methylated and substituted with piperazine to make the compound of formula VIII-1 which is then hydroxamated, thus synthesizing final compounds.

[Reaction Scheme 7]



Reaction scheme 7 above shows a general process of synthesizing inventive compounds 166, 169, 172 and 176, and other compounds of the present invention can also be prepared according to reaction scheme 7. As shown in reaction scheme 7, the compound of formula XIII that is the starting material is subjected to the Suzuki reaction to synthesize the compound of formula XIV, which is then N-alkylated with ethyl 7-bromoheptanoate to synthesize the compound of formula XV, which is then hydroxamated, thus synthesizing final compounds.

[Reaction Scheme 8]



Compound 357. R_1 = 1H-indol-6-yl
Compound 358. R_1 = 1H-indol-5-yl
Compound 359. R_1 = 1-methyl-1H-indazol-5-yl

Reaction scheme 8 above shows a general process of synthesizing inventive compounds 357, 358 and 359, and other compounds of the present invention can also be prepared according to reaction scheme 8. As shown in reaction scheme 9, compound 9 is allowed to react with thiophosgene and methylpiperazine so as to synthesize compound 11, which is then subjected to the Suzuki reaction to synthesize the compound of formula XVI, which is then hydroxamated, thus synthesizing final compounds.

[Examples]

Hereinafter, the present invention will be described in further detail with reference to examples. It is to be understood, however, that these examples are illustrative purposes only and are not construed to limit the scope of the present invention.

Compound 150

7-(4-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide

As shown in reaction scheme 1, 4-bromoaniline and ethyl 7-bromoheptanoate were reacted with each other to obtain a compound of formula III, which was then subjected to the Suzuki reaction

to obtain a compound of formula IV, which was then stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours. After the completion of the reaction has been confirmed, the reaction product was distilled under reduced pressure to remove the solvent, and the remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 150 (30 mg, 62%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.42 (m, 2H), 7.17 (m, 1H), 7.11 (m, 1H), 6.92 (dd, J = 2.4, 0.5 Hz, 1H), 6.70 (d, J = 8.7 Hz, 1H), 6.66 (dd, J = 8.7, 2.3 Hz, 1H), 6.44 (dd, J = 3.1, 0.8 Hz, 1H), 6.26 (dd, J = 3.1, 0.8 Hz, 2H), 3.09 (t, J = 7.1 Hz, 2H), 2.09 (t, J = 7.3 Hz, 2H), 1.63 (m, 4H), 1.44 (m, 4H). MS (ESI) m/z 352 (M^+ + H).

Compound 158

N-hydroxy-7-(4-(1-methyl-1H-indol-5-yl)phenylamino)heptanamide

As shown in reaction scheme 1, 4-bromoaniline and ethyl 7-bromoheptanoate were reacted with each other to obtain a compound of formula III, which was then subjected to the Suzuki reaction with boronic acid, and the resulting compound was stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining 158 (39 mg, 41%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.66 (s, 1H), 7.41 (d, J = 8.7 Hz, 2H), 7.35 (s, 1H), 7.11 (d, J = 3.1 Hz, 1H), 6.71 (d, J = 8.7 Hz, 2H), 6.41 (d, J = 3.1 Hz, 1H), 3.19 (s, 3H), 3.10 (t, J = 7.2 Hz, 2H), 2.10 (t, J = 7.5 Hz, 2H), 1.62 (m, 4H), 1.25 (m, 4H). MS (ESI) m/z 366 (M^+ + H)

Compound 166

7-(3-(1H-indol-6-yl)phenylamino)-N-hydroxyheptanamide

As shown in reaction scheme 7, a compound of formula XIV was obtained through the Suzuki reaction and then was allowed to react with ethyl 7-bromoheptanoate so as to obtain a compound of formula XV, after which the compound of formula XV (10 mg, 0.03 mmol) was stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining 166 (7 mg, 73%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56(m, 2H), 7.31(m, 3H), 6.92(m, 2H), 6.63(m, 1H), 6.37(m, 1H), 3.14(m, 2H), 2.14(m, 2H), 1.67(m, 4H), 1.41(m, 4H). MS (ESI) m/z 352 (M^+ + H).

Compound 167

7-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyheptanamide

Compound 167 (35 mg, 52%) as a white solid was obtained according to the same method as the synthesis of compound 150.

^{1}H NMR (400 MHz, CD_3OD) δ 7.52 (d, J = 8.3 Hz, 1H), 7.51 (s, 1H), 7.43 (dd, J = 6.6, 2.0 Hz, 1H), 7.22 (dd, J = 8.3, 1.6 Hz, 1H), 7.19 (d, J = 3.1 Hz, 1H), 6.70 (dd, J = 6.7, 2.0 Hz, 2H), 6.40 (dd, J = 3.1,

0.8 Hz, 1H), 3.10 (t, J = 7.1 Hz, 2H), 2.10 (t, J = 7.4 Hz, 2H), 1.62 (m, 4H), 1.41 (m, 2H). MS (ESI) m/z 352 (M^+ + H).

Compound 169

7-(3-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide

Compound 169 (8 mg, 70%) as a white solid was obtained according to the same method as the synthesis of compound 166.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, J = 1.4 Hz, 1H), 7.38 (m, 2H), 7.24 (d, J = 3.1 Hz, 1H), 7.15 (m, 2H), 6.92 (m, 2H), 6.60 (m, 1H), 6.47 (d, J = 3.0 Hz, 1H), 3.14 (m, 2H), 2.11 (m, 2H), 1.66 (m, 4H), 1.42 (m, 4H). MS (ESI) m/z 352 (M^+ + H).

Compound 170

7-(4-(1H-indol-4-yl)phenylamino)-N-hydroxyheptanamide

As shown in reaction scheme 3, a compound of formula IX was subjected to the Suzuki reaction to obtain a compound of formula XI, which was then stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 170 (15 mg, 78%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.45 (dd, J = 6.5, 2.1 Hz, 2H), 7.29 (d, J = 8.2 Hz, 1H), 7.19 (d, J = 3.2 Hz, 1H), 7.17 (t, J = 8.2 Hz, 1H), 7.01 (dd, J = 7.2, 0.8 Hz, 1H), 6.87 (dd, J = 6.5, 2.1 Hz, 2H), 6.55 (dd, J = 3.2, 0.8 Hz, 1H), 4.17 (t, J = 7.0 Hz, 2H), 2.05 (t, J = 7.5 Hz, 2H), 1.58 (m, 2H), 1.33 (m, 6H). MS (ESI) m/z 352 (M^+ + H).

Compound 172

7-(2-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide

Compound 172 (3 mg, 21%) as a white solid was obtained according to the same method as the synthesis of compound 166.

^{1}H NMR (400 MHz, CD_3OD) δ 7.50 (d, J = 1.3, 1H), 7.45 (d, J = 8.3 Hz, 1H), 7.27 (d, J = 3.2, 1H), 7.15 (m, 1H), 7.06 (m, 2H), 6.71 (m, 2H), 6.46 (dd, J = 3.1, 0.6 Hz, 1H), 3.07 (t, J = 6.9 Hz, 2H), 2.02 (t, J = 7.6 Hz, 2H), 1.51 (m, 4H), 1.29 (m, 4H). MS (ESI) m/z 352 (M^+ + H)

Compound 174

7-(5-(1H-indol-6-yl)pyridin-2-ylamino)-N-hydroxyheptanamode

Compound 174 (3 mg, 23%) as a white solid was obtained according to the same method as the synthesis of compound 170.

^{1}H NMR (400 MHz, CD_3OD) δ 8.19 (d, J = 2.4 Hz, 1H), 7.75 (dd, J = 8.7, 2.5 Hz, 1H), 7.57 (d, J = 8.3 Hz, 1H), 7.50 (d, J = 8.3 Hz, 1H), 7.50 (d, J = 0.7 Hz, 1H), 7.23 (t, J = 3.3 Hz, 1H), 7.18 (dd, J = 8.3, 1.6 Hz, 1H), 6.60 (d, J = 8.7 Hz, 1H), 6.43 (dd, J = 3.1, 0.9 Hz, 1H), 3.31 (m, 2H), 2.10 (t, J = 7.4 Hz, 2H), 1.65 (m, 4H), 1.43 (m, 4H). MS (ESI) m/z 353 (M^+ + H).

Compound 175

7-(6-(1H-indol-6-yl)pyridin-3-ylamino)-N-hydroxyheptanamide

Compound 175 (11 mg, 33%) as a white solid was obtained according to the same method as the synthesis of compound 170.

^{1}H NMR (400 MHz, CD_3OD) δ 7.95 (d, J = 2.7 Hz, 1H), 7.79 (s, 1H), 7.59 (d, J = 5.8 Hz, 1H), 7.57 (d, J = 5.5 Hz, 1H), 7.45 (dd, J = 8.3, 1.6 Hz, 1H), 7.25 (d, J = 3.1 Hz, 1H), 7.08 (dd, J = 8.7, 2.8 Hz, 1H), 6.44 (dd, J = 3.1, 0.7 Hz, 1H), 3.12 (t, J = 7.0 Hz, 2H), 2.10 (t, J = 7.4 Hz, 2H), 1.64 (m, 4H), 1.42 (m, 4H). MS (ESI) m/z 353 (M^+ + H).

Compound 176

7-(3-(1H-indol-7-yl)phenylamino)-N-hydroxyheptanamide

Compound 176 (22 mg, 56%) as a white solid was obtained according to the same method as the synthesis of compound 166.

^{1}H NMR (400 MHz, CD_3OD) δ 7.51 (d, J = 8.8 Hz, 1H), 7.23 (m, 2H), 7.08 (m, 2H), 6.67 (d, J = 1.4 Hz, 1H), 6.49 (d, J = 3.1 Hz, 1H), 3.12 (t, J = 7.1 Hz, 2H), 2.09 (t, J = 7.4 Hz, 2H), 1.63 (m, 4H), 1.40 (m, 4H). MS (ESI) m/z 352 (M^+ + H).

Compound 178

7-(5-(1H-indol-6-yl)pyrimidin-2-ylamino)-N-hydroxyheptanamide

Compound 178 (39 mg, 84%) as a white solid was obtained according to the same method as the synthesis of compound 170.

^{1}H NMR (400 MHz, CD_3OD) δ 8.56 (s, 2H), 7.58 (d, J = 8.2 Hz, 1H), 7.49 (s, 1H), 7.19 (d, J = 3.1 Hz, 1H), 7.16 (dd, J = 8.2, 1.4 Hz, 1H), 6.42 (d, J = 2.9 Hz, 1H), 4.16 (t, J = 6.9 Hz, 2H), 2.04 (t, J = 7.4 Hz, 2H), 1.78 (m, 2H), 1.30 (m, 6H). MS (ESI) m/z 354 (M^+ + H).

Compound 179

7-(4-(1H-indol-7-yl)phenylamino)-N-hydroxyheptanamide

Compound 179 (12 mg, 82%) as a white solid was obtained according to the same method as the synthesis of compound 170.

^{1}H NMR (400 MHz, CD_3OD) δ 7.47 (dd, J = 7.9, 1.0 Hz, 1H), 7.13 (d, J = 8.3 Hz, 2H), 7.08 (d, J = 3.1 Hz, 2H), 6.99 (t, J = 7.8 Hz, 1H), 6.84 (d, J = 6.2 Hz, 1H), 6.80 (d, J = 8.4 Hz, 2H), 6.44 (d, J = 3.2 Hz, 1H), 3.76 (t, J = 7.6 Hz, 2H), 1.98 (t, J = 7.6 Hz, 2H), 1.43 (m, 2H), 1.30 (m, 2H), 1.04 (m, 2H), 0.86 (m, 2H). MS (ESI) m/z 352 (M^+ + H).

Compound 180

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide

As shown in reaction scheme 1, 4-bromoaniline and ethyl 7-bromoheptanoate were reacted with each other to obtain a compound of formula III, which was then subjected to the Suzuki reaction

with indole 6-boronic acid to obtain a compound of formula IV, which was then acylated with 4-methoxybenzoyl chloride to obtain a compound of formula V, after which the compound (31 mg, 0.06 mmol) of formula V was stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 180 (12 mg, 41%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.57 (m, 4H), 7.27 (m, 4H), 7.13 (d, J = 8.4 Hz, 2H), 6.74 (d, J = 8.8 Hz, 2H), 6.43 (m, 1H), 3.93 (m, 2H), 3.70 (s, 3H), 2.05 (m, 2H), 1.60 (m, 4H), 1.36 (m, 4H). MS (ESI) m/z 352 (M^+ + H).

Compound 181

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide

Compound 181 (10 mg, 45%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.47 (s, 1H), 8.40 (d, J = 3.9 Hz, 1H), 7.79 (d, J = 7.5 Hz, 1H), 7.58 (m, 4H), 7.27 (m, 5H), 6.45 (d, J = 2.9 Hz, 1H), 5.50 (s, 1H), 3.99 (t, J = 6.8 Hz, 2H), 2.09 (t, J = 7.4 Hz, 2H), 1.65 (m, 4H), 1.30 (m, 4H). MS (ESI) m/z 457 (M^+ + H).

Compound 184

7-(N-(4-(1H-indol-6-yl)phenyl)-2-phenylacetamido)-N-hydroxyheptanamide

Compound 184 (27 mg, 82%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.71 (d, J = 8.4 Hz, 2H), 7.65 (m, 2H), 7.34 (m, 1H), 7.29 (d, J = 3.1 Hz, 1H), 7.21 (m, 5H), 7.04 (d, J = 6.8 Hz, 2H), 6.48 (d, J = 3.1 Hz, 1H), 3.74 (t, J = 7.4 Hz, 2H), 3.51 (s, 2H), 2.07 (t, J = 7.4 Hz, 2H), 1.57 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 470 (M^+ + H).

Compound 185

Phenyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 185 (20 mg, 51%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.73 (d, J = 1.9 Hz, 2H), 7.62 (m, 2H), 7.42 (m, 5H), 7.24 (m, 2H), 7.11 (m, 2H), 6.47 (d, J = 1.9 Hz, 1H), 3.81 (m, 2H), 2.10 (m, 2H), 1.62 (m, 4H), 1.38 (m, 4H). MS (ESI) m/z 472 (M^+ + H).

Compound 189

Benzyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 189 (12 mg, 51%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.63 (m, 4H), 7.29 (m, 9H), 6.47 (s, 1H), 5.15 (s, 2H), 3.73 (t, J = 7.5 Hz, 2H), 2.05 (t, J = 7.5 Hz, 2H), 1.58 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 486 (M^+ + H).

Compound 190

7-((4-(1H-indol-6-yl)phenyl)(2-hydroxyethyl)amino)-N-hydroxyheptanamide

Compound 190 (8 mg, 28%) as a white solid was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 396 (M^+ + H).

Compound 191

N-hydoxy-7-(4-(1-(phenylsulfonyl)-1H-indol-2-yl)phenylamino)heptanamide

Compound 191 (320 mg, 39%) as a white solid was obtained according to the same method as the synthesis of compound 170.

^{1}H NMR (400 MHz, CD_3OD) δ 8.21 (d, J = 8.3 Hz, 1H), 7.29 (m, 10H), 6.61 (d, J = 8.6 Hz, 2H), 6.40 (s, 1H), 3.10 (t, J = 7.0 Hz, 2H), 2.10 (t, J = 7.4 Hz, 2H), 1.64 (m, 4H), 1.42 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 203

7-(N-(4-(1H-indol-6-yl)phenyl)thiophene-2-sulfonamido)-N-hydroxyheptanamide

Compound 203 (4 mg, 15%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.79 (m, 2H), 7.64 (s, 1H), 7.61 (m, 2H), 7.43 (s, 1H), 7.26 (m, 4H), 6.48 (m, 1H), 6.31 (m, 1H), 5.94(s, 1H), 3.86 (m, 2H), 2.07 (m, 2H), 1.64 (m, 4H), 1.35 (m, 4H). MS (ESI) m/z 497 (M^+ + H).

Compound 204

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)furan-2-carboxamide

Compound 204 (4 mg, 14%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.82 (d, J = 4.9 Hz, 1H), 7.62 (m, 4H), 7.43 (d, J = 3.6 Hz, 1H), 7.29 (m, 2H), 7.15 (m, 3H), 6.47 (d, J = 2.7 Hz, 1H), 3.66 (t, J = 6.1 Hz, 2H), 3.07 (t, J = 7.3 Hz, 2H), 1.58 (m, 2H), 1.46 (m, 2H), 1.32 (m, 4H). MS (ESI) m/z 446 (M^+ + H).

Compound 207

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methoxyphenylsulfonamido)-N-hydroxyheptanamide

Compound 207 (54 mg, 6%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.57 (m, 6H), 7.26 (m, 2H), 7.05 (d, J = 8.4 Hz, 2H), 7.00 (d, J = 8.9 Hz, 2H), 6.45 (d, J = 3.1 Hz, 1H), 3.83 (s, 3H), 3.53 (t, J = 6.2 Hz, 2H), 2.04 (t, J = 7.4 Hz, 2H), 1.54 (m, 2H), 1.36 (m, 4H), 1.29 (m, 2H). MS (ESI) m/z 522 (M^+ + H).

Compound 208

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide

Compound 208 (8 mg, 22%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 1.16 Hz, 1H), 7.56 (d, J = 8.44 Hz, 1H), 7.41 (m, 1H), 7.32 (m, 2H), 7.24 (d, J = 3.08 Hz, 1H), 7.13 (d, J = 8.36 Hz, 1H), 6.75 (d, J = 8.76 Hz, 1H), 6.47 (d, J = 2.48 Hz, 1H), 3.94 (t, J = 7.38 Hz, 2H), 2.07 (t, J = 7.38 Hz, 2H), 1.62 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 486 (M^+ + H).

Compound 209

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylbenzamide

Compound 209 (52 mg, 98%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.54 (m, 4H), 7.22 (m, 4H), 7.10 (d, J = 8.1 Hz, 2H), 7.00 (d, J = 7.6 Hz, 2H), 6.43 (d, J = 2.9 Hz, 2H), 3.91 (t, J = 7.2 Hz, 2H), 2.22 (s, 3H), 2.06 (t, J = 7.2 Hz, 2H), 1.59 (m, 4H), 1.24 (m, 4H). MS (ESI) m/z 470 (M^+ + H).

Compound 210

7-(N-(4-(1H-indol-6-yl)phenyl)phenylsulfonamido)-N-hydroxyheptanamide

Compound 210 (14 mg, 27%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.61 (m, 8H), 7.54 (t, J = 7.8 Hz, 1H), 7.28 (dd, J = 8.3, 1.6 Hz, 1H), 7.27 (d, J = 3.1 Hz, 1H), 7.08 (d, J = 8.5 Hz, 2H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.61 (t, J = 6.4 Hz, 2H), 2.06 (t, J = 7.4 Hz, 2H), 1.57 (m, 2H), 1.42 (m, 4H), 1.31 (m ,2H). MS (ESI) m/z 492(M^+ + H).

Compound 211

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)picolinamide

Compound 211 (10 mg, 74%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.37 (d, J = 3.8 Hz, 1H), 7.70 (t, J = 7.2 Hz, 1H), 7.52 (m, 4H), 7.39 (d, J = 7.8 Hz, 1H), 7.28 (m, 1H), 7.25 (d, J = 3.0 Hz, 1H), 7.19 (d, J = 8.4 Hz, 1H), 7.15 (d, J = 7.9 Hz, 2H), 6.43 (d, J = 2.6 Hz, 1H), 4.00 (t, J = 7.2 Hz, 2H), 2.09 (t, J = 7.3 Hz, 2H), 1.64 (m, 4H), 1.44 (m, 4H). MS (ESI) m/z 457 (M^+ + H).

Compound 212

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3-methoxybebzamide

Compound 212 (52 mg, 98%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 1.2 Hz, 1H), 7.56 (d, J = 8.4 Hz, 1H), 7.41 (m, 1H), 7.32 (m, 2H), 7.24 (d, J = 3.1 Hz, 1H), 7.13 (d, J = 8.4 Hz, 1H), 6.75 (d, J = 8.8 Hz, 1H), 6.47 (d, J = 2.5 Hz, 1H), 3.94 (t, J = 7.4 Hz, 2H), 2.07 (t, J = 7.4 Hz, 2H), 1.62 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 470 (M^+ + H).

Compound 214

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3,4,5-trimethoxybenzamide

Compound 214 (10 mg, 25%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.59 (m, 4H), 7.23 (m, 4H), 6.63 (s, 2H), 6.44 (d, 1H, J = 2.2 Hz), 3.96 (t, 2H, J = 7.0 Hz), 3.68 (s, 3H), 3.49 (s, 6H), 2.08 (t, 2H, J = 7.3 Hz), 1.63 (m, 4H), 1.37 (m, 4H). MS (ESI) m/z 546 (M^+ + H).

Compound 215

N-(4-(1H-indol-6-yl)phenyl)-4-(dimethylamino)-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide

Compound 215 (10 mg, 52%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.57 (m, 4H), 7.24 (m, 4H), 7.13 (d, J = 8.5 Hz, 2H), 6.48 (m, 2H), 6.43 (m, 1H), 3.92 (t, J = 7.5 Hz, 2H), 2.87 (s, 6H), 2.05 (m, 2H), 1.61 (m, 4H), 1.36 (m, 4H). MS (ESI) m/z 451 (M^+ + H).

Compound 218

7-(N-(4-(1H-indol-6-yl)phenyl)-2-aminoacetamido)-N-hydroxyheptanamide

Compound 218 (8 mg, 46%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.78 (d, J = 8.3 Hz, 2H), 7.66 (s, 1H), 7.63 (d, J = 8.3 Hz, 1H), 7.32 (dd, J = 8.3, 1.7 Hz, 2H), 7.31 (m , 1H), 7.28 (d, J = 3.1 Hz, 1H), 6.47 (dd, J = 3.1, 0.7 Hz, 1H), 3.77(t, J = 7.3 Hz, 2H), 2.07 (d, J = 7.3 Hz, 2H), 1.59 (m, 4H), 1.36 (m, 4H). MS (ESI) m/z 409 (M^+ + H).

Compound 221

N-(4-(1H-indol-6-yl)phenyl)-6-chloro-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide

Compound 221 (22 mg, 32%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.29 (s, 1H), 7.72 (d, J = 7.6 Hz, 1H), 7.62 (m, 4H), 7.25 (m , 5H), 6.44 (d, J = 2.8 Hz, 2H), 3.97 (m, 2H), 2.08 (t, J = 7.3 Hz, 2H), 1.62 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 491 (M^+ + H).

Compound 222

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)isonicotinamide

Compound 222 (45 mg, 57%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.40 (d, J = 5.1 Hz, 2H), 7.56 (m, 4H), 7.27 (m , 3H), 7.16 (m, 3H), 6.44 (d, J = 2.9 Hz, 1H), 3.95 (m, 2H), 2.07 (m, 2H), 1.61 (m, 4H), 1.27 (m, 4H). MS (ESI) m/z 457 (M^+ + H).

Compound 228

(Z)-N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(N'-hydroxycarbamimidoyl)banzamide

Compound 228 (51 mg, 41%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.70 (d, J = 7.6 Hz, 1H), 7.49 (m, 5H), 7.40 (d, J = 7.9 Hz, 1H), 7.35 (d, J = 7.9 Hz, 1H), 7.25 (d, J = 3.1 Hz, 1H), 7.14 (d, J = 7.8 Hz, 1H), 6.43 (d, J = 3.0 Hz, 1H), 3.95 (m, 2H), 2.07 (t, J = 7.4 Hz, 2H), 1.62 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 514 (M^+ + H).

Compound 229

N-(4-(1H-indol-6-yl)phenyl)-2,6-difluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide

Compound 229 (49 mg, 92%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.55 (m, 4H), 7.25 (d, J = 3.1 Hz, 1H), 7.20 (d, J = 8.4 Hz, 1H), 7.16 (d, J = 8.2 Hz, 1H), 6.81 (m, 2H), 6.43 (d, J = 2.9 Hz, 1H), 3.94 (t, J = 7.3 Hz, 2H), 2.04 (m, 2H), 1.61 (m, 4H), 1.31 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 230

N-(4-(1H-indol-6-yl)phenyl)-4-fluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide

Compound 230 (47 mg, 74%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.58 (s, 1H), 7.56 (d, J = 2.8 Hz, 1H), 7.51 (d, J = 8.4 Hz, 2H), 7.32 (m, 2H), 7.25 (d, J = 3.1 Hz, 1H), 7.21 (dd, J = 8.4, 1.0 Hz, 1H), 7.05 (d, J = 8.2 Hz, 2H), 6.88 (t, J = 8.6 Hz, 2H), 6.44 (d, J = 3.0 Hz, 1H), 3.86 (t, J = 7.4 Hz, 2H), 2.06 (t, J = 7.4 Hz, 2H), 1.59 (m, 4H), 1.25 (m, 4H). MS (ESI) m/z 474 (M^+ + H).

Compound 231

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-6-(trifluoromethyl)nicotinamide

Compound 231 (52 mg, 52%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.60 (s, 1H), 7.87 (d, J = 7.9 Hz, 1H), 7.61 (d, J = 8.2 Hz, 1H), 7.55 (m, 4H), 7.26 (d, J = 3.1 Hz, 1H), 7.21 (d, J = 9.4 Hz, 1H), 7.15 (d, J = 8.0 Hz, 1H), 6.44 (d, J = 2.9 Hz, 1H), 3.94 (t, J = 6.8 Hz, 2H), 2.08 (t, J = 7.4 Hz, 2H), 1.68 (m, 4H), 1.35 (m, 4H). MS (ESI) m/z 525 (M^+ + H).

Compound 234

6-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyhexanamide

Compound 234 (33 mg, 73%) as a yellow oil was obtained according to the same method as the synthesis of compound 150.

^{1}H NMR (400 MHz, CD_3OD) δ 7.52 (m, 2H), 7.44 (d, J = 6.6 Hz, 2H), 7.22 (m, 2H), 6.71 (d, J = 8.5 Hz, 2H), 3.13 (t, J = 7.0 Hz, 2H), 2.14 (t, J = 7.3 Hz, 2H), 1.67 (m, 4H), 1.47 (m, 4H). MS (ESI) m/z 337 (M^+ + H).

Compound 235

8-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyoctanamide

Compound 235 (33 mg, 73%) as a yellow oil was obtained according to the same method as the synthesis of compound 150.

Compound 236

N-(4-(1H-indol-6-yl)phenyl)-4-ethoxy-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide

Compound 236 (10 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.56 (m, 4H), 7.24 (m, 4H), 7.13 (d, J = 8.5 Hz, 2H), 6.71 (d, J = 8.8 Hz, 2H), 6.43 (m, 1H), 3.93 (q, J = 7.0 Hz, 2H), 3.57 (t, J = 6.4 Hz, 2H), 2.07 (t, J = 7.5 Hz, 2H), 1.65 (m, 4H), 1.37 (m, 4H), 1.30 (t, J = 7.0 Hz, 3H). MS (ESI) m/z 501 (M^+ + H).

Compound 237

7-((4-(1H-indol-6-yl)phenyl)(benzyl)amino)-N-hydroxyheptanamide

Compound 237 (40 mg, 29%) as a yellow solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.44 (m, 4H), 7.22 (m, 7H), 6.72 (d, J = 8.8 Hz, 2H), 6.39 (d, J = 2.8 Hz, 1H), 4.53 (s, 2H), 3.40 (t, J = 7.6 Hz, 2H), 2.06 (t, J = 7.5 Hz, 2H), 1.60 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 442 (M^+ + H).

Compound 239

N-(4-(1H-indol-6-yl)phenyl)-2,4,6-trifluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide

Compound 239 (50 mg, 90%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.56 (m, 4H), 7.24 (m, 4H), 6.79 (m, 2H), 6.44 (m, 1H), 3.97 (t, J = 7.3 Hz, 2H), 2.11 (t, J = 7.3 Hz, 2H), 1.66 (m, 4H), 1.25 (m, 4H). MS (ESI) m/z 509 (M^+ + H).

Compound 242

N-(4-(1H-indol-6-yl)phenyl)-4-amino-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide

Compound 242 (47 mg, 71%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.56 (m, 4H), 7.25 (m, 2H), 7.12 (m, 4H), 6.44 (m, 3H), 3.91 (t, J = 7.5 Hz, 2H), 2.06 (t, J = 7.5 Hz, 2H), 1.59 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 471 (M^+ + H).

Compound 243

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)piperidine -1-carboxamide

Compound 243 (46 mg, 62%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.6 (m, 4H), 7.26 (m, 2H), 7.08 (d, J = 8.0 Hz, 2H), 6.45 (d, J = 2.7 Hz, 1H), 3.58 (t, J = 7.8 Hz, 2H), 3.13 (m, 4H), 2.11 (t, J = 7.5 Hz, 2H), 1.56 (m, 4H), 1.44 (m, 4H), 1.24 (m, 4H). MS (ESI) m/z 462 (M^+ + H).

Compound 244

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxy -3-(trifluoromethyl)benzamide

Compound 244 (55 mg, 55%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 555 (M^+ + H).

Compound 245

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(trifluoromethyl)benzamide

Compound 245 (10 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 524 (M^+ + H).

Compound 246

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3,4-dimethoxybenzamide

Compound 246 (51 mg, 71%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 517 (M^+ + H).

Compound 249

7-(N-(4-(1H-indol-6-yl)phenyl)-3,4-dimethoxyphenylsulfonamido)-N-hydroxyheptanamide

Compound 249 (40 mg, 58%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.60 (m, 4H), 7.27 (m, 3H), 7.06 (q, J = 8.5, 3H), 6.93 (d, J = 2.1 Hz, 1H), 6.45 (dd, J = 3.1, 0.6 Hz, 1H), 3.87 (s, 3H), 3.67 (s, 3H), 3.56 (t, J = 6.2 Hz, 2H), 2.07 (t, J = 7.4 Hz, 2H), 1.57 (m, 2H), 1.34 (m, 6H). MS (ESI) m/z 551 (M^+ + H).

Compound 250

7-(N-(4-(1H-indol-6-yl)phenyl)-4-(methylsulfonyl)phenylsulfonamido)-N-hydroxyheptanamide

Compound 250 (56 mg, 69%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.12 (d, J = 7.7 Hz, 2H), 7.86 (d, J = 7.7 Hz, 2H), 7.61 (m, 4H), 7.29 (m, 2H), 7.1 (d, J = 8.5 Hz, 2H), 6.46 (d, J = 3.0 Hz, 1H), 3.64 (t, J = 6.3 Hz, 2H), 2.08 (t, J = 7.3 Hz, 2H), 1.58 (m, 2H), 1.44 (m, 4H), 1.30 (m, 2H). MS (ESI) m/z 569 (M^+ + H).

Compound 251

7-(4-(1H-indol-6-yl)-3-(trifluoromethyl)phenylamino)-N-hydroxyheptanamide

Compound 251 (15 mg, 33%) as a yellow oil was obtained according to the same method as the synthesis of compound 170.

^{1}H NMR (400 MHz, CD_3OD) δ 7.48 (d, J = 7.7 Hz, 1H), 7.25 (s, 1H), 7.22 (d, J = 3.1 Hz, 1H), 7.11 (d, J = 8.4 Hz, 1H), 6.93 (d, J = 2.4 Hz, 1H), 6.90 (dd, J = 8.2, 0.7 Hz, 6.79 (dd, J = 8.4, 2.4 Hz, 1H),

6.43 (dd, J = 3.1, 0.8 Hz, 1H), 3.12 (t, J = 7.0 Hz, 2H), 2.10 (t, J = 7.4 Hz, 2H), 1.63 (m, 4H), 1.41 (m, 4H). MS (ESI) m/z 420 (M^+ + H).

Compound 252

N-(4-(1H-indol-6-yl)-3-(trifluoromethyl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide

As shown in reaction scheme 3, a compound of formula IX was acylated with nicotinoyl chloride to obtain a compound of formula X, which was then subjected to the Suzuki reaction to obtain a compound of formula XI, which was then stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 252 (25 mg, 52%).

^{1}H NMR (400 MHz, CD_3OD) δ 8,47 (s, 2H), 7.84 (d, J = 7.3 Hz, 1H), 7.57 (s, 1H), 7.44 (m, 4H), 7.27 (m, 1H), 7.24 (s, 1H), 6.86 (d, J = 8.1 Hz, 1H), 6.46 (dd, J = 3.1, 0.9 Hz, 1H), 4.00 (m, 2H), 2.09 (t, J = 7.4 Hz, 2H), 1.62 (m, 4H), 1.23 (m, 4H). MS (ESI) m/z 525(M^+ + H).

Compound 253

7-(N-(4-(1H-indol-6-yl)phenyl)naphthalene-2-sulfonamido)-N-hydroxyheptanamide

Compound 253 (54 mg, 41%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.18 (s, 1H), 7.95 (m, 3H), 7.59 (m, 7H), 7.24 (m, 2H), 7.02 (d, J = 8.4 Hz, 2H), 6.44 (d, J = 2.8 Hz, 1H), 3.61 (t, J = 6.0 Hz, 2H), 2.06 (t, J = 7.4 Hz, 2H), 1.58 (m, 2H), 1.37 (m,4H), 1.24 (m, 2H). MS (ESI) m/z 541 (M^+ + H).

Compound 254

N-(4-(1H-indol-6-yl)-3-methylphenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide

Compound 254 (49 mg, 94%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

^{1}H NMR (400 MHz, CD_3OD) δ 7.53 (d, J = 7.8 Hz, 1H), 7.29 (d, J = 6.8 Hz, 2H), 7.13 (d, J = 8.0 Hz, 1H), 7.03 (d, J = 1.8 Hz, 1H), 6.90 (m, 2H), 6.60 (d, J = 8.8 Hz, 2H), 7.39 (dd, J = 3.1, 0.8 Hz, 1H), 3.92 (t, J = 7.4 Hz, 2H), 3.73 (s,3H), 2.26 (s, 3H), 2.07 (t, J = 7.2 Hz, 2H), 1.62 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 499 (M^+ + H).

Compound 255

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(4-methoxyphenyl)ureido)-N-hydroxyheptanamide

As shown in reaction scheme 2, 4-bromoaniline and ethyl 7-bromoheptanoate were reacted with each other to obtain a compound of formula III, which was then allowed to react with 4-nitrophenylchloroformate so as to obtain a compound of formula VI, which was then subjected to the Suzuki reaction with boronic acid to obtain a compound of formula VII, which was then allowed to react with 4-methoxybenzenamine so as to obtain a compound of formula VIII, after which the compound of formula VIII (31 mg, 0.06 mmol) was stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 255 (12 mg, 41%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.80 (d, J = 8.44 Hz, 2H), 7.68 (s, 1H), 7.64 (d, J = 8.2 Hz, 1H), 7.38 (m, 3H), 7.29 (d, J = 3.1 Hz, 1H), 7.19 (dd, J = 6.8, 2.8 Hz, 2H), 6.82 (dd, J = 6.8, 2.1 Hz, 2H), 6.48 (d,

J = 3.08 Hz, 1H), 3.74 (m, 5H), 2.08 (t, J = 7.3 Hz, 2H), 1.62 (m, 4H), 1.36 (m, 4H). MS (ESI) m/z 500 (M^+ + H).

Compound 256

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3-methoxyphenyl)ureido)-N-hydroxyheptanamide

Compound 256 (39 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.78 (d, J = 8.1 Hz, 2H), 7.69 (s, 1H), 7.63 (d, J = 8.2 Hz, 1H), 7.36 (t, J = 8.3 Hz, 3H), 7.28 (d, J = 2.7 Hz, 1H), 7.11 (t, J = 8.0 Hz, 1H), 7.05 (d, J = 1.8 Hz, 1H), 6.82 (d, J = 7.6 Hz, 1H), 6.58 (m, 1H), 6.47 (d, J = 1.4 Hz, 1H), 3.76 (m, 5H), 2.07 (t, J = 7.3 Hz, 2H), 1.61 (m, 4H), 1.35 (m, 4H). MS (ESI) m/z 500 (M^+ + H).

Compound 257

7-(N-(4-(1H-indol-6-yl)phenyl)acetamido)-N-hydroxyheptanamide

Compound 257 (39 mg, 93%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 8.3 Hz, 2H), 7.65 (t, J = 9.0 Hz, 2H), 7.32 (m, 4H), 6.48 (d, J = 3.1 Hz, 1H), 6.48 (d, J = 3.1 Hz, 1H), 3.74 (t, J = 7.4 Hz, 2H), 3.36 (s, 1H), 2.09 (t, J = 7.2 Hz, 2H), 1.58 (m, 4H), 1.34 (m, 4H). MS (ESI) m/z 393 (M^+ + H).

Compound 258

Methyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 258 (10 mg, 41%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.64 (d, J = 8.6 Hz, 1H), 7.61 (m, 1H), 7.59 (d, J = 8.3 Hz, 1H), 7.28 (dd, J = 8.3, 1.6 Hz, 1H), 7.25 (d, J = 3.2 Hz, 1H), 7.23 (d, J = 8.3 Hz, 2H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.67 (m, 5H), 2.05 (t, J = 7.3 Hz, 2H), 1.56 (m, 4H), 1.30 (m, 4H). MS (ESI) m/z 410 (M^+ + H).

Compound 259

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(2-methoxyphenyl)ureido)-N-hydroxyheptanamide

Compound 259 (39 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.99 (dd, J = 7.5, 1.8 Hz, 1H), 7.77 (d, J = 8.4 Hz , 2H), 7.68 (s, 1H), 7.61 (d, J = 8.2 Hz, 1H), 7.30 (m, 4H), 7.06 (m, 4H), 7.06 (m, 1H), 6.87 (m, 2H), 6.77 (dd, J = 7.3, 1.8 Hz, 1H), 6.46 (d, J = 3.0 Hz, 1H), 3.70 (t, J = 7.0 Hz, 2H), 3.52 (s, 3H), 2.06 (t, J = 7.3 Hz, 2H), 1.56 (m, 4H), 1.26 (m, 4H). MS (ESI) m/z 500 (M^+ + H).

Compound 260

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3,5-dimethoxyphenyl)ureido)-N-hydroxyheptanamide

Compound 260 (35 mg, 75%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.94 (d, J = 4.3 Hz, 2H), 7.75 (s, 1H), 7.61 (d, J = 8.1 Hz, 1H), 7.33 (d, J = 7.8 Hz, 3H), 7.28 (s, 1H), 6.58 (s, 1H), 6.51 (s, 2H), 6.47 (s, 1H), 6.13 (s, 1H), 3.71 (m, 8H), 2.17 (t, J = 7.0 Hz, 2H), 1.47 (m, 4H), 1.21 (m, 4H). MS (ESI) m/z 530 (M^+ + H).

Compound 261

7-(N-(4-(1H-indol-6-yl)phenyl)-5-amino-2-methoxyphenylsulfonamido)-N-hydroxyheptanamide

Compound 261 (53 mg, 63%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 536 (M^+ + H).

Compound 262

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(thiophen-2-yl)ureido)-N-hydroxyheptanamide

Compound 262 (47 mg, 76%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.76 (d, J = 8.2 Hz, 2H), 7.68 (s, 1H), 7.62(d, J = 8.2 Hz, 1H), 7.33 (m, 3H), 7.28 (d, J = 3.0 Hz, 1H), 6.79 (dd, J = 5.4, 1.1 Hz, 1H), 6.73 (m, 1H), 6.51 (dd, J = 3.6, 1.1 Hz, 1H), 6.46 (d, J = 2.9 Hz, 1H), 3.72 (t, J = 7.5 Hz, 2H), 2.07 (t, J = 7.2 Hz, 2H), 1.58 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 476 (M^+ + H).

Compound 263

7-(N-(4-(1H-indol-6-yl)phenyl)pyridine-3-sulfonamido)-N-hydroxyheptanamide

Compound 263 (29 mg, 49%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.72 (m, 2H), 7.96 (m, 1H), 7.58 (m, 4H), 7.51 (m, 1H), 7.16 (m, 2H), 7.04 (m, 2H), 6.40 (d, J = 3.1 Hz, 1H), 3.56 (t, J = 5.9 Hz, 2H), 2.05 (t, J = 3.1 Hz, 2H), 1.56 (m, 4H), 1.34 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 264

7-(N-(4-(1H-indol-6-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide

Compound 264 (30 mg, 43%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.66 (d, J = 8.5 Hz, 2H), 7.63 (s, 1H), 7.60 (d, J = 8.2 Hz, 1H), 7.37 (d, J = 8.5 Hz, 2H), 7.29 (dd, J = 8.3, 1.5 Hz, 1H), 7.27 (d, J = 3.1 Hz, 1H), 6.46 (d, J = 3.0 Hz, 1H), 3.63 (t, J = 6.8 Hz, 2H), 2.88 (s, 3H), 2.03 (t, J = 7.4 Hz, 2H), 1.52 (m, 2H), 1.40 (m, 2H), 1.29 (m, 4H). MS (ESI) m/z 430 (M^+ + H).

Compound 265

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(dimethylamino)acetamido)-N-hydroxyheptanamide

Compound 265 (43 mg, 83%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 8.2 Hz, 1H), 7.67 (s, 1H), 7.62 (d, J = 8.2 Hz, 1H), 7.31 (m, 4H), 6.47 (d, J = 2.9 Hz, 1H), 3.71 (t, J = 7.3 Hz, 2H), 3.06 (s, 2H), 2.30 (s, 6H), 2.07 (t, J = 7.3 Hz, 2H), 1.55 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 438 (M^+ + H).

Compound 266

4-methoxyphenyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 266 (5 mg, 20%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.70 (d, J = 8.4 Hz, 2H), 7.61 (m, 2H), 7.37 (d, J = 8.5 Hz, 2H), 7.30 (dd, J = 1.5, 8.3 Hz, 1H), 7.26 (d, J = 3.1 Hz, 2H), 6.99 (m, 2H), 6.87 (m, 2H), 6.45 (d, J = 3.0 Hz, 1H), 4.09 (m, 2H), 4.08 (s, 3H), 2.06 (m, 2H), 1.61 (m, 4H), 1.20 (m, 4H). MS (ESI) m/z 502 (M^+ + H).

Compound 267

Ethyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 267 (42 mg, 32%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.63 (m, 4H), 7.38 (m, 4H), 6.45 (s, 1H), 4.12 (q, J = 6.9 Hz, 2H), 3.69 (t, J = 7.1 Hz, 2H), 2.07 (t, J = 7.2 Hz, 2H), 1.56 (m, 4H), 1.44 (m, 4H), 1.23 (m, 3H). MS (ESI) m/z 423 (M^+ + H).

Compound 268

7-(1-(4-(1H-indol-6-yl)phenyl)-3,3-dimethylureido)-N-hydroxyheptanamide

Compound 268 (20 mg, 83%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.65 (d, J = 6.7 Hz, 2H), 7.61 (s, 1H), 7.59 (d, J = 8.3 Hz, 1H), 7.28 (dd, J = 8.3, 1.6 Hz, 1H), 7.25 (d, J = 3.1 Hz, 1H), 7.10 (dd, J = 6.7, 2.0 Hz, 2H), 6.44 (dd, J = 3.1, 0.8 Hz, 1H), 3.61 (t, J = 7.5 Hz, 2H), 2.69 (s, 6H), 2.06 (t, J = 7.4 Hz, 2H), 1.59 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 423 (M^+ + H).

Compound 269

2-methoxyethyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 269 (45 mg, 54%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.65 (m, 4H), 7.27 (m, 4H), 6.43 (d, J = 8.24 Hz, 1H), 4.22 (m, 2H), 3.71 (m, 2H), 3.54 (m, 2H), 3.30 (s, 3H), 2.07 (m, 2H), 1.60 (m, 4H), 1.34 (m, 4H). MS (ESI) m/z 454 (M^+ + H).

Compound 270

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)nicotinamide

Compound 270 (42 mg, 72%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.46 (s, 1H), 8.40 (d, J = 4.6 Hz, 1H), 7.99 (s, 1H), 7.78 (m, 2H), 7.68 (m, 3H), 7.36 (dd, J = 1.3, 8.5 Hz, 1H), 7.30 (m, 3H), 4.08 (s, 3H), 4.00 (t, J = 7.3 Hz, 2H), 2.23 (t, J = 7.4 Hz, 2H), 1.63 (m, 4H), 1.27 (m, 4H). MS (ESI) m/z 472 (M^+ + H).

Compound 271

N-hydroxy-7-(4-(1-methyl-1H-indazol-6-yl)phenylamino)heptanamide

Compound 271 (36 mg, 68%) as a yellow oil was obtained according to the same method as the synthesis of compound 150.

^{1}H NMR (400 MHz, CD_3OD) δ 7.93 (s, 1H), 7.71 (d, J = 8.4 Hz, 1H), 7.60 (s, 1H), 7.51 (d, J = 8.2 Hz, 2H), 7.39 (d, J = 8.4 Hz, 1H), 6.72 (d, J = 8.2 Hz, 2H), 4.06 (s, 3H), 3.12 (t, J = 6.9 Hz, 2H), 2.10 (t, J = 7.3 Hz, 2H), 1.65 (m, 4H), 1.42 (m, 4H). MS (ESI) m/z 368 (M^+ + H).

Compound 272

7-(N-(4-(1H-indol-6-yl)phenyl)propionamido)-N-hydroxyheptanamide

Compound 272 (40 mg, 70%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.64 (m, 4H), 7.28 (d, J = 8.5 Hz, 2H), 7.16 (d, J = 8.1 Hz, 2H), 6.46 (s, 1H), 3.64 (t, J = 7.1 Hz, 2H), 2.03 (m, 4H), 1.47 (m, 4H), 1.26 (m, 4H), 0.99 (t, J = 7.4 Hz, 3H). MS (ESI) m/z 407 (M^+ + H).

Compound 273

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-1-methyl-1,2,5,6-tetrahydropyridine -3-carboxamide

Compound 273 (47 mg, 74%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.17 (s, 1H), 10.31 (s, 1H), 7.62 (m, 4H), 7.29 (m, 4H), 6.43 (s, 1H), 5.66 (s, 1H), 3.77 (t, J = 7.4 Hz, 2H), 2.98 (S, 2H), 2.35 (t, J = 5.2 Hz, 2H), 2.24 (s, 3H), 2.03 (m, 4H), 1.55 (m, 4H), 1.22 (m, 4H). MS (ESI) m/z 474 (M^+ + H).

Compound 274

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(pyridin-3-yl)ureido)-N-hydroxyheptanamide

Compound 274(47 mg, 72%) as a white solid was obtained according to the same method as the synthesis of compound 255.

MS (ESI) m/z 472 (M^+ + H).

Compound 275

7-(1-(4-(1H-indol-6-yl)phenyl)-3-methylureido)-N-hydroxyheptanamide

Compound 275(40 mg, 90%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.73 (d, J = 8.3 Hz, 2H), 7.64 (s, 1H), 7.60 (d, J = 8.2 Hz, 1H), 7.31 (dd, J = 8.2, 1.0 Hz, 1H), 7.26 (m, 3H), 6.45 (d, J = 3.0 Hz, 1H), 3.66 (t, J = 7.4 Hz, 2H), 2.65 (s, 3H), 2.06 (t, J = 7.4 Hz, 2H), 1.53 (m, 4H), 1.39 (m, 4H). MS (ESI) m/z 409 (M^+ + H).

Compound 276

7-(N-(4-(1H-indol-6-yl)phenyl)ethylsulfonamido)-N-hydroxyheptanamide

Compound 276 (44 mg, 43%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.68 (d, J = 8.4 Hz, 2H), 7.63 (s, 1H), 7.60 (d, J = 8.2 Hz 1H), 7.42 (d, J = 8.4 Hz, 2H), 7.30 (dd, J = 8.2, 1.4 Hz, 2H), 7.27 (d, J = 3.1 Hz, 2H), 6.45 (d, J = 3.0 Hz, 1H), 3.72 (t, J = 6.7 Hz, 2H), 3.09 (q, J = 7.4 Hz, 2H), 2.06 (t, J = 7.3 Hz, 2H), 1.57 (m, 2H), 1.47 (m, 2H), 1.34 (m, 7H). MS (ESI) m/z 443 (M^+ + H).

Compound 277

7-((4-(1H-indol-6-yl)phenyl)(N,N-dimethylsulfamoyl)amino)-N-hydroxyheptanamide

Compound 277 (45 mg, 58%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.69 (d, J = 8.4 Hz, 2H), 7.64 (s, 1H), 7.60 (d, J = 8.2 Hz 1H), 7.45 (d, J = 8.3 Hz, 2H), 7.31 (d, J = 8.2 Hz, 1H), 7.27 (d, J = 3.0 Hz, 1H), 6.46 (d, J = 2.9 Hz, 1H), 3.67 (t, J = 6.8 Hz, 2H), 2.76 (s, 6H), 2.06 (t, J = 8.0 Hz, 2H), 1.58 (m, 2H), 1.48 (m, 2H), 1.36 (m, 4H). MS (ESI) m/z 458 (M^+ + H).

Compound 278

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)cyclohexanecarboxamide

Compound 278 (46 mg, 62%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 462 (M^+ + H).

Compound 279

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)cyclopropanecarboxamide

Compound 279 (20 mg, 42%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 420 (M^+ + H).

Compound 280

7-(N-(4-(1H-indol-6-yl)phenyl)-2-morpholinoacetamido)-N-hydroxyheptanamide

Compound 280 (47 mg, 79%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 479 (M^+ + H).

Compound 281

(S)-N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)pyrrolidine-2-carboxamide

Compound 281 (44 mg, 84%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.76 (d, J = 8.3 Hz, 2H), 7.67 (s, 1H), 7.62 (d, J = 8.2 Hz 1H), 7.30 (m, 4H), 6.46 (d, J = 3.0 Hz, 1H), 3.82 (m, 1H), 3.66 (m, 2H), 3.15 (m, 1H), 2.75 (m, 1H), 2.07 (t, J = 7.2 Hz, 2H), 1.89 (m, 3H), 1.74(m, 4H), 1.53 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 448 (M^+ + H).

Compound 282

7-(1-(4-(1H-indol-6-yl)phenyl)-3-isopropylureido)-N-hydroxyheptanamide

Compound 282 (43 mg, 73%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 8.5 Hz, 2H), 7.65 (d, J = 0.7 Hz, 1H), 7.61 (d, J = 8.3 Hz, 1H), 7.32 (dd, J = 8.3, 1.6 Hz, 1H), 7.28 (d, J = 8.6 Hz, 2H), 7.27 (d, J = 3.2 Hz, 1H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.88 (m, 1H), 3.66 (t, J = 7.6 Hz, 2H), 2.06 (t, J = 7.2 Hz, 2H), 1.59 (m, 4H), 1.32 (m, 4H), 1.05 (d, J = 6.6 Hz, 6H). MS (ESI) m/z 437 (M^+ + H).

Compound 283

7-(1-(4-(1H-indol-6-yl)phenyl)-3-isobutylureido)-N-hydroxyheptanamide

Compound 283 (45 mg, 51%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.74 (d, J = 8.5 Hz, 2H), 7.65 (s, 1H), 7.60 (d, J = 8.2 Hz, 1H), 7.31 (dd, J = 8.3, 1.6 Hz, 1H), 7.28 (d, J = 7.4 Hz, 2H), 7.26 (d, J = 2.1 Hz, 1H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.65 (t, J = 7.4 Hz, 2H), 2.91 (t, J = 6.7 Hz, 2H), 2.05 (t, J = 7.5 Hz, 2H), 1.67 (m, 1H), 1.54 (m, 4H), 1.30 (m, 4H), 0.81 (d, J = 6.7 Hz, 6H). MS (ESI) m/z 451 (M^+ + H).

Compound 284

N-hydroxy-7-(N-(4-(1-methyl-1H-indazol-6-yl)phenyl)methylsulfonamido)heptanamide

Compound 284 (44 mg, 77%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.00 (s, 1H), 7.77 (m, 4H), 7.49 (d, J = 8.2 Hz, 2H), 7.42 (d, J = 8.4 Hz, 3H), 4.08 (s, 3H), 3.72 (t, J = 6.6 Hz, 2H), 2.94 (s, 3H), 2.05 (t, J = 7.2 Hz, 2H), 1.56 (m, 2H), 1.45 (m, 2H), 1.33 (m, 2H), 1.25 (m, 2H). MS (ESI) m/z 444 (M^+ + H).

Compound 285

7-((4-(1H-indol-6-yl)phenyl)(propyl)amino)-N-hydroxyheptanamide

Compound 285 (34 mg, 89%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 444 (M^+ + H).

Compound 286

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(4-methylpiperazin-1-yl)acetamido)-N-hydroxyheptanamide

Compound 286 (56 mg, 69%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 8.4 Hz, 2H), 7.66 (s, 1H), 6.46 (d, J = 2.7 Hz, 1H), 3.73 (t, J = 7.4 Hz, 2H), 3.00 (s, 2H), 2.48 (m, 8H), 2.27 (s, 3H), 2.07 (t, J = 7.4 Hz, 2H), 1.57 (m, 4H), 1.25 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 287

7-(1-(4-(1H-indol-6-yl)phenyl)-3-butylureido)-N-hydoxyheptanamide

Compound 287 (45 mg, 51%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.73 (d, J = 8.5 Hz, 2H), 7.65 (s, 1H), 7.60 (d, J = 8.3 Hz, 1H), 7.31 (dd, J = 8.3, 1.6 Hz, 1H), 7.27 (d, J = 8.3 Hz, 2H), 7.26 (d, J = 3.2 Hz, 1H), 6.45 (dd, J = 3.1, 0.6 Hz, 1H), 3.65 (t, J = 7.4 Hz, 2H), 3.09 (t, J = 7.0 Hz, 2H), 2.06 (t, J = 7.5 Hz, 2H), 1.54 (m, 4H), 1.39 (m, 4H), 1.25 (m 4H), 0.89 (t, J = 7.3 Hz, 3H). MS (ESI) m/z 451 (M^+ + H).

Compound 288

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(4-methylpentyl)ureido)-N-hydroxyheptanamide

Compound 288 (46 mg, 65%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.74 (d, J = 8.5 Hz, 2H), 7.64 (s, 1H), 7.61 (d, J = 8.3 Hz, 1H), 7.31 (dd, J = 8.2, 1.6 Hz, 1H), 7.27 (d, J = 8.4 Hz, 2H), 7.26 (d, J = 3.1 Hz, 1H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.66 (t, J = 7.4 Hz, 2H), 3.12 (m, 2H), 2.06 (t, J = 7.5 Hz, 2H), 1.55 (m, 4H), 1.51 (m, 2H), 1.31 (m, 7H), 0.88 (d, J = 6.6 Hz, 6H). MS (ESI) m/z 465 (M^+ + H).

Compound 289

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3-(dimethylamino)propyl)ureido)-N-hydroxyheptanamide

Compound 289 (49 mg, 90%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.74 (d, J = 8.4 Hz, 2H), 7.64 (s, 1H), 7.61 (d, J = 8.6 Hz, 1H), 7.31 (dd, J = 8.3, 1.6 Hz, 1H), 7.27 (d, J = 8.6 Hz, 2H), 7.27 (m, 1H), 6.46 (dd, J = 3.1, 0.8 Hz, 1H), 3.66 (t, J = 7.4 Hz, 2H), 3.15 (t, J = 6.5 Hz, 2H), 2.30 (t, J = 7.1 Hz, 2H), 2.10 (s, 6H), 2.06 (t, J = 7.5 Hz, 2H), 1.57 (m, 6H), 1.27 (m, 6H). MS (ESI) m/z 480 (M^+ + H).

Compound 290

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(cyclohexylmethyl)ureido)-N-hydroxyheptanamide

Compound 290 (41 mg, 94%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.74 (d, J = 8.4 Hz, 2H), 7.65 (s, 1H), 7.60 (d, J = 8.2 Hz, 1H), 7.31 (dd, J = 8.3, 1.4 Hz, 1H), 7.27 (m, 3H), 6.45 (d, J = 3.0 Hz, 1H), 3.65 (t, J = 7.5 Hz, 2H), 2.92 (d, J = 6.9 Hz, 2H), 2.05 (t, J = 7.4 Hz, 2H), 1.66 (m, 8H), 1.31 (m, 8H), 0.83 (m, 3H). MS (ESI) m/z 491 (M^+ + H).

Compound 291

7-(N-(4-(1H-indol-6-yl)phenyl)pentanamido)-N-hydroxyheptanamide

Compound 291 (54 mg, 63%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.73 (d, J = 8.4 Hz, 2H), 7.66 (s, 1H), 7.62 (d, J = 8.24 Hz, 2H), 6.46 (d, J = 2.5 Hz, 1H), 3.70 (t, J = 7.4 Hz, 2H), 2.15 (m, 4H), 1.56 (m, 6H), 1.31 (m, 6H), 0.80 (m, 3H). MS (ESI) m/z 436 (M^+ + H).

Compound 292

7-(N-(4-(1H-indol-6-yl)phenyl)isobutylamido)-N-hydroxyheptanamide

Compound 292 (46 mg, 79%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.75 (d, J = 8.4 Hz, 2H), 7.67 (s, 1H), 7.62 (d, J = 8.2 Hz, 2H), 7.31 (m, 4H), 6.46 (d, J = 2.4 Hz, 1H), 3.69 (t, J = 7.5 Hz, 2H), 2.05 (m, 2H), 1.58 (m, 4H), 1.02 (s, 3H), 1.01 (s, 3H). MS (ESI) m/z 422 (M^+ + H).

Compound 293

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(4-(2-methoxyethyl)piperazin-1-yl)acetamido)-N-hydroxyheptanamide

Compound 293 (52 mg, 56%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 536 (M^+ + H).

Compound 294

7-(1-(4-(1H-indol-6-yl)phenyl)-3,3-diethylureido)-N-hydroxyheptanamide

Compound 294 (45 mg, 51%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.65 (d, J = 8.6 Hz, 2H), 7.61 (t, J = 0.8 Hz, 1H), 7.59 (dd, J = 8.3, 0.5 Hz, 1H), 7.28 (dd, J = 8.3, 1.6 Hz, 1H), 7.25 (d, J = 3.2 Hz, 1H), 7.14 (d, J = 8.6 Hz, 2H), 6.44 (dd, J = 3.1, 0.8 Hz, 1H), 3.56 (t, J = 7.5 Hz, 2H), 3.14 (q, J = 7.0 Hz, 4H), 2.06 (t, J = 7.5 Hz, 2H), 1.59 (m, 4H), 1.33 (m, 4H), 0.94 (t, J = 7.1 Hz, 6H). MS (ESI) m/z 451 (M^+ + H).

Compound 295

7-(1-(4-(1H-indol-6-yl)phenyl)-3-ethylureido)-N-hydroxyheptanamide

Compound 295 (42 mg, 76%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.71 (d, J = 8.4 Hz, 2H), 7.65 (s, 1H), 7.60 (d, J = 8.3 Hz, 1H), 7.30 (dd, J = 8.3, 1.2 Hz, 1H), 7.25 (m, 3H), 6.45 (d, J = 2.9 Hz, 1H), 3.64 (t, J = 7.5 Hz, 2H), 3.14 (m, 2H), 2.05 (t, J = 7.4 Hz, 2H), 1.55 (m, 4H), 1.29 (m, 4H), 1.01 (t, J = 7.1 Hz, 3H). MS (ESI) m/z 423 (M^+ + H).

Compound 296

N-hydroxy-7-(N-(4-(2-methyl-1H-indol-5-yl)phenyl)methylsulfonamido)heptanamide

As shown in reaction scheme 4, 6-bromo-2-methyl-1H-indole and 4-nitrophenylboronic acid were subjected to the Suzuki reaction to obtain compound 2, which was then reduced with palladium/activated carbon to obtain compound 3. Then, compound 3 is allowed to react with ethyl 7-bromoheptanoate to obtain compound 4, which was then allowed to react with methanesulfonyl chloride to obtain a compound of formula V-1, after which the compound of formula V-1 (16 mg, 0.035 mmol) was stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 296 (12 mg, 77.3%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.67 (d, J = 1.9 Hz, 2H), 7.65 (s, 1H), 7.41 (d, J = 6.6 Hz, 2H), 7.30 (d, J = 3.5 Hz, 2H), 6.17 (s, 1H), 3.71 (t, J = 6.7 Hz, 2H), 2.93 (s, 3H), 2.42 (s, 3H), 2.05 (t, J = 7.3 Hz, 2H), 1.57 (m, 4H), 1.31 (m, 4H). MS (ESI) m/z 443 (M^+ + H).

Compound 299

Isobutyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate

Compound 299 (45 mg, 52%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.63 (m, 4H), 7.28 (m, 4H), 6.45 (d, J = 2.7 Hz, 1H), 3.85 (d, J = 5.9 Hz, 2H), 3.67 (t, J = 7.4 Hz, 2H), 1.59 (m, 4H), 1.23 (m, 4H), 0.87 (m, 6H). MS (ESI) m/z 452 (M^+ + H).

Compound 300

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)thiophene-2-carboxamide

Compound 300 (26 mg, 64%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.70 (d, J = 8.4 Hz, 2H), 7.66 (s, 1H), 7.61 (d, J = 8.2 Hz, 2H), 7.43 (d, J = 4.7 Hz, 1H), 7.32 (d, J = 8.5 Hz, 1H), 7.27 (m, 3H), 6.81 (m, 2H), 6.46 (d, J = 3.0 Hz, 1H), 3.65 (t, J = 7.4 Hz, 2H), 2.06 (m, 2H), 1.63 (m, 4H), 1.30 (m, 4H). MS (ESI) m/z 462 (M^+ + H).

Compound 302

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)picolinamide

Compound 302 (47 mg, 71%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.37 (s, 1H), 7.98 (s, 1H), 7.77 (d, J = 8.4 Hz, 2H), 7.66 (m, 3H), 7.35 (m, 5H), 4.07 (s, 3H), 3.69 (t, J = 7.1 Hz, 2H), 2.07 (t, J = 7.2 Hz, 2H), 1.56 (m, 4H), 1.44 (m, 4H). MS (ESI) m/z 471 (M^+ + H).

Compound 303

7-(N-(4-(1H-indol-5-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide

Compound 303 (42 mg, 92%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.81 (t, J = 1.3 Hz, 1H), 7.67 (m, 2H), 7.45 (d, J = 4.3 Hz, 1H), 7.39 (m, 3H), 7.28 (d, J = 3.1 Hz, 1H), 6.51 (t, J = 3.2 Hz, 1H), 3.66 (t, J = 6.6 Hz, 2H), 2.91 (s, 3H), 2.06 (t, J = 7.3 Hz, 2H), 1.56 (m, 2H), 1.44 (m, 2H), 1.33 (m, 2H), 1.29 (m, 2H). MS (ESI) m/z 429 (M^+ + H).

Compound 304

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-1-methylpiperidine -4-carboxamide

Compound 304 (47 mg, 77%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.78 (d, J = 8.4 Hz, 2H), 7.67 (s, 1H), 7.62 (d, J = 8.2 Hz, 1H), 7.33 (m, 1H), 7.31 (d, J = 8.4 Hz, 2H), 7.28 (d, J = 3.1 Hz, 1H), 6.46 (d, J = 2.4 Hz, 1H), 3.70 (t, J = 7.7 Hz, 2H), 2.94 (d, J = 11.5 Hz, 2H), 2.38 (m, 1H), 2.28 (s, 3H), 2.06 (t, J = 7.3 Hz, 2H), 1.50 (m, 6H), 1.20 (m, 8H). MS (ESI) m/z 477 (M^+ + H).

Compound 305

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-ooxheptyl)picolinamide

Compound 305 (45 mg, 66%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.85 (d, J = 3.8 Hz, 1H), 7.65 (m, 2H), 7.47 (d, J = 7.9 Hz, 2H), 7.41 (d, J = 8.4 Hz, 1H), 7.33 (d, J = 7.6 Hz, 1H), 7.22 (m, 3H), 7.10 (d, J = 8.0 Hz, 2H), 6.47 (d, J = 2.5 Hz, 1H), 3.96 (t, J = 6.9 Hz, 2H), 2.08 (t, J = 7.2 Hz, 2H), 1.62 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 456 (M^+ + H).

Compound 306

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)morpholine-4carboxamide

Compound 306 (43 mg, 65%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.13 (s, 1H), 10.29 (s, 1H), 8.63 (s, 1H), 7.64 (d, J = 6.5 Hz, 2H), 7.60 (s, 1H), 7.57 (d, J = 8.2 Hz, 2H), 7.35 (m, 1H), 7.28 (dd, J = 8.2, 1.4 Hz, 1H), 7.16 (d, J = 8.5 Hz, 2H), 6.41 (s, 1H), 3.54 (t, J = 7.6 Hz, 2H), 3.38 (m, 4H), 3.08 (m, 4H), 1.89 (t, J = 7.2 Hz, 2H), 1.47 (m, 4H), 1.22 (m, 4H). MS (ESI) m/z 465 (M^+ + H).

Compound 307

7-(N-(4-(1,2-dimethyl-1H-indol-5-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide

Compound 307 (90 mg, 93%) as a white solid was obtained according to the same method as the synthesis of compound 296.

^{1}H NMR (400 MHz, CD_3OD) δ 7.69 (m, 3H), 7.41 (m, 4H), 6.25 (s, 1H), 3.58 (m, 5H), 2.95 (s, 3H), 2.39 (s, 3H), 1.88 (t, J = 6.9 Hz, 2H), 1.46 (m, 4H), 1.16 (m, 4H). MS (ESI) m/z 458 (M^+ + H).

Compound 309

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide

Compound 309 (47 mg, 78%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.13 (s, 1H), 10.30 (s, 1H), 8.63 (s, 1H), 7.63 (d, J = 6.5 Hz, 2H), 7.60 (s, 1H), 7.57 (d, J = 8.3 Hz, 1H), 7.35 (t, J = 2.6 Hz, 1H), 7.28 (dd, J = 8.3, 1.3 Hz, 1H), 7.12 (d, J = 8.5 Hz, 2H), 6.41 (s, 1H), 3.52 (t, J = 7.2 Hz, 2H), 3.09 (s, 4H), 2.09 (s, 4H), 2.05 (s, 3H), 1.90 (t, J = 7,3 Hz, 2H), 1.45 (m, 4H), 1.22 (m, 4H). MS (ESI) m/z 478 (M^+ + H).

Compound 310

N-hydroxy-7-(N-(4-(1-methyl-1H-indazol-6-yl)phenyl)ethylsulfonamido)heptanamide

Compound 310 (45 mg, 85%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.00 (s, 1H), 7.78 (m, 4H), 7.52 (d, J = 7.4 Hz, 1H), 7.50 (d, J = 8.4 Hz, 1H), 7.44 (d, J = 8.4 Hz, 1H), 4.09 (s, 3H), 3.76 (t, J = 6.6 Hz, 2H), 3.12 (q, J = 8.4 Hz, 2H), 2.06 (t, J = 7.3 Hz, 2H), 1.59 (m, 2H), 1.47 (m, 2H), 1.27 (m, 7H). MS (ESI) m/z 458 (M^+ + H).

Compound 311

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide

Compound 311 (45 mg, 65%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 8.45 (s, 1H), 8.38 (d, J = 3.4 Hz, 1H), 7.75 (d, J = 7.7 Hz, 1H), 7.72 (s, 1H), 7.55 (d, J = 8.2 Hz, 2H), 7.42 (d, J = 8.4 Hz, 1H), 7.30 (d, J = 8.6 Hz, 2H), 7.25 (d, J = 3.1 Hz, 1H), 7.15 (d, J = 8.0 Hz, 2H), 6.48 (d, J = 3.0 Hz, 1H), 3.95 (t, J = 6.9 Hz, 2H), 2.08 (t, J = 7.3 Hz, 2H), 1.59 (m, 4H), 1.37 (m, 4H). MS (ESI) m/z 456 (M^+ + H).

Compound 312

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide

Compound 312 (42 mg, 93%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.99 (s, 1H), 7.80 (d, J = 8.4 Hz, 1H), 7.76 (d, J = 8.2 Hz, 2H), 7.75 (s, 1H), 7.45 (dd, J = 8.5, 1.2 Hz, 1H), 7.23 (d, J = 8.5 Hz, 2H), 4.10 (s, 3H), 3.66 (t, J = 7.6 Hz, 2H), 3.24 (m, 4H), 2.27 (t, J = 4.5 Hz, 4H), 2.21 (s, 3H), 2.06 (t, J = 7.3 Hz, 2H), 1.42 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 493 (M^+ + H).

Compound 313

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine -1-carboxamixde

Compound 313 (47 mg, 78%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.78 (s, 1H), 7.65 (d, J = 8.6 Hz, 2H), 7.44 (d, J = 8.5 Hz, 1H), 7.37 (dd, J = 8.5, 1.7 Hz, 1H), 7.25 (d, J = 3.1 Hz, 1H), 7.15 (d, J = 8.5 Hz, 2H), 6.49 (dd, J = 3.1, 0.7 Hz, 1H), 3.63 (t, J = 7.5 Hz, 2H), 3.21 (m, 4H), 2.24 (t, J = 4.7 Hz, 4H), 2.19 (s, 3H), 2.06 (t, J = 7.4 Hz, 2H), 1.58 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 478 (M^+ + H).

Compound 314

7-(N-(4-(1H-indol-5-yl)phenyl)ethylsulfonamido)-N-hydroxyheptanamide

Compound 314 (44 mg, 43%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.81 (s, 1H), 7.67 (d, J = 8.4 Hz, 2H), 7.46 (d, J = 8.4 Hz, 1H), 7.40 (m, 3H), 7.27 (d, J = 3.0 Hz, 1H), 6.51 (d, J = 2.9 Hz, 1H), 3.71 (t, J = 6.6 Hz, 2H), 3.07 (q, J = 7.4 Hz, 2H), 2.05 (t, J = 7.3 Hz, 2H), 1.56 (m, 2H), 1.43 (m, 2H), 1.30 (m, 7H). MS (ESI) m/z 443 (M^+ + H).

Compound 315

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)morpholine-4-carboxamide

Compound 315 (9 mg, 40%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.99 (s, 1H), 7.80 (d, J = 8.6 Hz, 1H), 7.72 (d, J = 6.9 Hz, 2H), 7.71 (s, 1H), 7.44 (dd, J = 8.5, 1.2 Hz, 1H), 7.24 (d, J = 8.5 Hz, 2H), 4.09 (s, 3H), 3.66 (t, J = 7.4 Hz, 2H), 3.47 (m, 4H), 3.20 (m, 4H), 2.06 (t, J = 7.3 Hz, 2H), 1.58 (m, 4H), 1.26 (m, 4H). MS (ESI) m/z 480 (M^+ + H).

Compound 316

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)morpholine-4-carboxamide

Compound 316 (45 mg, 65%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.78 (d, J = 1.2 Hz, 1H), 7.65 (d, J = 8.4 Hz, 2H), 7.44 (d, J = 8.4 Hz, 1H), 7.37 (d, J = 8.4 Hz, 1H), 7.25 (d, J = 2.9 Hz, 1H), 7.15 (d, J = 8.4 Hz, 2H), 6.49 (d, J = 2.8 Hz, 1H), 3.62 (t, J = 7.4 Hz, 2H), 3.44 (m, 4H), 3.17 (m, 4H), 2.06 (t, J = 7.4 Hz, 2H), 1.57 (m, 4H), 1.27 (m, 4H). MS (ESI) m/z 465 (M^+ + H).

Compound 317

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethylmorpholine-4-carboxamide

Compound 317 (43 mg, 86%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.67 (d, J = 8.4 Hz, 2H), 7.62 (s, 1H), 7.60 (d, J = 8.3 Hz, 1H), 7.29 (dd, J = 8.3, 1.2 Hz, 1H), 7.26 (d, J = 3.1 Hz, 1H), 7.16 (d, J = 8.4 Hz, 2H), 6.45 (d, J = 3.0 Hz, 1H), 3.65 (m, 4H), 3.41 (m, 2H), 2.31 (m, 2H), 2.06 (t, J = 7.4 Hz, 2H), 1.58 (m, 4H), 1.17 (m, 4H). MS (ESI) m/z 493 (M^+ + H).

Compound 318

N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)morpholine-4-carboxamide

Compound 318 (50 mg, 80%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.99 (s, 1H), 7.80 (d, J = 8.5 Hz, 1H), 7.76 (m, 3H), 7.44 (dd, J = 8.5, 1.1 Hz, 1H), 7.22 (d, J = 8.51 Hz, 2H), 4.09 (s, 3H), 3.67 (m, 4H), 3.41 (m, 2H), 2.32 (m, 2H), 2.06 (t, J = 7.3 Hz, 2H), 1.58 (m, 4H), 1.27 (m, 4H), 0.98 (d, J = 6.2 Hz, 6H). MS (ESI) m/z 508 (M^+ + H).

Compound 319

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethylmorpholine - 4-carboxamide

Compound 319 (49 mg, 39%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.79 (d, J = 1.1 Hz, 1H), 7.66 (d, J = 8.4 Hz, 2H), 7.44 (d, J = 8.4 Hz, 1H), 7.37 (dd, J = 8.4, 1.3 Hz, 1H), 7.25 (d, J = 3.0 Hz, 1H), 7.15 (d, J = 8.4 Hz, 2H), 6.49 (d, J = 2.9 Hz, 1H), 3.61 (m, 4H), 3.40 (m, 2H), 2.06 (m, 2H), 1.58 (m, 4H), 1.19 (m, 4H), 0.97 (d, J = 6,2 Hz, 6H). MS (ESI) m/z 493 (M^+ + H).

Compound 320

N-hydroxy-7-(N-(4-(1-methyl-1H-indol-5-yl)phenyl)methylsulfonamido)heptanamide

As shown in reaction scheme 5, 4-bromoaniline and methanesulfonyl chloride were reacted with each other to obtain compound 6, which was then allowed to react with ethyl 7-bromoheptanoate to obtain compound 7. Then, compound 7 was subjected to the Suzuki reaction to obtain a compound of formula XII, after which the compound of formula XII was methylated on the indole ring, and then stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 320 (3 mg, 61%).

MS (ESI) m/z 444 (M^+ + H).

Compound 321

N-hydroxy-7-(N-(4-(1-methyl-1H-indol-6-yl)phenyl)methylsulfonamido)heptanamide

Compound 321 (8 mg, 69%) as a white solid was obtained according to the same method as the synthesis of compound 320.

MS (ESI) m/z 444 (M^+ + H).

Compound 323

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-isopropylpiperazine-1-carboxamide

Compound 323 (50 mg, 79%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.69 (d, J = 8.4 Hz, 2H), 7.62 (m, 2H), 7.30 (dd, J = 8.2, 1.4 Hz, 1H), 7.27 (d, J = 3.0 Hz, 1H), 7.19 (d, J = 4.6, 2H), 6.46 (d, J = 2.9 Hz, 1H), 3.68 (t, J = 7.2 Hz, 2H), 3.28 (m, 5H), 2.44 (m, 4H), 2.08 (t, J = 7.2 Hz, 2H), 1.62 (m, 4H), 1.34 (m, 4H), 1.23 (m, 3H), 0.90 (m, 3H). MS (ESI) m/z 505 (M^+ + H).

Compound 324

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)pyrrolidine-1-carboxamide

Compound 324 (44 mg, 84%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.67 (s, 1H), 7.65 (d, J = 4.2 Hz, 2H), 7.60 (d, J = 8.2 Hz, 1H), 7.30 (dd, J = 8.2, 1.4 Hz, 1H), 7.27 (d, J = 3.1 Hz, 1H), 7.15 (m, J = 8.4 Hz 2H), 6.46 (d, J = 2.4 Hz, 1H), 3.62 (t, J = 7.4 Hz, 2H), 3.05 (m, 4H), 2.06 (t, J = 7.2 Hz, 2H), 1.69 (m, 4H), 1.59 (m, 4H), 1.31 (m, 4H). MS (ESI) m/z 448 (M^+ + H).

Compound 325

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydoxyamino)-7-oxoheptyl)isonicotinamide

Compound 325 (45 mg, 57%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

MS (ESI) m/z 457 (M^+ + H).

Compound 326

7-(N-(6-(1H-indol-6-yl)pyridin-3-yl)methylsulfonamido)-N-hydroxyheptanamide

Compound 326 (34 mg, 84%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

^{1}H NMR (400 MHz, CD_3OD) δ 8.57 (d, J = 1.7 Hz, 1H), 8.06 (s, 1H), 7.91 (d, J = 8.4 Hz, 1H), 7.85 (d, J = 6.6 Hz, 1H), 7.65 (m, 2H), 7.34 (d, J = 2.6 Hz, 1H), 6.50 (d, J = 2.6 Hz, 1H), 3.72 (t, J = 6.7 Hz, 2H), 2.97 (s, 3H), 2.05 (t, J = 7.3 Hz, 2H), 1.56 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 430 (M^+ + H).

Compound 327

N-hydroxy-7-(N-(6-(1-methyl-1H-indazol-6-yl)pyridin-3-yl)methylsulfonamido)heptanamide

Compound 327 (44 mg, 64%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.31 (s, 1H), 8.67 (d, J = 2.2 Hz, 1H), 8.64 (s, 1H), 8.36 (s, 1H), 8.18 (d, J = 8.4 Hz, 1H), 8.00 (s, 1H), 7.99 (dd, J = 8.4, 2.2 Hz, 1H), 7.90 (d, J = 7.3 Hz, 1H), 7.85 (d, J = 8.4 Hz, 1H), 4.12 (s, 3H), 3.71 (t, J = 6.6 Hz, 2H), 3.05 (s, 3H), 1.89 (t, J = 7.3 Hz, 2H), 1.39 (m, 4H), 1.18 (m, 4H). MS (ESI) m/z 445 (M^+ + H).

Compound 328

7-(N-(6-(1H-indol-5-yl)pyridin-3-yl)methylsulfonamido)-N-hydroxyheptanamide

Compound 328 (29 mg, 91%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

^{1}H NMR (400 MHz, CD_3OD) δ 8.56 (d, J = 2.0 Hz, 1H), 8.20 (d, J = 1.2 Hz, 1H), 7.88 (d, J = 6.4 Hz, 1H), 7.84 (d, J = 6.0 Hz, 1H), 7.76 (d, J = 6.8 Hz, 1H), 7.49 (d, J = 8.5 Hz, 1H), 7.30 (d, J = 3.1 Hz, 1H), 6.57 (d, J = 2.6 Hz, 1H), 3.72 (t, J = 6.8 Hz, 2H), 2.97 (s, 3H), 2.05 (t, J = 7.3 Hz, 2H), 1.56 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 430 (M^+ + H).

Compound 329

N-(4-(1H-indol-6-yl)phenyl)-4-acetyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide

Compound 329 (50 mg, 60%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.69 (d, J = 8.6 Hz, 2H), 7.62 (s, 1H), 7.59 (d, J = 8.3 Hz, 1H), 7.29 (dd, J = 8.2, 1.5 Hz, 1H), 7.26 (d, J = 3.1 Hz, 1H), 7.22 (d, J = 8.6 Hz, 2H), 6.44 (m, 1H), 3.66 (t, J =

7.5 Hz, 2H), 3.37 (m, 4H), 3.25 (m, 4H), 2.06 (t, J = 7.4 Hz, 2H), 2.01 (s, 3H), 1.59 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 506 (M^+ + H).

Compound 330

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-1,4-diazepane -1-carboxamide

Compound 330 (49 mg, 92%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.66 - 7.58 (m, 4H), 7.29 - 7.25 (m, 2H), 7.11 (d, J = 8.6 Hz, 2H), 6.44 (d, J = 3.1 Hz, 1H), 3.61 (t, J = 7.4 Hz, 2H), 3.35 (m, 2H), 3.18 (t, J = 6.0 Hz, 2H), 2.59 (m, 2H), 2.53 (m, 2H), 2.30 (s, 3H), 2.07 (t, J = 7.3 Hz, 2H), 1.76 (m, 2H), 1.61 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 331

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indol-6-yl)phenyl)piperazine-1-carboxamide

As shown in reaction scheme 6, 4-bromoaniline and ethyl 7-bromoheptanoate were allowed to react with each other so as to obtain compound 9, which was then allowed to react with 4-nitrophenyl chloroformate so as to obtain compound 10. Then, compound 10 was subjected to the Suzuki reaction with boronic acid to obtain a compound of formula VII-1, which was then methylated on the indole ring and allowed to react with 4-methylpiperazine, thus obtaining a compound of formula VIII-1. Then, the compound of formula VIII-1 (201 mg, 0.398 mmol) was stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate,

washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 331 (106 mg 54%).

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.72 (d, J = 8.6 Hz, 2H), 7.60 - 7.58 (m, 2H), 7.32 (d, J = 8.3 Hz, 1H), 7.19 - 7.17 (m, 3H), 6.43 (d, J = 3.1 Hz, 1H), 3.84 (s, 3H), 3.64 (t, J = 7.4 Hz, 2H), 3.24 (m, 4H), 2.26 (m, 4H), 2.20 (s, 3H), 2.06 (t, J = 7.4 Hz, 2H), 1.59 (m, 4H), 1.35 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 332

7-(N-(4-(1H-indol-2-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide

Compound 332 (29 mg, 44%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

MS (ESI) m/z 429 (M^+ + H).

Compound 333

Tert-butyl 2-(4-(N-(7-(hydroxyamino)-7-oxoheptyl)methylsulfonamido)phenyl)-1H-indole-1-carboylate

Compound 333 (52 mg, 24%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

MS (ESI) m/z 529 (M^+ + H).

Compound 334

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(2-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide

Compound 334 (235 mg, 97%) as a white solid was obtained according to the same method as the synthesis of compound 296.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.64 - 7.62 (m, 3H), 7.32 - 7.30 (m, 2H), 7.15 (d, J = 6.7 Hz, 2H), 6.16 (s, 1H), 3.63 (t, J = 7.5 Hz, 2H), 3.23 (m, 4H), 2.42 (s, 3H), 2.25 (m, 4H), 2.20 (s, 3H), 2.06 (t, J = 7.4 Hz, 2H), 1.59 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 493 (M^+ + H).

Compound 335

N-(4-(1H-indol-6-yl)phenyl)-4-benzyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide

Compound 335 (5 mg, 54%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.64 (d, J = 8.6 Hz, 2H), 7.61 (m, 2H), 7.29 (dd, J = 8.3, 1.6 Hz, 1H), 7.23 (m, 6H), 7.13 (d, J = 8.6 Hz, 2H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.61 (t, J = 7.5 Hz, 2H), 3.43 (s, 2H), 3.21 (m, 4H), 2.25 (t, J = 4.8 Hz, 4H), 2.05 (t, J = 7.5 Hz, 2H), 1.58 (m, 4H), 1.31 (m, 4H). MS (ESI) m/z 554 (M^+ + H).

Compound 336

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide

Compound 336 (39 mg, 70%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.00 (d, J = 0.9 Hz, 1H), 7.80 (dd, J = 8.4, 0.6 Hz, 1H), 7.76 (m, 3H), 7.45 (dd, J = 8.5, 1.4 Hz, 1H), 7.23 (d, J = 8.6 Hz, 2H), 4.10 (s, 3H), 3.66 (t, J = 7.5 Hz, 2H), 3.26 (m, 4H), 2.37 (q, J = 7.2 Hz, 2H), 2.31 (m, 4H), 2.06 (t, J = 7.4 Hz, 2H), 1.60 (m, 4H), 1.32 (m, 4H), 1.03 (t, J = 7.2 Hz, 3H). MS (ESI) m/z 507 (M^+ + H).

Compound 337

7-(N-(4-(5-bromo-1H-indol-2-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide

Compound 337 (45 mg, 70%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

MS (ESI) m/z 507 (M^+ + H).

Compound 338

Tert-butyl 5-bromo-2-(4-(N-(7-(hydorxyamino)-7-oxoheptyl)methylsulfonamido)phenyl)-1H-indazole-1-carboxylate

Compound 338 (60 mg, 70%) as a yellow oil was obtained according to the same method as the synthesis of compound 252.

MS (ESI) m/z 607 (M^+ + H).

Compound 339

N-(4-(1H-indol-6-yl)phenyl)-4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide

Compound 339 (29 mg, 49%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.55 (m, 5H), 7.29 (d, J = 7.9 Hz, 1H), 7.26 (s, 1H), 7.16 (d, J = 6.7 Hz, 1H), 6.44 (m, 1H), 3.63 (t, J = 7.0 Hz, 2H), 3.24 (m, 4H), 2.35 (m ,2H), 2.29 (m, 4H), 2.15 (t, J = 7.2 Hz, 2H), 1.58 (m, 4H), 1.28 (m, 4H), 1.02 (t, J = 6.8 Hz, 3H). MS (ESI) m/z 492 (M^+ + H).

Compound 340

N-(4-(1H-indol-5-yl)phenyl)-4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-caqrboxamide

Compound 340 (42 mg, 90%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.78 (s, 1H), 7.66 (d, J = 7.5 Hz, 2H), 7.56 (m, 2H), 7.43 (m, 1H), 7.25 (m, 1H), 7.16 (d, J = 7.4 Hz, 2H), 6.49 (s, 1H), 3.63 (t, J = 6.6 Hz, 2H), 3.25 (m, 4H), 2.36 (m, 2H), 2.30 (m, 4H), 2.06 (m, 2H), 1.58 (m, 4H), 1.27 (m ,4H), 1.02 (t, J = 6.8 Hz, 3H)). MS (ESI) m/z 492 (M^+ + H).

Compound 341

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide

Compound 341 (7 mg, 77%) as a yellow oil was obtained according to the same method as the synthesis of compound 331.

^{1}H NMR (400 MHz, DMSO-d_6) δ 7.78 (s, 1H), 7.67 (d, J = 6.6 Hz, 2H), 7.44 (s, 2H), 7.18 - 7.16 (m, 3H), 6.48 (d, J = 3.1 Hz, 1H), 3.82 (s, 3H), 3.64 (t, J = 7.4 Hz, 2H), 3.25 (m, 4H), 2.26 (m, 4H), 2.21 (s, 3H), 2.06 (t, J = 7.4 Hz, 2H), 1.60 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 492 (M^+ + H).

Compound 342

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-sulfonamido)heptanamide

Compound 342 (0.4 g, 42%) as a yellow oil was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.99 (s, 1H), 7.79 (d, J = 8.4 Hz, 1H), 7.75 (d, J = 8.3 Hz, 2H), 7.74 (s, 1H), 7.51 (d, J = 8.4 Hz, 2H), 7.42 (d, J = 8.4 Hz, 1H), 4.08 (s, 3H), 3.70 (t, J = 6.9 Hz, 2H), 3.23 (t, J = 4.8 Hz, 4H), 2.40 (t, J = 4.6 Hz, 4H), 2.24 (s, 3H), 2.05 (t, J = 7.4 Hz, 2H), 1.52 (m, 2H), 1.44 (m, 2H), 1.32 (m, 4H). MS (ESI) m/z 529 (M^+ + H).

Compound 343

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(2-methoxyphenyl)piperazine-1-carboxamide

Compound 343 (30 mg, 76%) as a yellow liquid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.95 (s, 1H), 7.65 (d, J = 8.5 Hz, 2H), 7.62 (s, 1H), 7.58 (d, J = 8.3 Hz, 1H), 7.28 (dd, J = 8.3, 1.2 Hz, 1H), 7.24 (d, J = 3.1 Hz, 1H), 7.14 (d, J = 8.5 Hz, 2H), 6.44 (d, J = 2.9 Hz, 1H), 3.74 (s, 3H), 3.62 (t, J = 7.6 Hz, 2H), 3.32 (m, 4H), 2.77 (m, 4H), 2.05 (t, J = 7.5 Hz, 2H), 1.58 (m, 4H), 1.28 (m, 4H). MS (ESI) m/z 507 (M^+ + H).

Compound 344

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(3-methoxyphenyl)piperazine-1-carboxamide

Compound 344 (35 mg, 92%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.64 (d, J = 8.5 Hz, 2H), 7.61 (s, 1H), 7.58 (d, J = 8.2 Hz, 1H), 7.28 (dd, J = 8.3, 1.4 Hz, 1H), 7.25 (d, J = 3.1 Hz, 1H), 7.14 (d, J = 8.5 Hz, 2H), 7.05 (d, J = 8.2 Hz, 1H), 3.68 (s, 3H), 3.62 (t, J = 7.5 Hz, 2H), 3.28 (m, 4H), 2.88 (m, 4H), 2.05 (t, J = 7.4 Hz, 2H), 1.57 (m, 4H), 1.30 (m, 4H). MS (ESI) m/z 507 (M^+ + H).

Compound 345

N-(4-(3H-benzo[d]imidazol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide

Compound 345 (39 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.19 (s, 1H), 7.83 (s, 1H), 7.68 (m, 3H), 7.55 (m, 1H), 7.20 (m, 2H), 3.65 (t, J = 8.0 Hz, 2H), 3.24 (m, 4H), 2.24 (m, 4H), 2.21 (s, 3H), 2.06 (m, 2H), 1.59 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 479 (M^+ + H).

Compound 346

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(2-hydroxyethyl)piperazine-1-carboxamide

Compound 346 (23 mg, 39%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.66 (d, J = 8.6 Hz, 2H), 7.61 (s, 1H), 7.59 (d, J = 8.3 Hz, 1H), 7.29 (dd, J = 6.7, 1.6 Hz, 1H), 7.26 (d, J = 3.1 Hz, 1H), 7.16 (d, J = 8.6 Hz, 2H), 6.44 (dd, J = 3.1, 0.8 Hz, 1H), 3.62 (m, 2H), 3.59 (t, J = 5.9 Hz, 2H), 3.24 (m, 4H), 2.45 (t, J = 5.9 Hz, 2H), 2.35 (m, 4H), 2.06 (t, J = 7.3 Hz, 2H), 1.58 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 508 (M^+ + H).

Compound 347

7-(3-(2-(dimethylamino)ethyl)-1-(4-(1-methyl-1H-indzol-6-yl)phenyl)ureido)-N-hydroxyheptanamide

Compound 347 (15 mg, 52%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.01 (s, 1H), 7.82 (d, J = 8.5 Hz, 2H), 7.79 (s, 1H), 7.47 (dd, J = 8.5, 1.3 Hz, 1H), 7.37 (d, J = 8.4 Hz, 2H), 4.11 (s, 3H), 3.69 (t, J = 7.4 Hz, 2H), 3.26 (t, J = 6.7 Hz, 2H), 2.26 (s, 6H), 2.08 (t, J = 7.2 Hz, 2H), 1.65 (m, 4H), 1.32 (m, 4H). MS (ESI) m/z 481 (M^+ + H).

Compound 348

N-hydroxy-7-(1-(4-(1-methyl-1H-indazol-6-yl)phenyl)-3-(2-(1-methylpyrrolidin-2-yl)ethyl)ureido)heptanamide

Compound 348 (38 mg, 96%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.00 (s, 1H), 7.83 (d, J = 8.5 Hz, 2H), 7.82 (m , 1H), 7.78 (s, 1H), 7.47 (dd, J = 8.5, 1.4 Hz, 1H), 7.34 (d, J = 8.5 Hz, 2H), 4.10 (s, 3H), 3.68 (t, J = 7.9 Hz, 2H), 3.18 (m, 2H), 2.93 (m, 1H), 2.20 (s, 3H), 2.06 (t, J = 7.4 Hz, 2H), 2.00 (m, 4H), 1.60 (m, 4H), 1.51 (m, 4H), 1.27 (m, 4H). MS (ESI) m/z 521 (M^+ + H).

Compound 349

N-(4-(1H-indol-6-yl)phenyl)-4-butyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide

Compound 349 (82 mg, 74%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.64 (d, J = 8.6 Hz, 2H), 7.62 (s, 1H), 7.59 (d, J = 8.3 Hz, 1H), 7.28 (d, J = 8.3 Hz, 1H), 7.25 (d, J = 3.0 Hz, 1H), 7.10 (d, J = 8.4 Hz, 2H), 3.59 (t, J = 7.6 Hz, 2H), 3.11 (m,

4H), 2.05 (t, J = 7.4 Hz, 2H), 1.54 (m, 4H), 1.34 (m, 6H), 1.21 (m, 4H), 0.86 (t, J = 7.3 Hz, 3H). MS (ESI) m/z 520 (M^+ + H).

Compound 350

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carboxamide

Compound 350 (39 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.04 (s, 1H), 7.97 (s, 1H), 7.71 (m, 3H), 7.60 (d, *J* = 8.8 Hz, 1H), 7.19 (d, *J* = 8.5 Hz, 2H), 4.06 (s, 3H), 3.64 (t, *J* = 7.5 Hz, 2H), 3.18 (m, 4H), 2.29 (m, 4H), 2.20 (s, 3H), 2.04 (m, 2H), 1.58 (m, 4H), 1.39 (m, 4H). MS (ESI) m/z 493 (M^+ + H).

Compound 351

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine -1-carboxamide

Compound 351 (39 mg, 50%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.04 (s, 1H), 7.97 (s, 1H), 7.69 (m, 3H), 7.60 (m, 1H), 7.17 (d, *J* = 13.3 Hz, 2H), 7.07 (s, 3H), 3.64 (t, *J* = 7.2 Hz, 2H), 3.24 (s, 4H), 2.37 (m ,2H), 2.30 (m ,4H), 2.04 (t, *J* = 6.4 Hz, 2H), 1.58 (m, 4H), 1.32 (m, 4H), 1.17 (t, *J* = 7.1 Hz, 3H). MS (ESI) m/z 507 (M^+ + H).

Compound 352

N-(4-(1H-indol-6-yl)phenyl)-4-(2-(dimethylamino)ethyl)-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide

Compound 352 (60 mg, 44%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.68 (dd, *J* = 8.6, 2.4 Hz, 2H), 7.61 (s, 1H), 7.59 (d, *J* = 8.3 Hz, 1H), 7.29 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.26 (m, 1H), 7.19 (d, *J* = 4.6 Hz, 1H), 7.17 (d, *J* = 4.6, 1H), 6.45 (d, *J* =

3.1 Hz, 1H), 3.65 (t, J = 6.0 Hz, 2H), 3.25 (m, 4H), 2.39 (m, 2H), 2.34 (m, 2H), 2.06 (t, J = 7.3 Hz, 2H), 2.04 (m, 4H), 1.84 (s, 6H), 1.58 (m, 4H), 1.33 (m, 4H). MS (ESI) m/z 535 (M^+ + H).

Compound 353

7-(3-((1-ethylpyrrolidin-2-yl)methyl)-1-(4-(1-methyl-1H-indazol-6-yl)phenyl)ureido)-N-hydroxyheptanamide

Compound 353 (40 mg, 51%) as a yellow oil was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 8.01 (s, 1H), 7.83 (m, 3H), 7.79 (s, 1H), 7.47 (dd, J = 8.5, 1.4 Hz, 1H), 7.36 (d, J = 8.5 Hz, 2H), 4.11 (s, 3H), 3.70 (t, J = 6.6 Hz, 2H), 3.16 (m, 2H), 2.94 (m, 1H), 2.82 (m, 1H), 2.39 (m, 2H), 2.08 (m, 2H), 1.88 (m, 4H), 1.52 (m, 6H), 1.32 (m 4H), 1.11 (t, J = 7.2 Hz, 3H). MS (ESI) m/z 521 (M^+ + H).

Compound 354

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methylpiperazine-1-sulfonamido)-N-hydroxyheptanamide

Compound 354 (45 mg, 36%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.69 (d, J = 8.6 Hz, 2H), 7.63 (s, 1H), 7.60 (d, J = 8.2 Hz, 1H), 7.46 (d, J = 8.6 Hz, 2H), 7.30 (dd, J = 8.3, 1.6 Hz, 1H), 7.27 (d, J = 3.1 Hz, 1H), 6.45 (dd, J = 3.1, 0.8 Hz, 1H), 3.69 (t, J = 7.0 Hz, 2H), 3.22 (m, 4H), 2.42 (m, 4H), 2.26 (s, 3H), 2.05 (t, J = 7.4 Hz, 2H), 1.57 (m, 2H), 1.45 (m, 2H), 1.30 (m, 4H). MS (ESI) m/z 514 (M^+ + H).

Compound 355

7-(N-(4-(1H-indol-5-yl)phenyl)-4-methylpiperazine-1-sulfonamido)-N-hydroxyheptanamide

Compound 355 (38 mg, 44%) as a white solid was obtained according to the same method as the synthesis of compound 180.

^{1}H NMR (400 MHz, CD_3OD) δ 7.80 (d, J = 1.3 Hz, 1H), 7.66 (d, J = 8.5 Hz, 2H), 7.43 (m, 3H), 7.38 (dd, J = 8.5, 1.6 Hz, 1H), 7.26 (d, J = 3.1 Hz, 1H), 3.66 (t, J = 7.0 Hz, 2H), 3.21 (m, 4H), 2.40 (m, 4H), 2.24 (s, 3H), 2.05 (t, J = 7.2 Hz, 2H), 1.56 (m, 2H), 1.44 (m, 2H), 1.31 (m, 4H). MS (ESI) m/z 514 (M^+ + H).

Compound 356

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperidine-1-carboxamide

Compound 356 (300 mg, 94%) as a white solid was obtained according to the same method as the synthesis of compound 255.

^{1}H NMR (400 MHz, CD_3OD) δ 7.65 (dd, J = 6.7, 1.9 Hz, 2H), 7.61 (m, 1H), 7.28 (dd, J = 8.2, 1.6 Hz, 1H), 7.25 (m, 1H), 7.13 (d, J = 8.6 Hz, 2H), 6.44 (dd, J = 3.1, 0.8 Hz, 1H), 3.82 (s, 1H), 3.79 (s, 1H), 3.62 (t, J = 7.2 Hz, 2H), 2.57 (m ,2H), 2.06 (t, J = 7.2 Hz, 2H), 1.57 (m, 4H), 1.42 (m, 4H), 0.91 (m, 1H), 0.90 (d, J = 7.2 Hz, 3H). MS (ESI) m/z 477 (M^+ + H).

Compound 357

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methylpiperazine-1-carbothioamido)-N-hydroxyheptanamide

As shown in reaction scheme 8, thiophosgene was added dropwise to compound 9, and then 1-methylpiperazine was added thereto, thus synthesizing compound 11. Then, compound 11 was subjected to the Suzuki reaction to obtain a compound of formula XVI, which was then stirred with hydroxylamine and potassium hydroxide for 30 minutes. Then, a 50% water solution of hydroxylamine was added to the stirred solution until the undissolved solids were dissolved so that the solution became clear. Then, the reaction solution was stirred at room temperature for 10 hours, and after the completion of the reaction has been confirmed, the reaction product was concentrated under reduced pressure to remove the solvent. The remaining material was extracted using ethyl acetate, washed with brine, dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was crystallized, thus obtaining compound 357 (146 mg, 95%).

^{1}H NMR (400 MHz, CD_3OD) δ 7.69 (d, J = 6.6 Hz, 2H), 7.60 (m, 2H), 7.29 (m, 2H), 7.14 (d, J = 8.6 Hz, 2H), 6.45 (d, J = 3.1 Hz, 1H), 4.09 (m, 2H), 3.58 (m, 4H), 2.28 (m, 4H), 2.20 (s, 3H), 2.07 (t, J = 7.4 Hz, 2H), 1.73 (m, 2H), 1.59 (m, 2H), 1.34 (m, 4H). MS (ESI) m/z 494 (M^+ + H).

Compound 358

7-(N-(4-(1H-indol-5-yl)phenyl)-4-methylpiperazine-1-carbothioamido)-N-hydroxyheptanamide

Compound 358 (168 mg, 98%) as a brown solid was obtained according to the same method as the synthesis of compound 357.

^{1}H NMR (400 MHz, CD_3OD) δ 7.79 (s, 1H), 7.67 (d, J = 6.6 Hz, 2H), 7.44 (d, J = 8.5 Hz, 1H), 7.38 (d, J = 8.5 Hz, 1H), 7.25 (d, J = 3.2 Hz, 1H), 7.14 (m, 2H), 6.49 (d, J = 3.1 Hz, 1H), 4.09 (m, 2H), 3.58 (m, 4H), 2.28 (m, 4H), 2.20 (s, 3H), 2.07 (t, J = 7.4 Hz, 2H), 1.72 (m, 2H), 1.59 (m, 2H), 1.33 (m, 4H). MS (ESI) m/z 494 (M^+ + H).

Compound 359

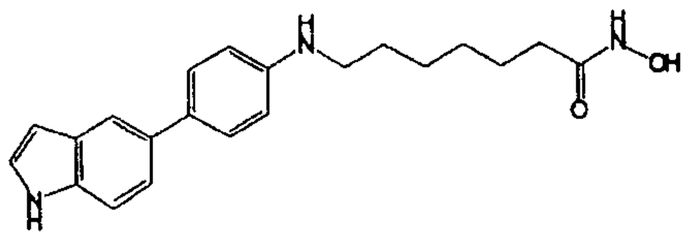
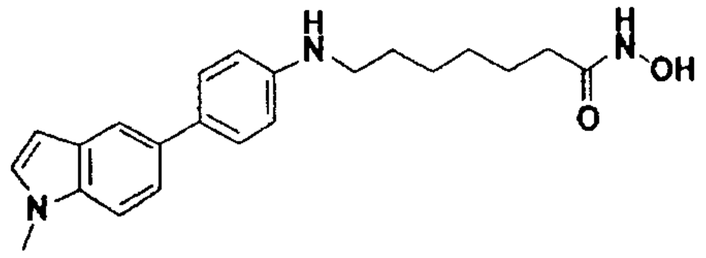
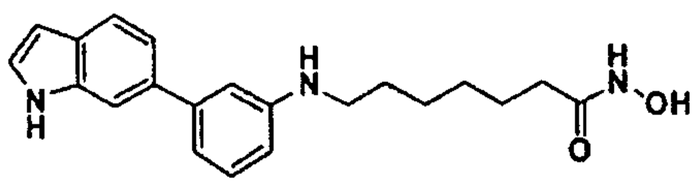
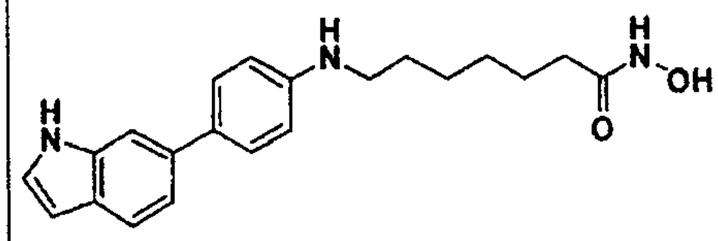
N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-thiocarboamido)heptanamide

Compound 359 (30 mg, 38%) as a brown oil was obtained according to the same method as the synthesis of compound 357.

^{1}H NMR (400 MHz, CD_3OD) δ 8.05 (s, 1H), 7.99 (s, 1H), 7.72 (m, 3H), 7.62 (d, J = 8.8 Hz, 1H), 7.17 (d, J = 8.6 Hz, 2H), 4.09 (m, 5H), 3.59 (m, 4H), 2.29 (m, 4H), 2.21 (s, 3H), 2.07 (t, J = 7.5 Hz, 2H), 1.73 (m, 2H), 1.60 (m, 2H), 1.34 (m, 4H). MS (ESI) m/z 509 (M^+ + H).

The chemical structures of compounds 150 to 359 as described above are shown in Tables 1 to 15 below.

[Table 1]

Compound	Structure	Compound	Structure
150		158	
166		167	
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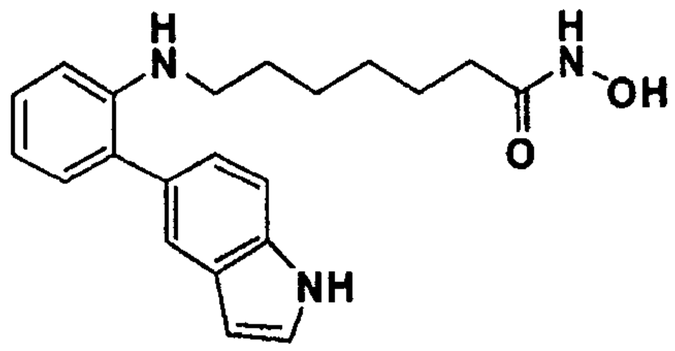
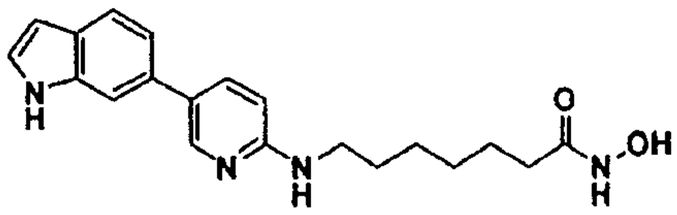
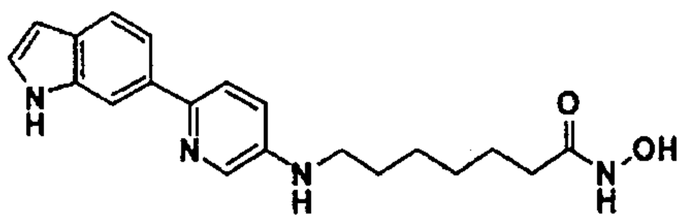
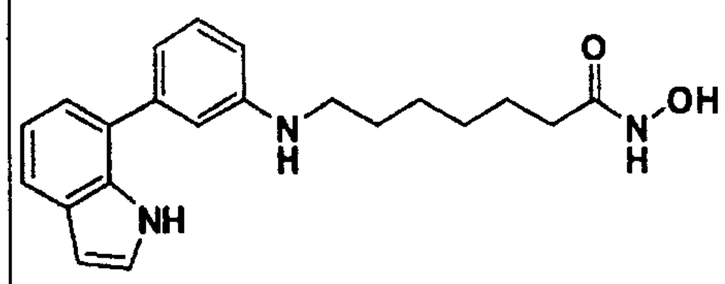
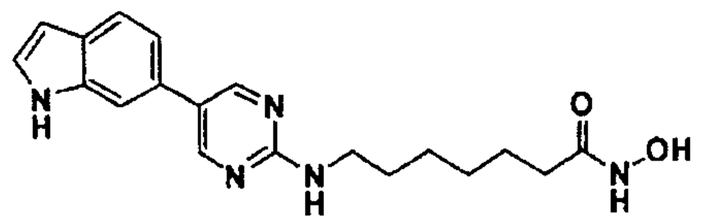
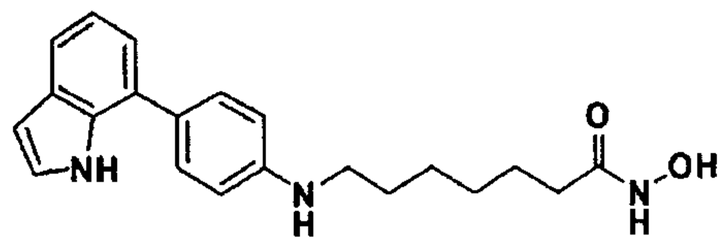
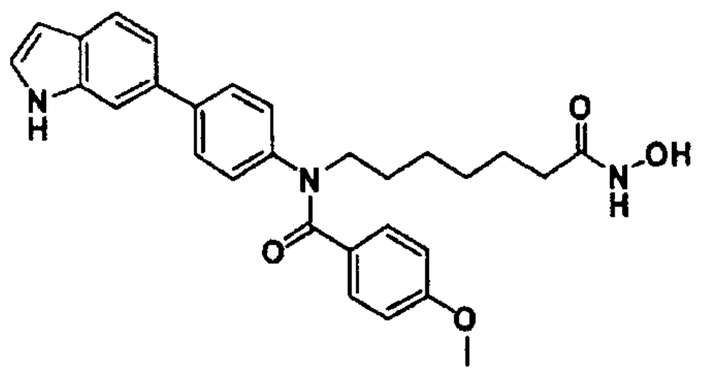
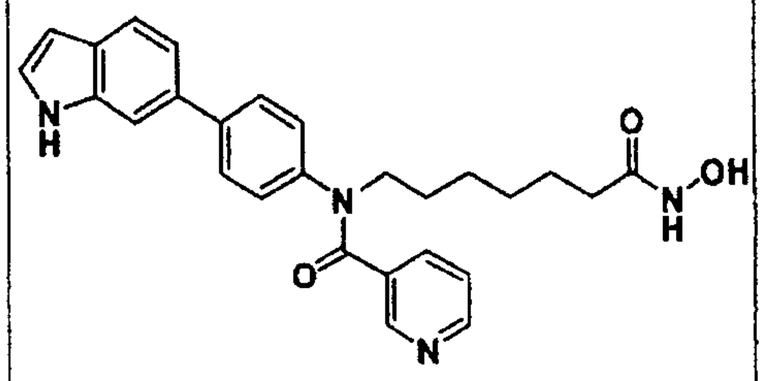
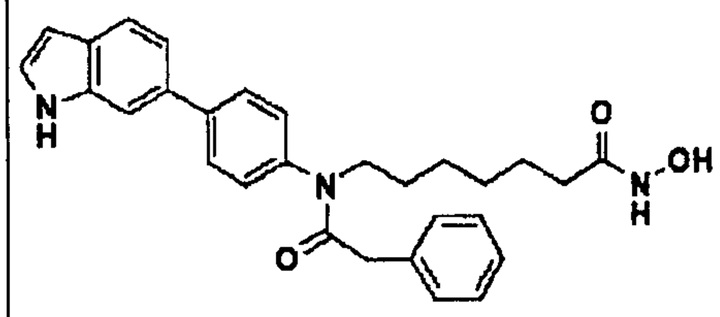
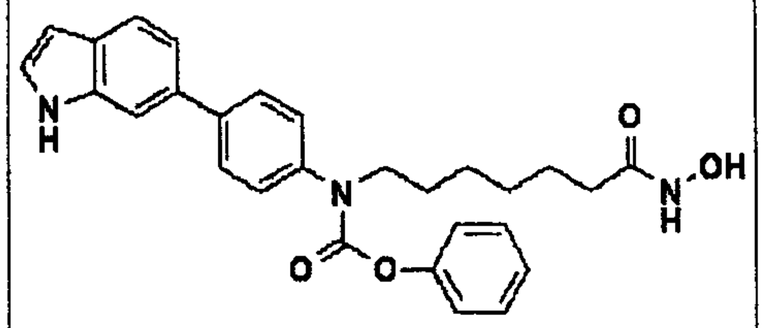
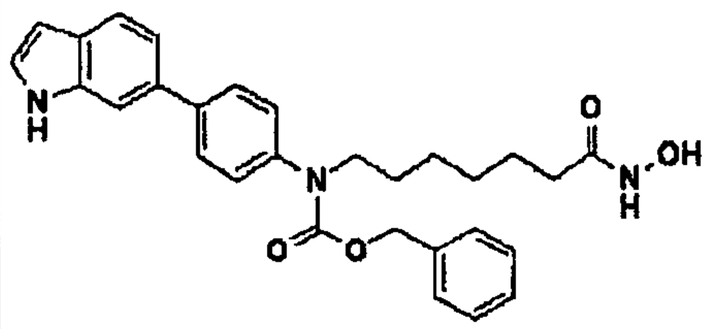
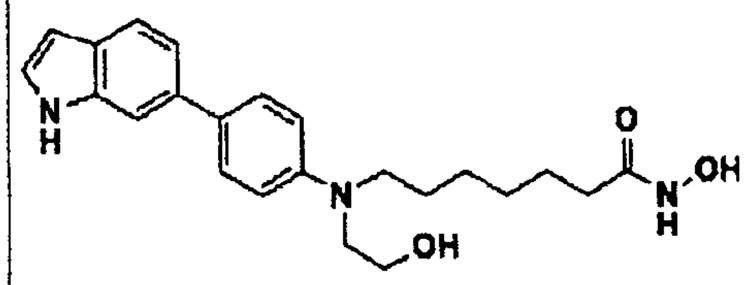
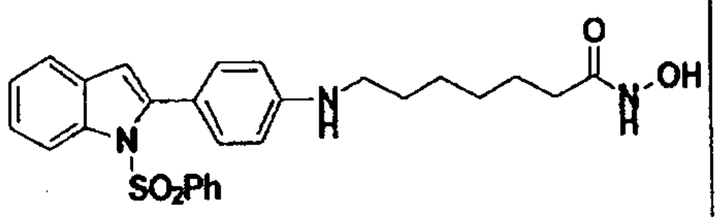
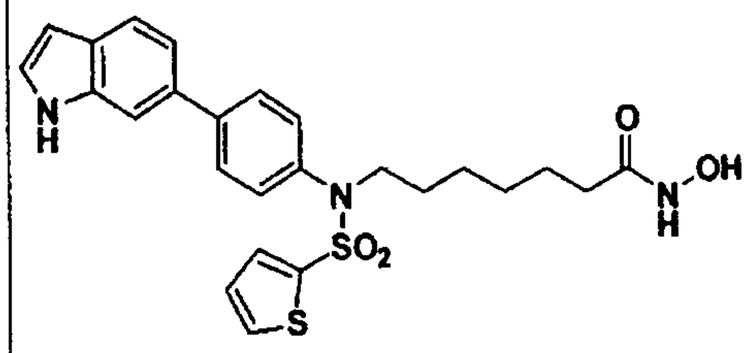
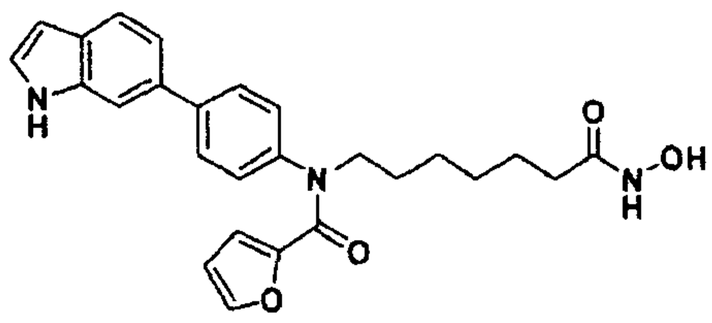
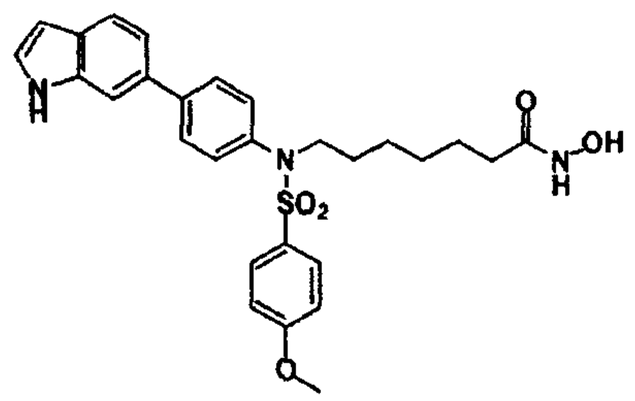
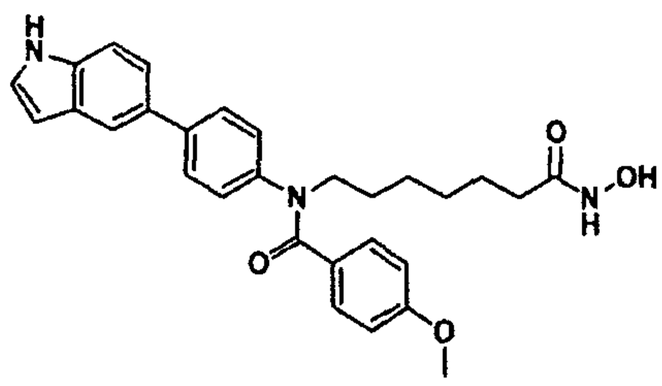
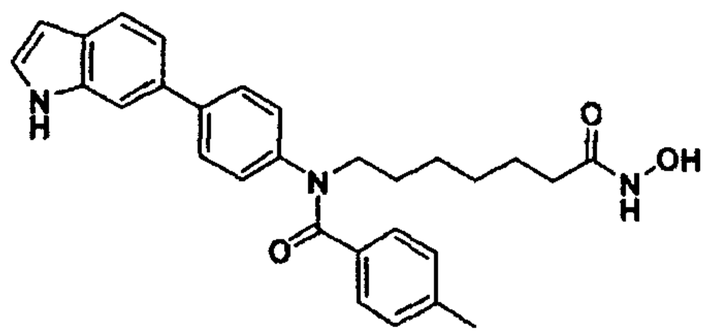
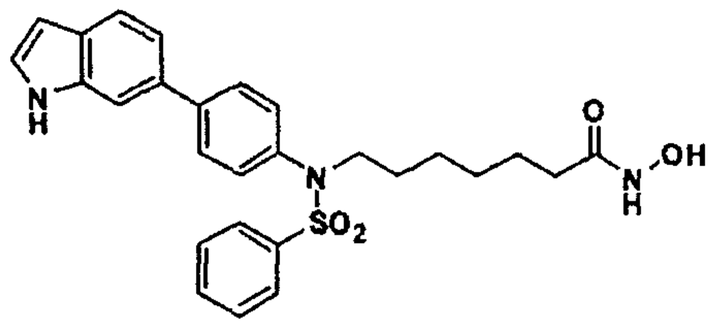
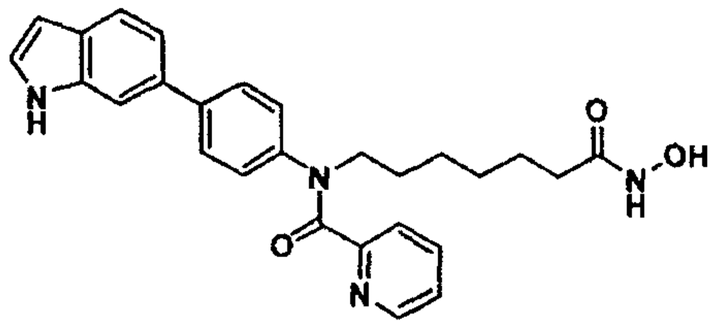
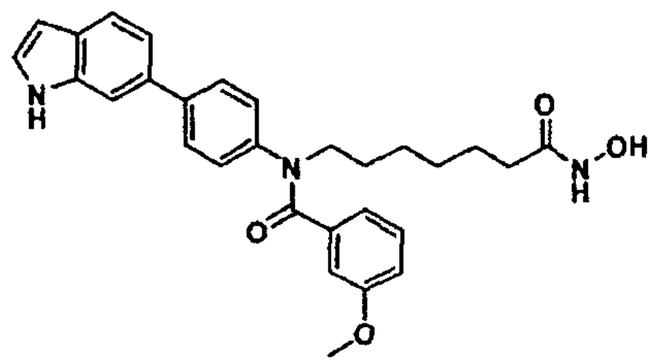
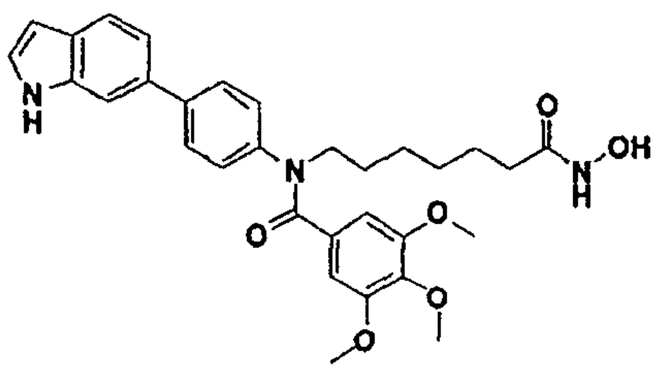
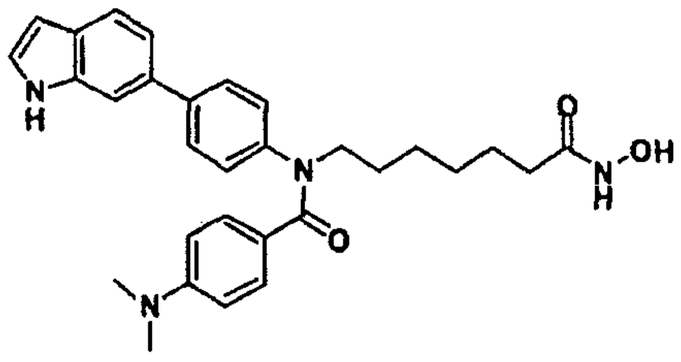
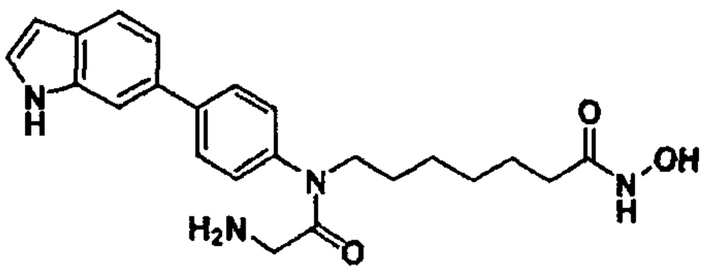
172		174	
175		176	

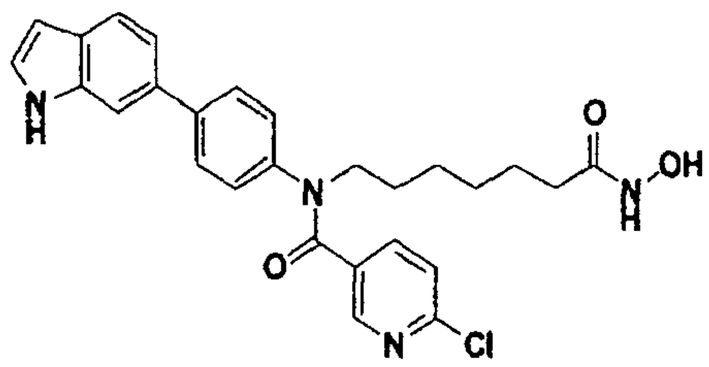
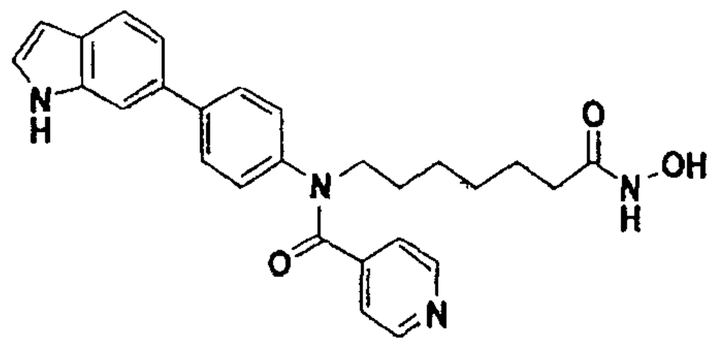
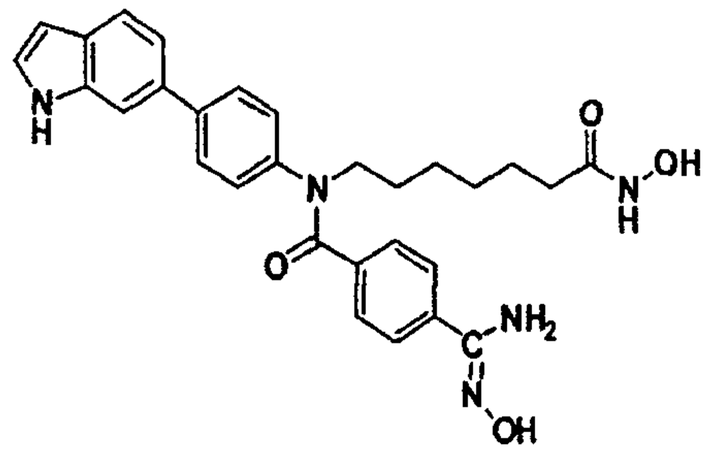
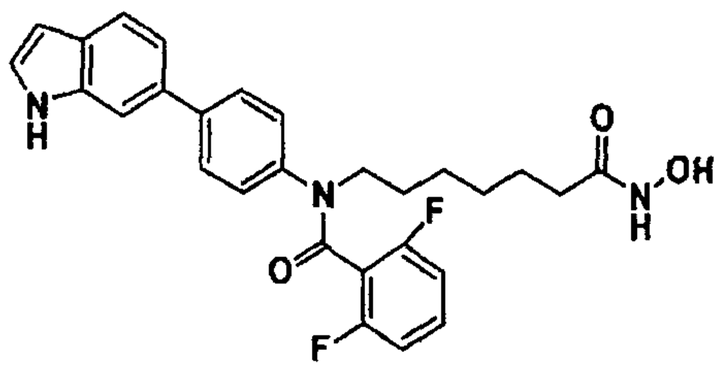
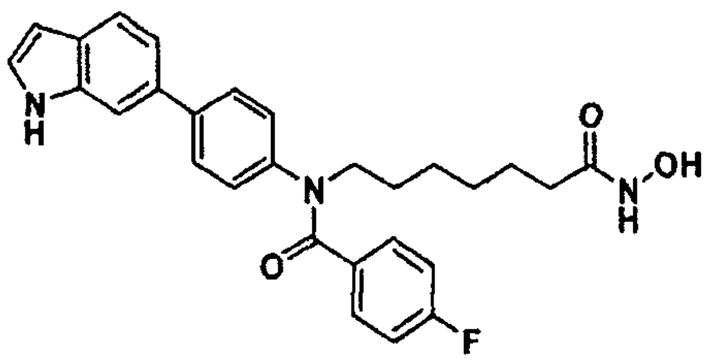
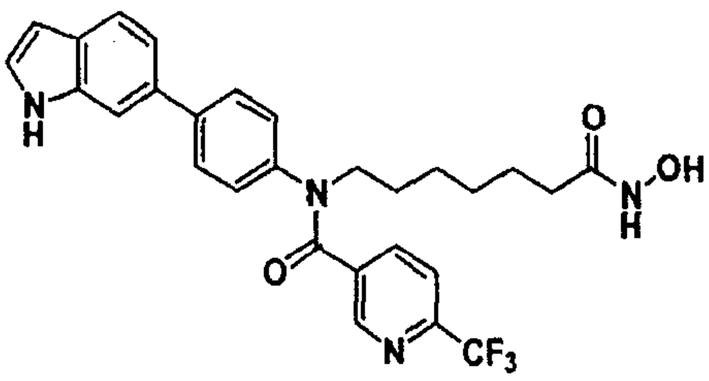
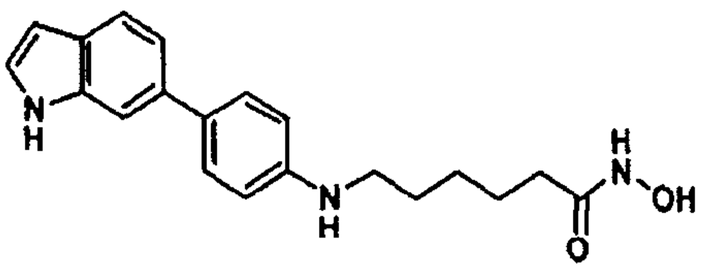
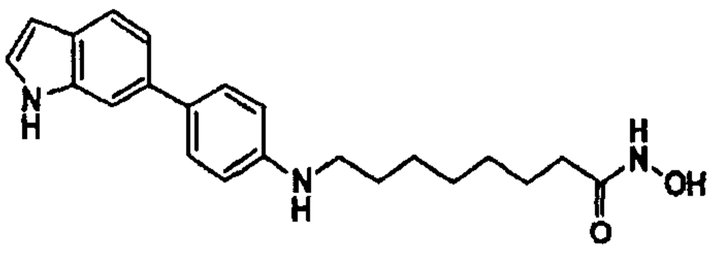
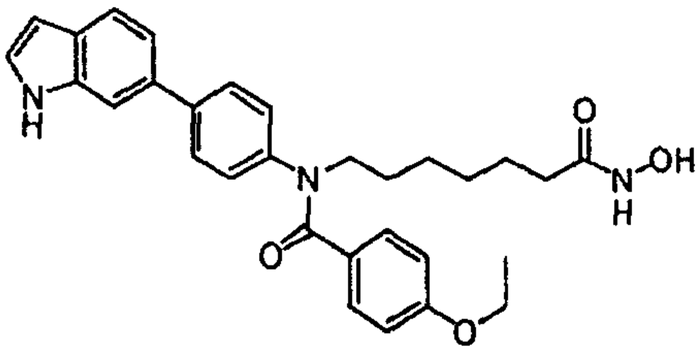
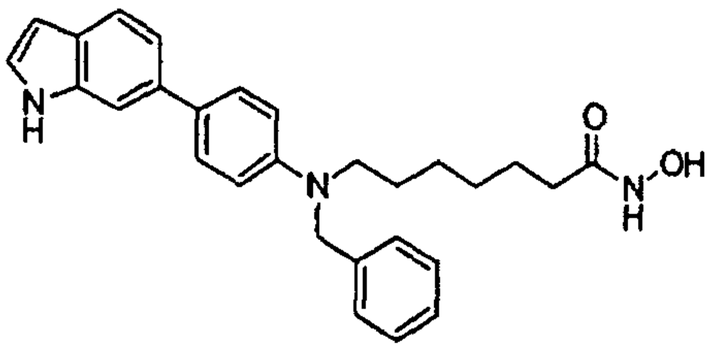
[Table 2]

Compound	Structure	Compound	Structure
178		179	
180		181	
184		185	
189		190	
191		203	

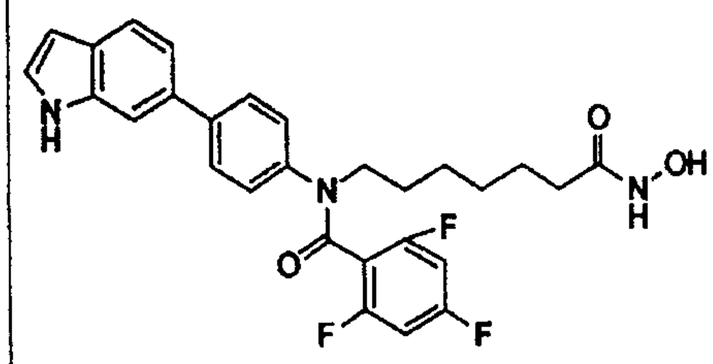
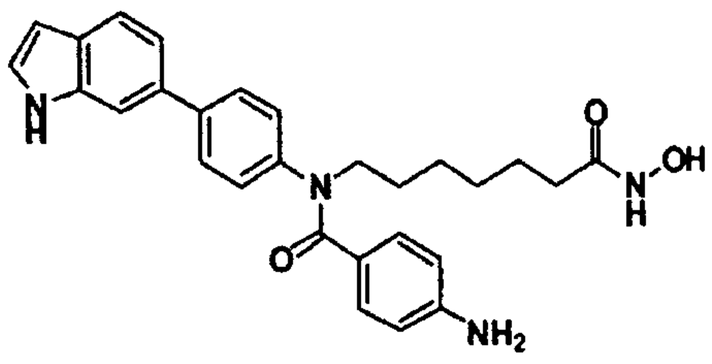
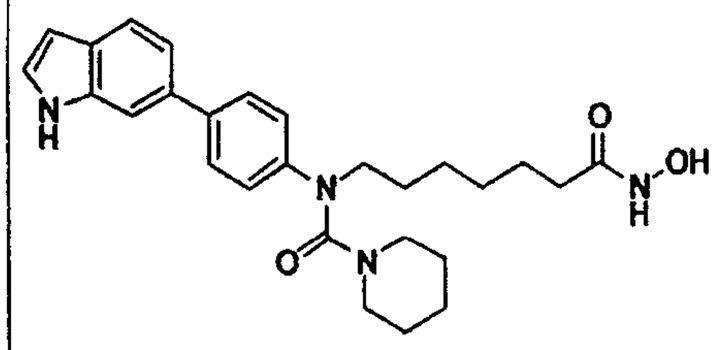
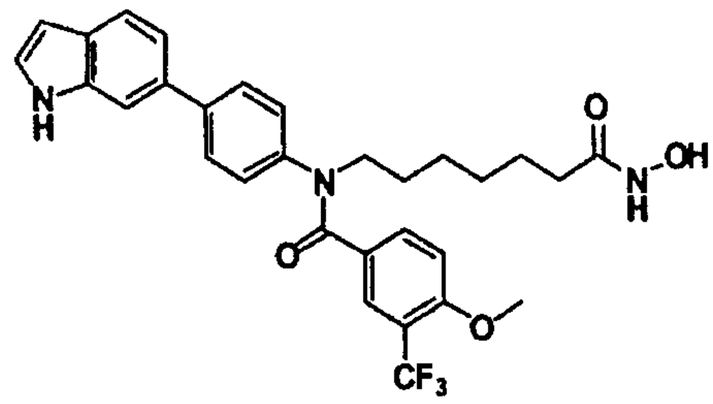
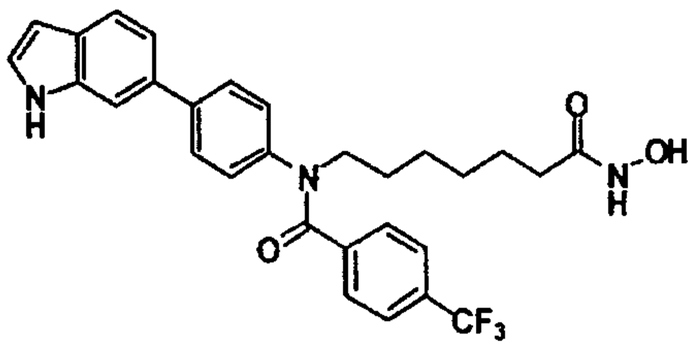
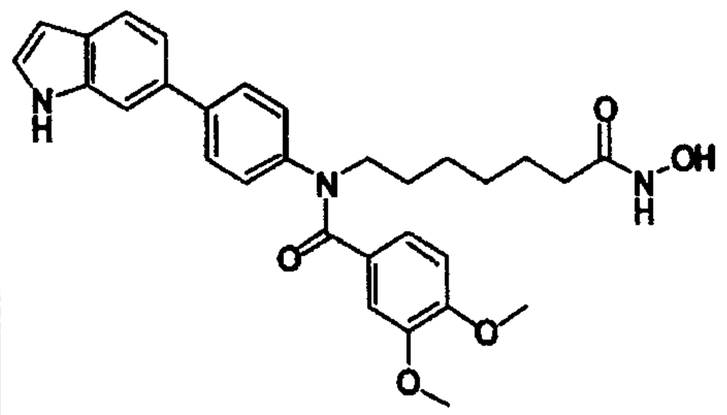
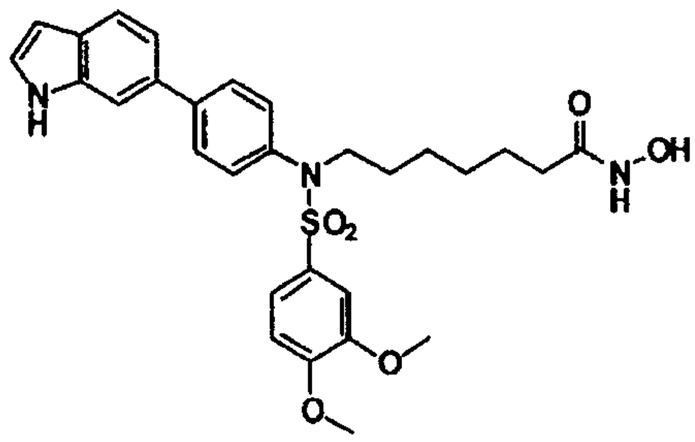
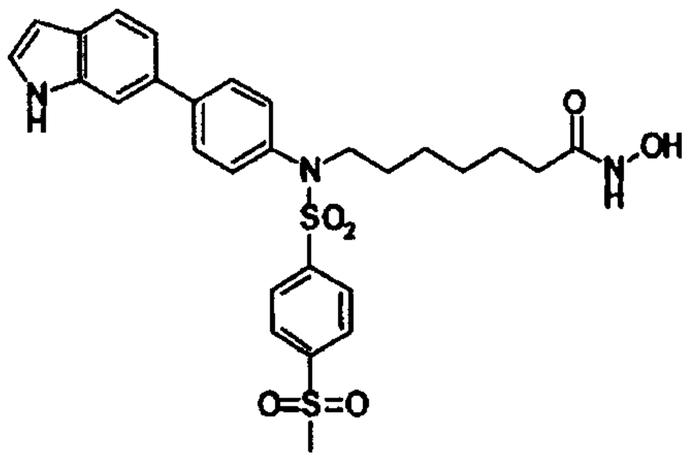
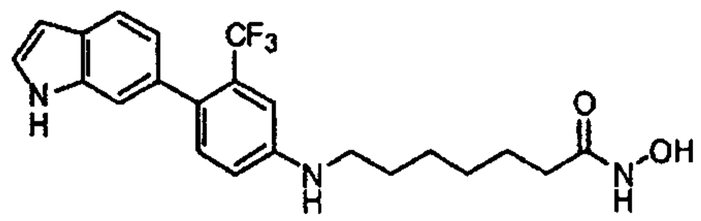
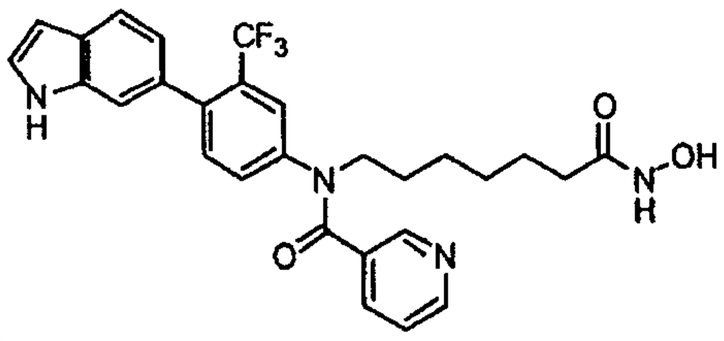
[Table 3]

Compound	Structure	Compound	Structure
204		207	
208		209	
210		211	
212		214	
215		218	

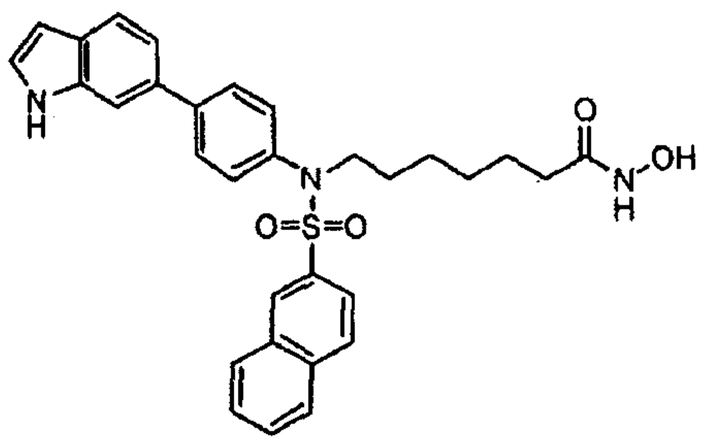
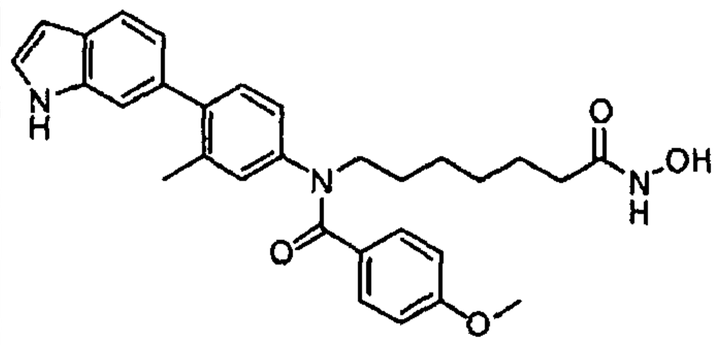
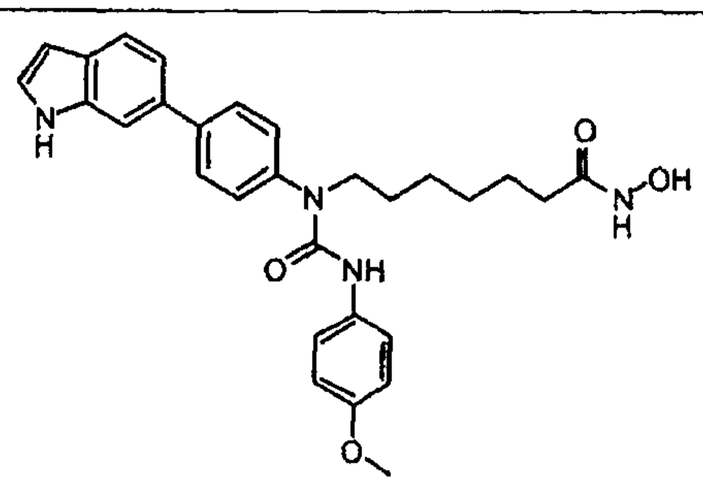
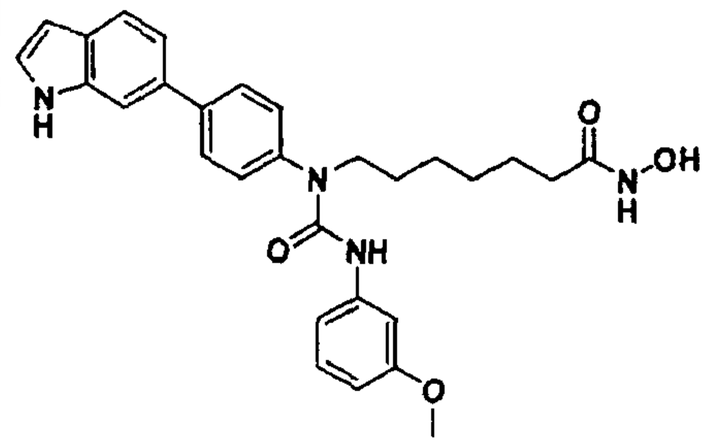
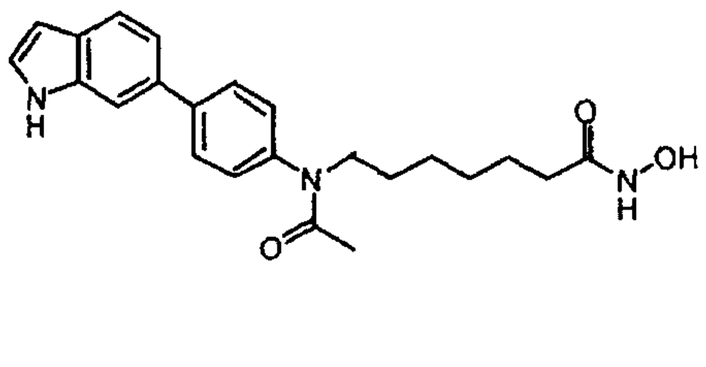
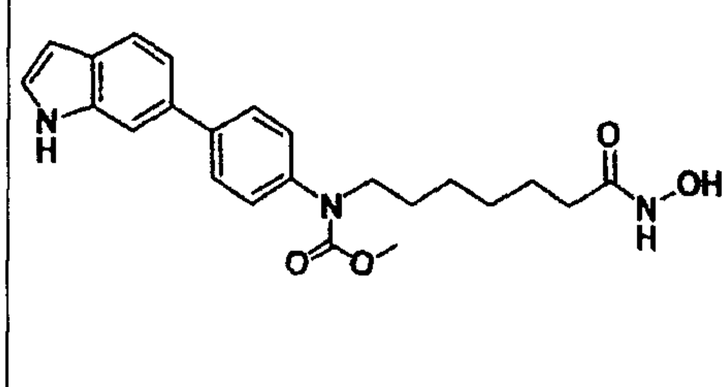
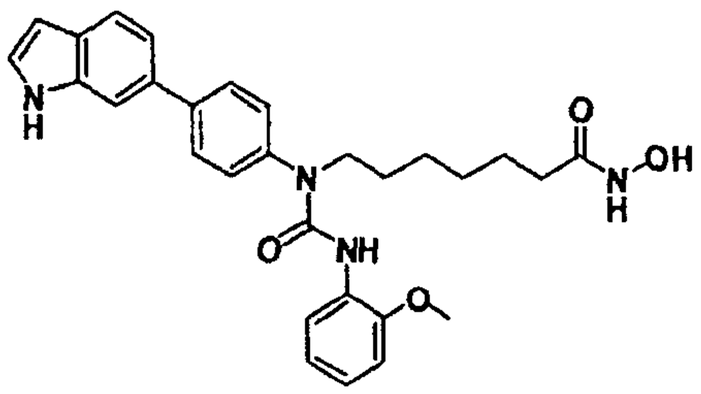
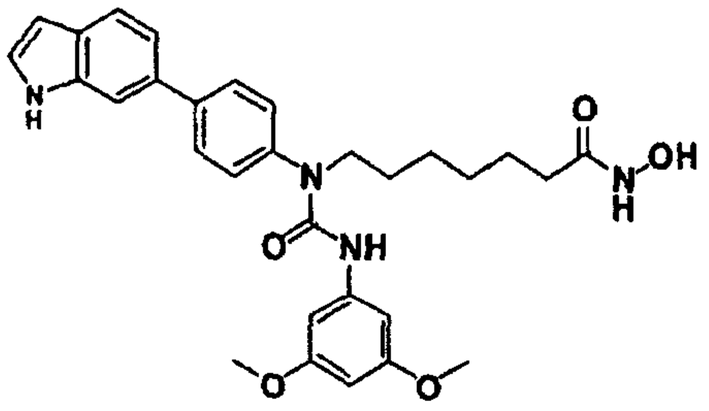
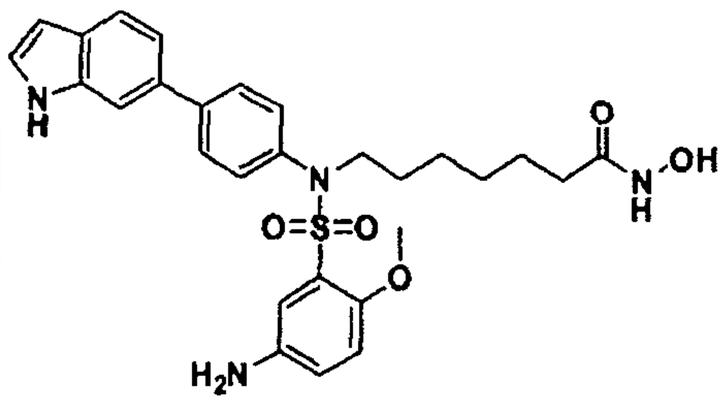
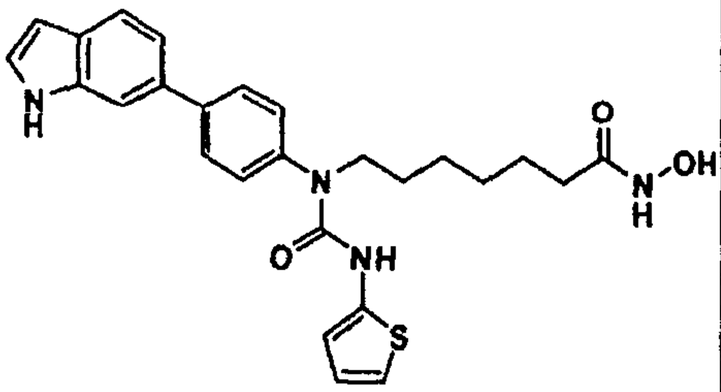
[Table 4]

Compound	Structure	Compound	Structure
221		222	
228		229	
230		231	
234		235	
236		237	

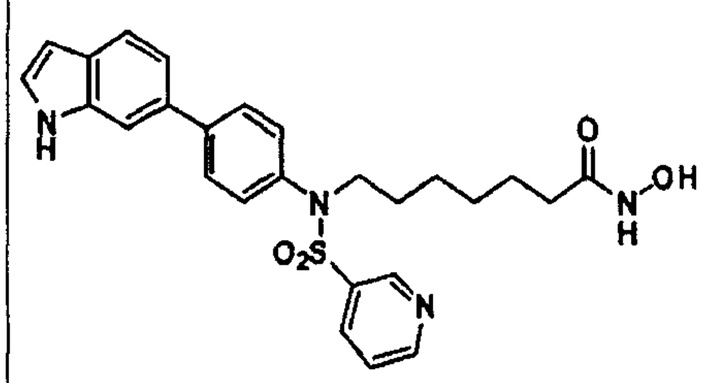
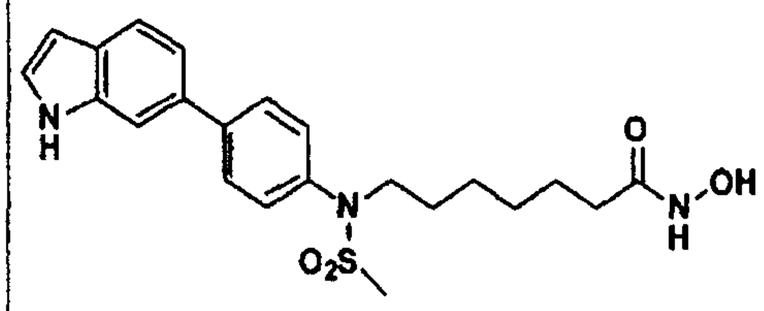
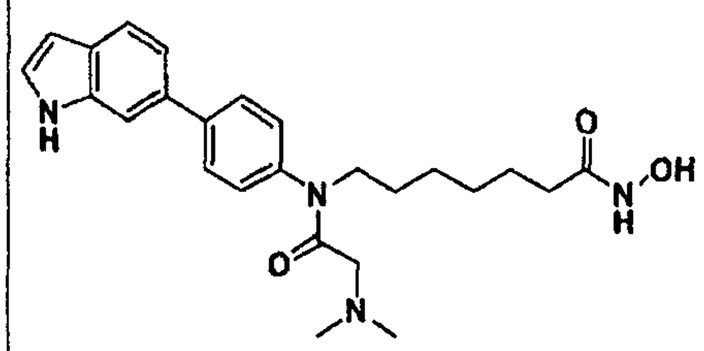
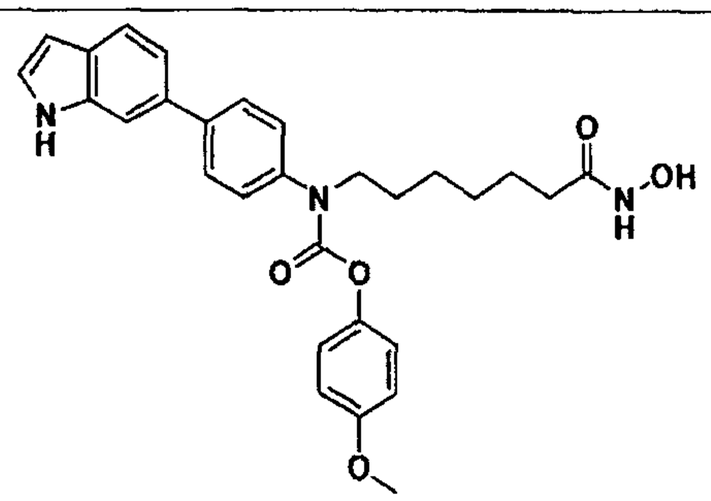
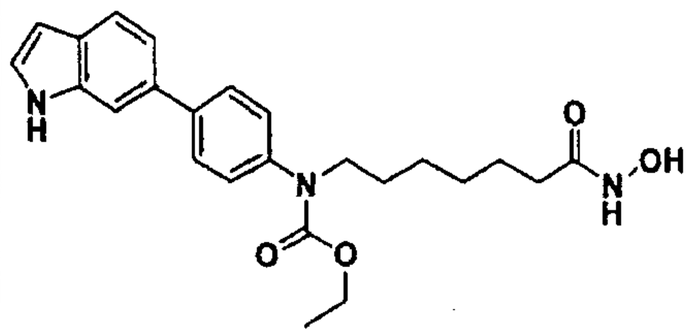
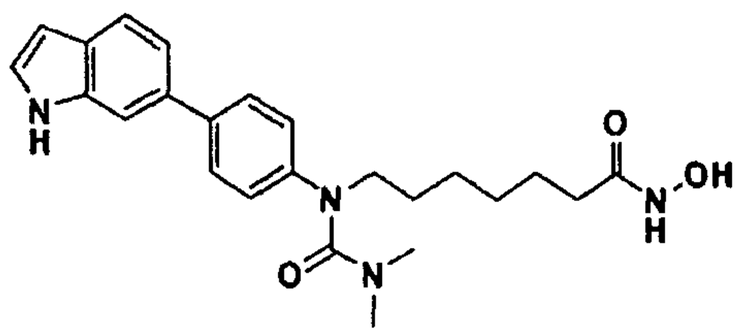
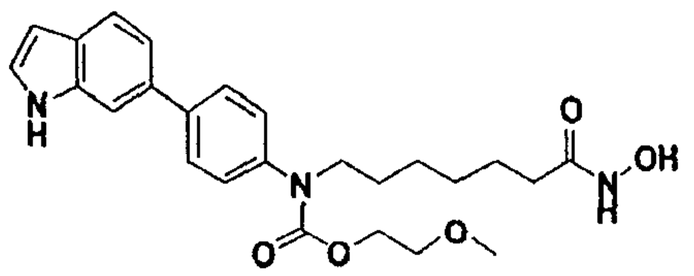
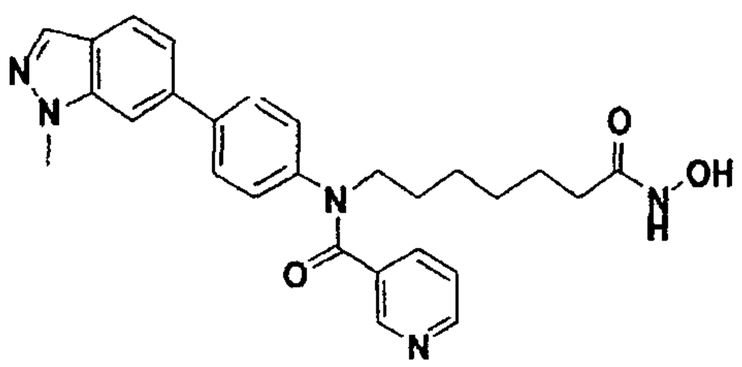
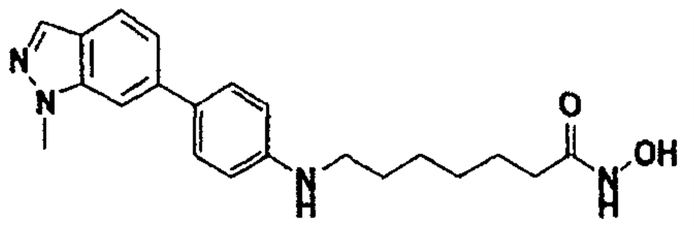
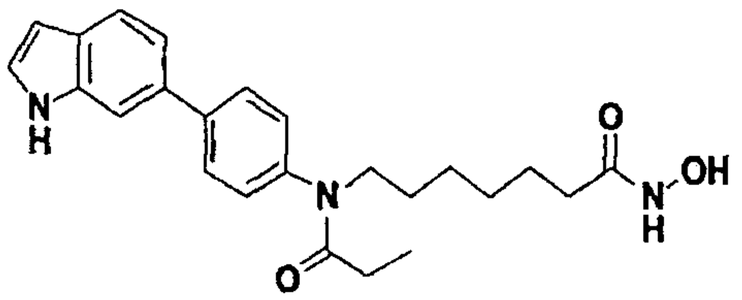
[Table 5]

Compound	Structure	Compound	Structure
239		242	
243		244	
245		246	
249		250	
251		252	

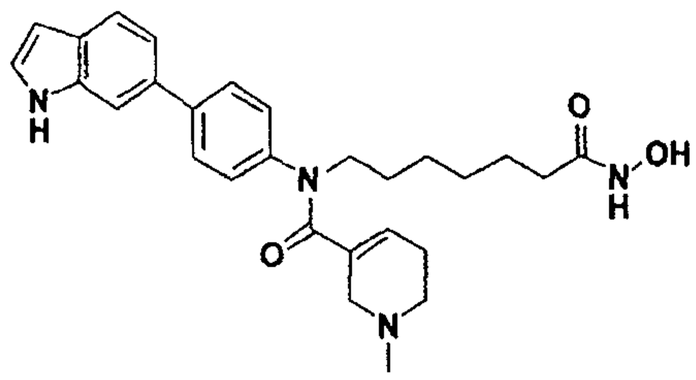
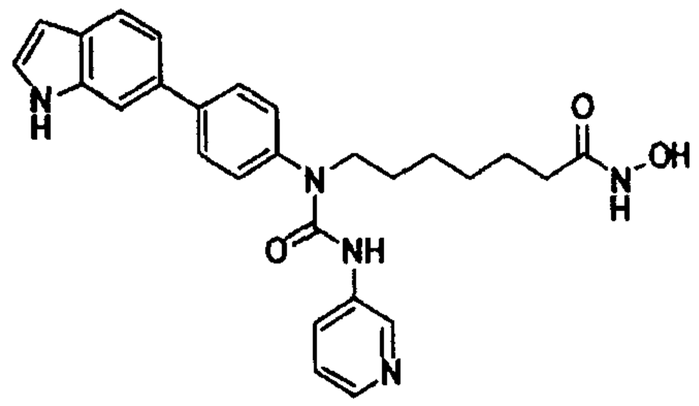
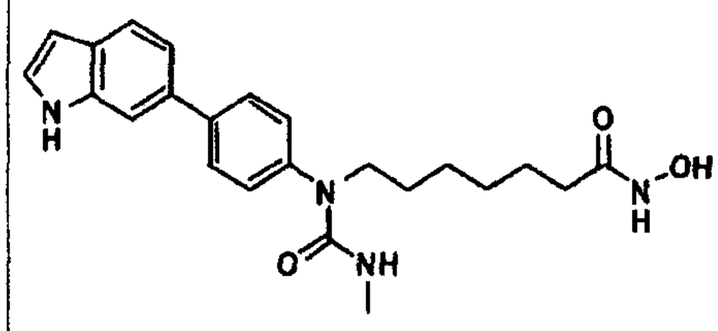
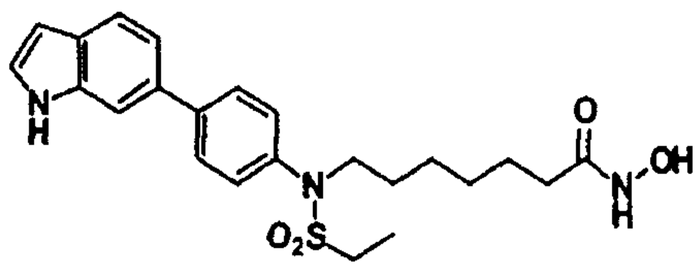
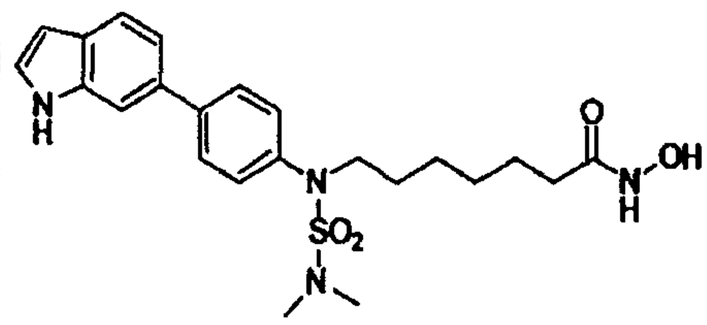
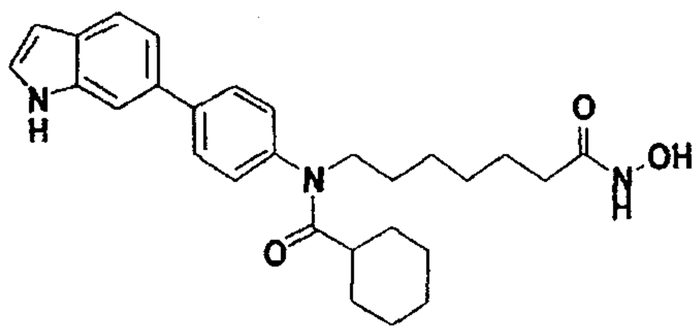
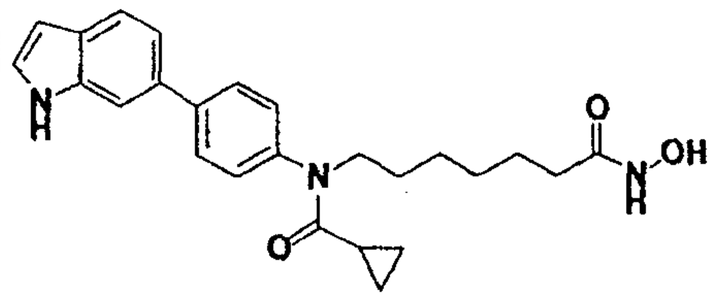
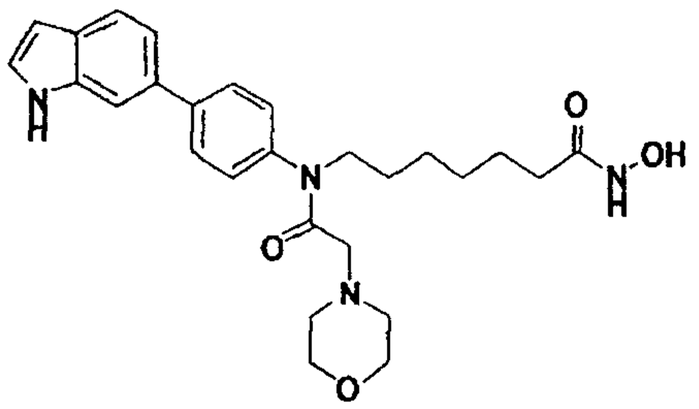
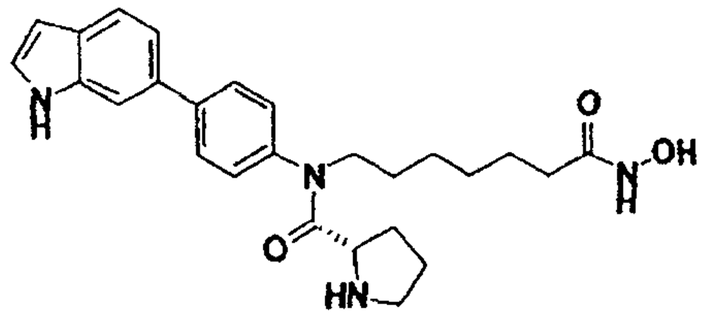
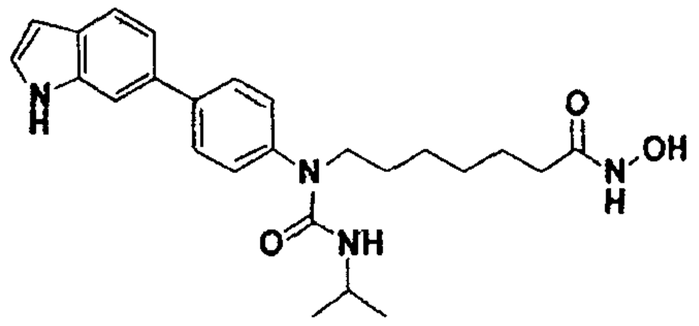
[Table 6]

Compound	Structure	Compound	Structure
253		254	
255		256	
257		258	
259		260	
261		262	

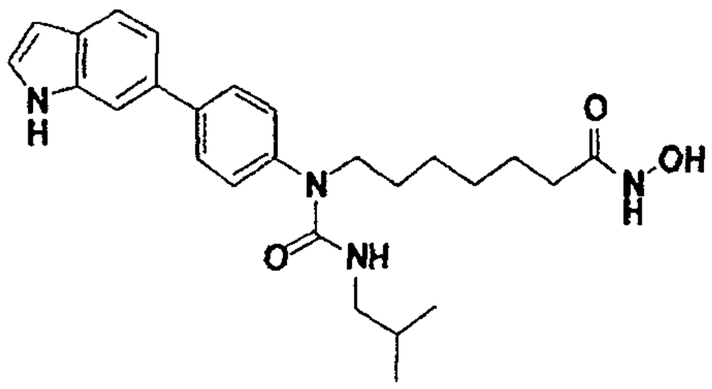
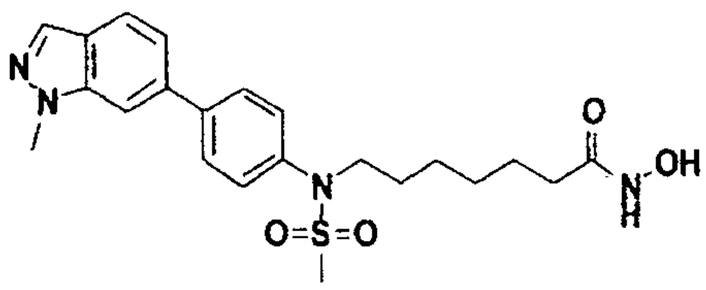
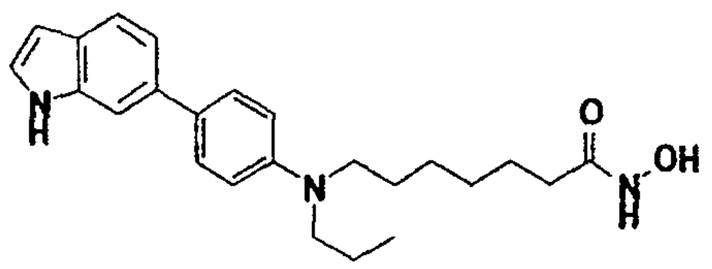
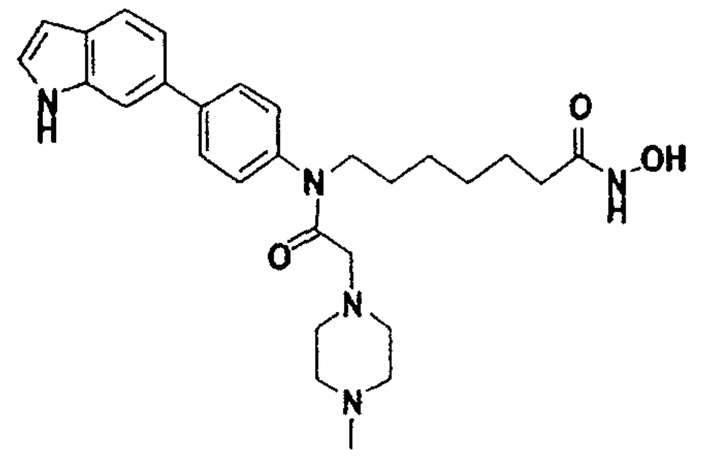
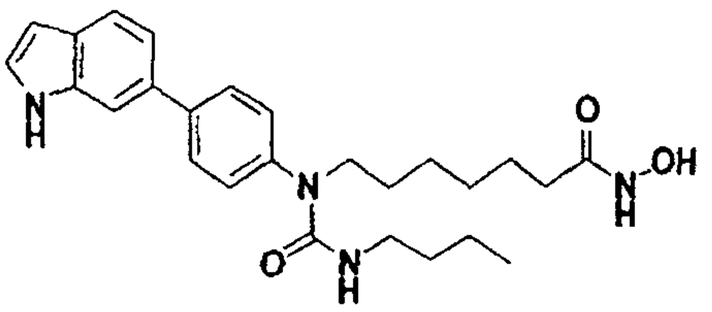
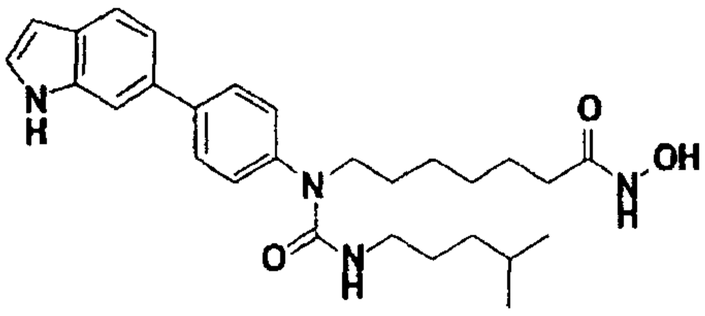
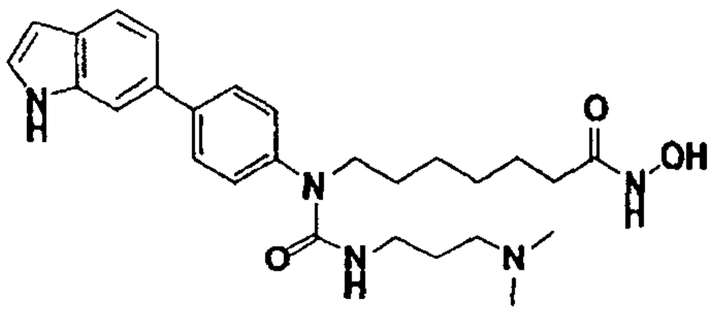
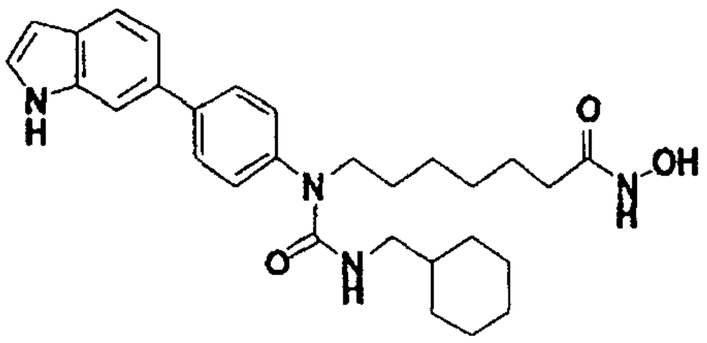
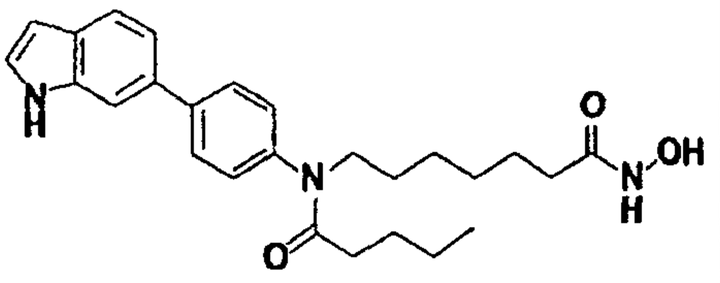
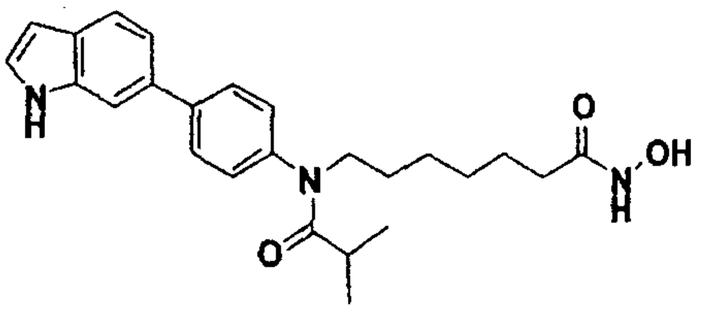
[Table 7]

Compound	Structure	Compound	Structure
263		264	
265		266	
267		268	
269		270	
271		272	

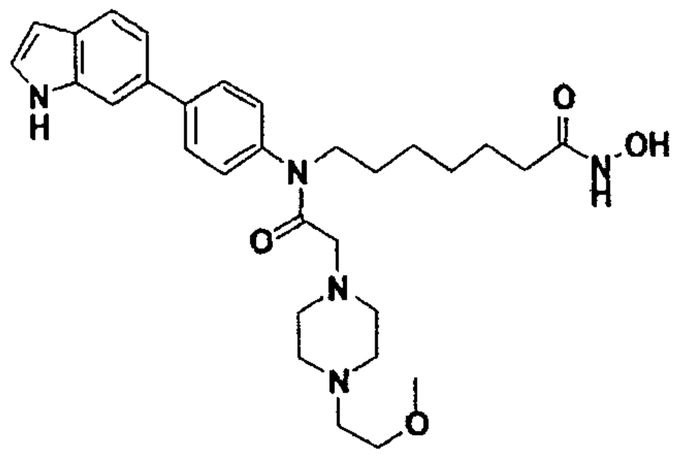
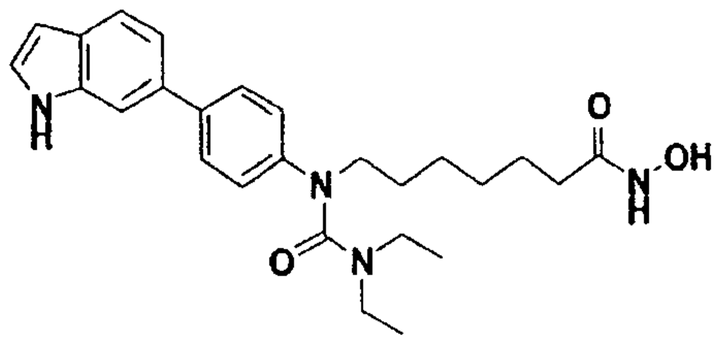
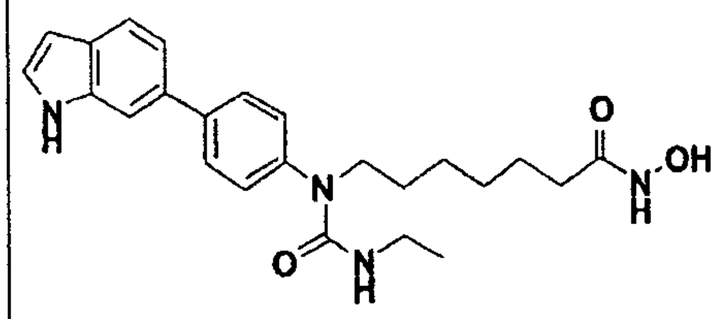
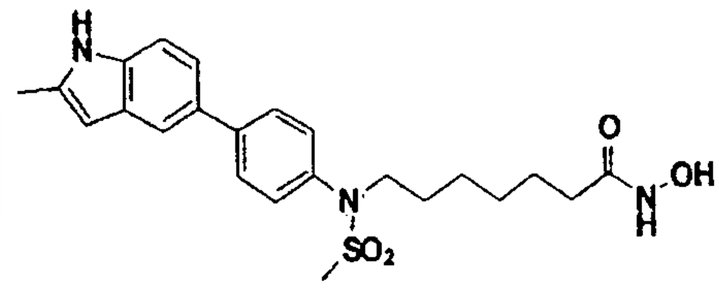
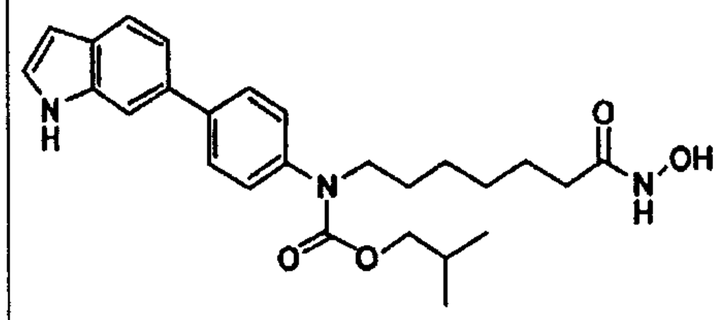
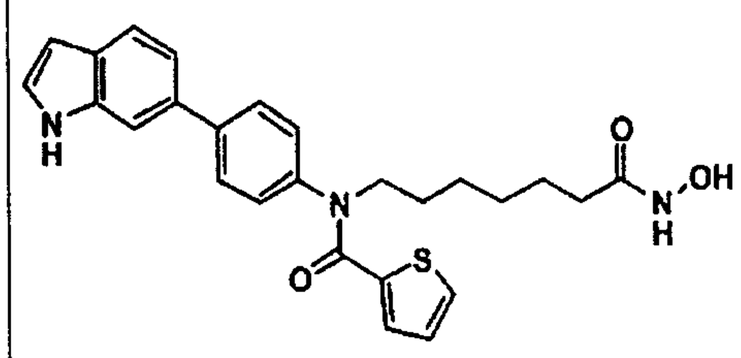
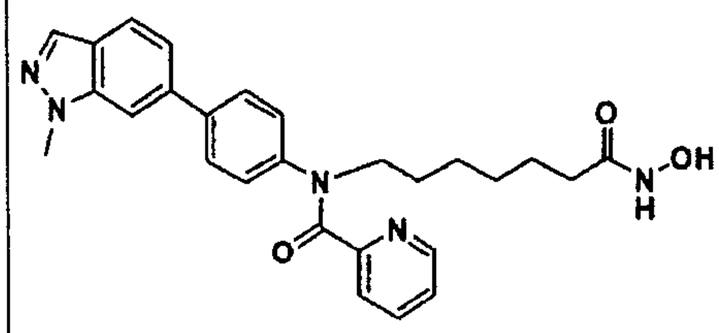
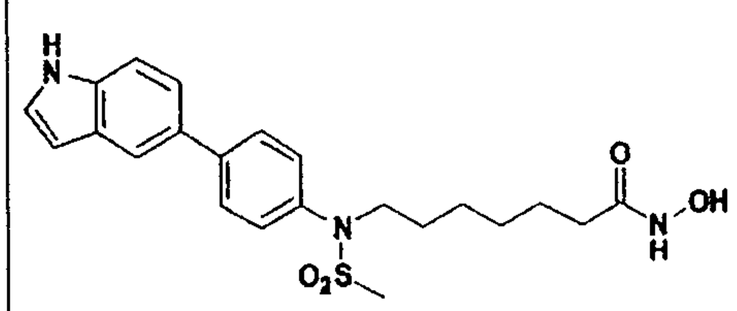
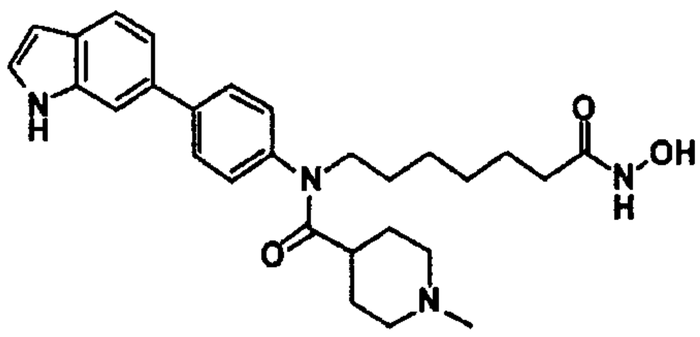
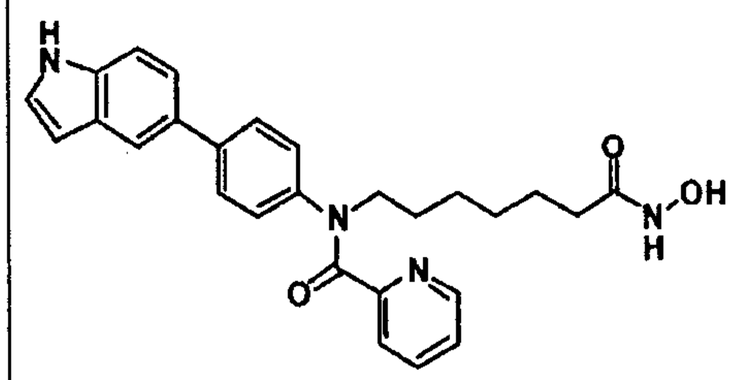
[Table 8]

Compound	Structure	Compound	Structure
273		274	
275		276	
277		278	
279		280	
281		282	

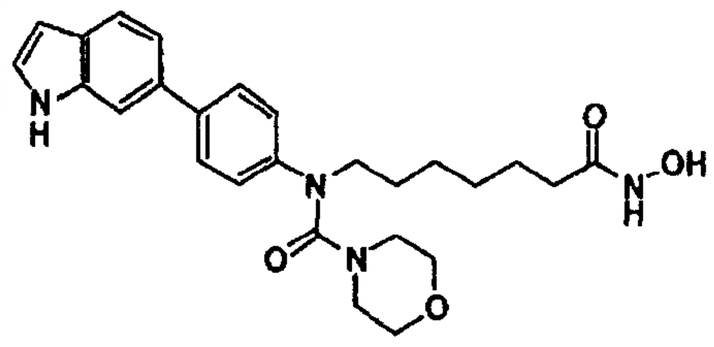
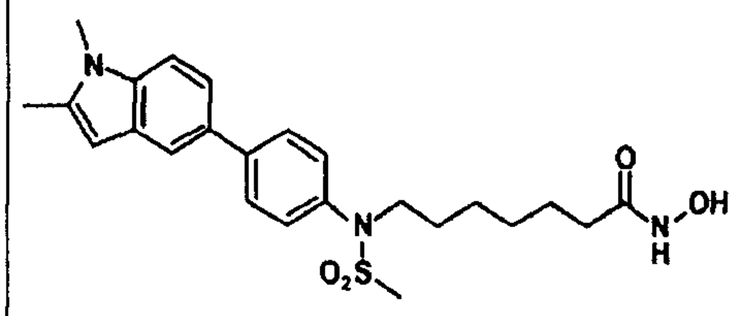
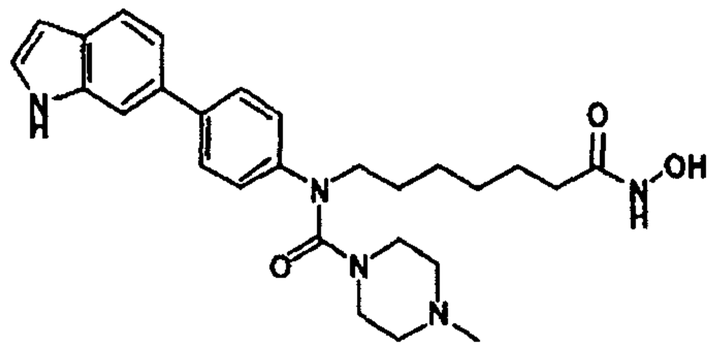
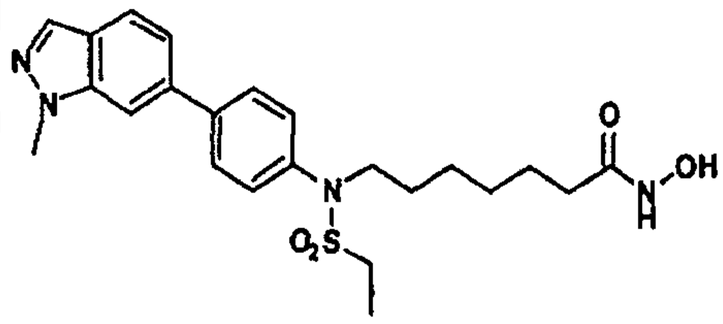
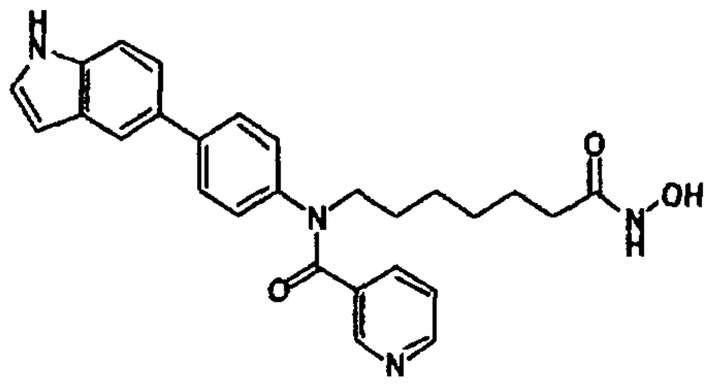
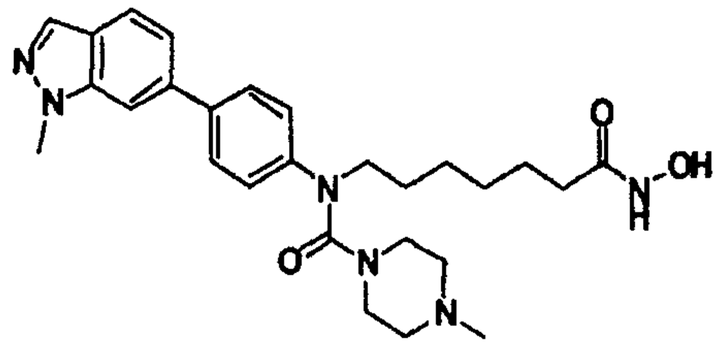
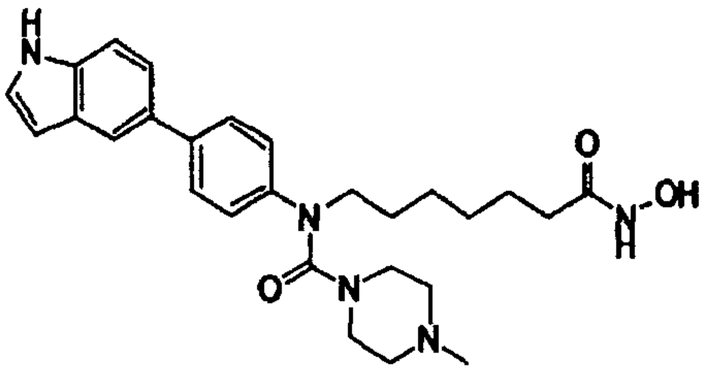
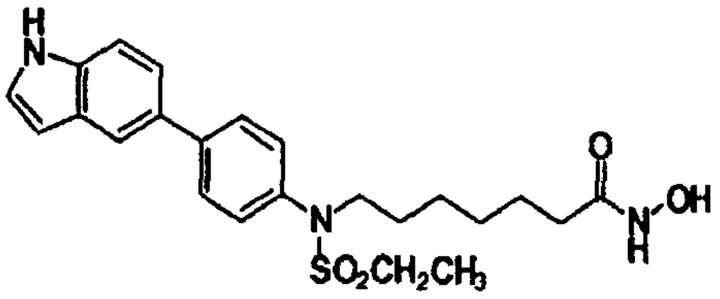
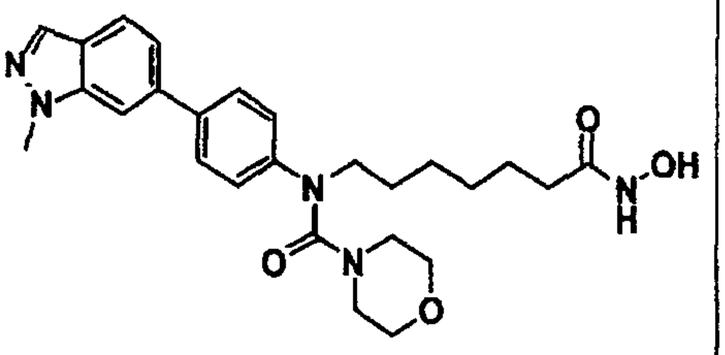
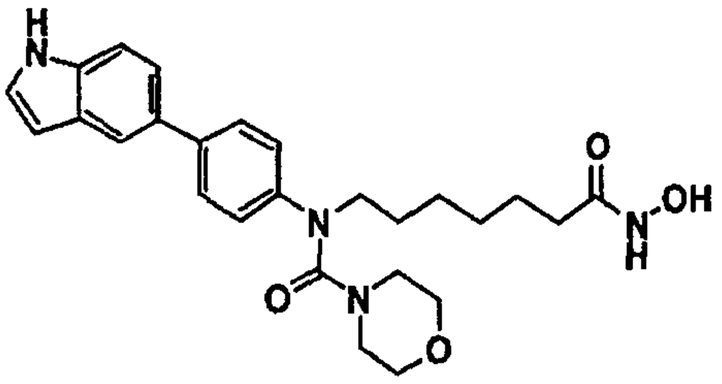
[Table 9]

Compound	Structure	Compound	Structure
283		284	
285		286	
287		288	
289		290	
291		292	

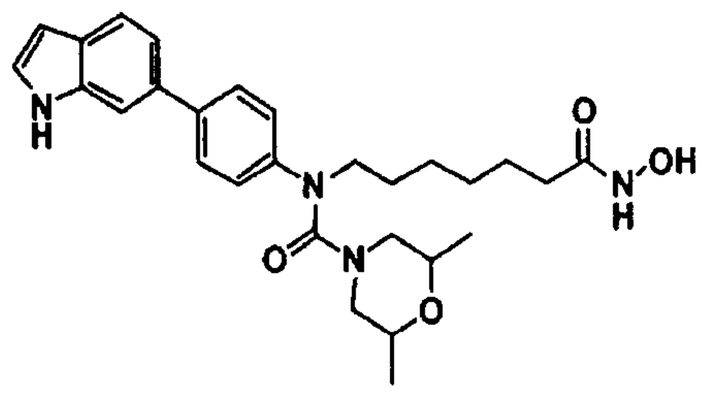
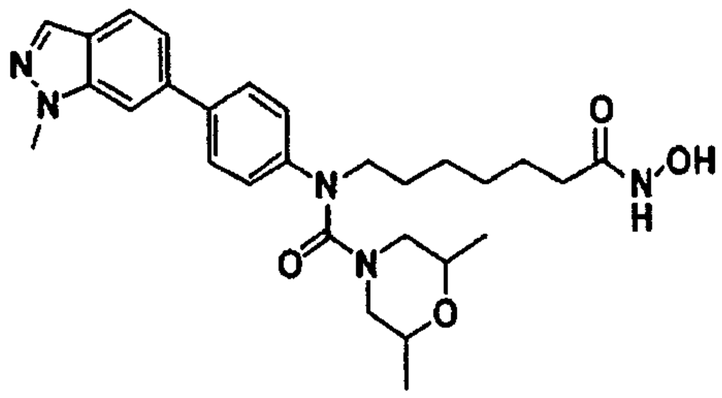
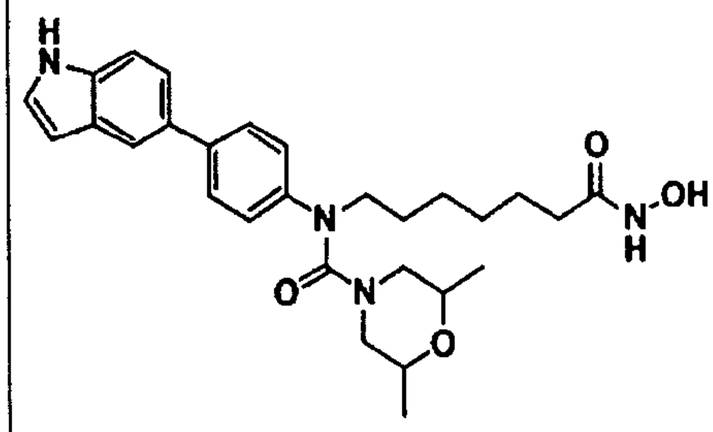
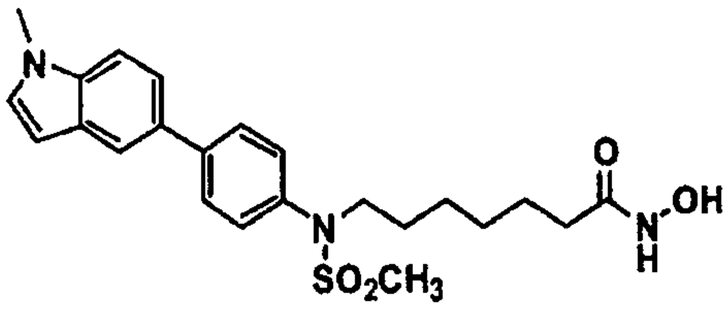
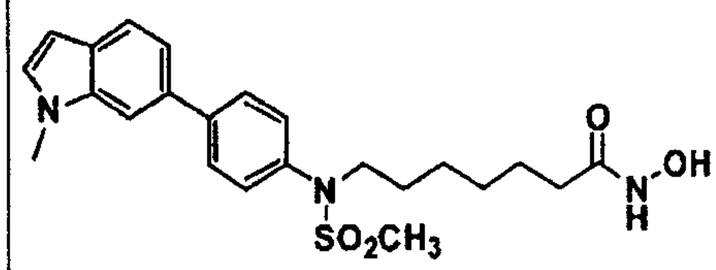
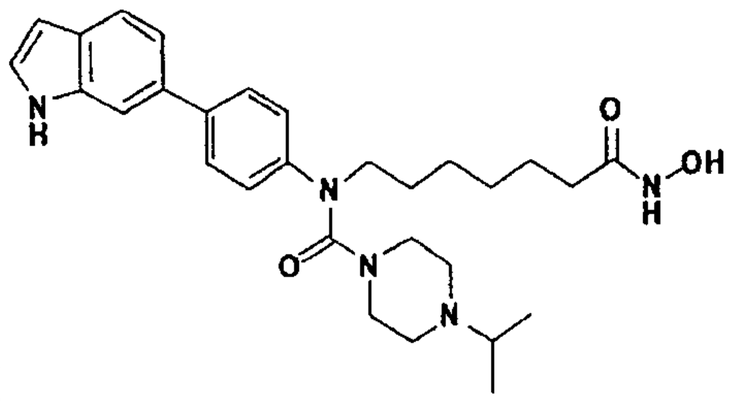
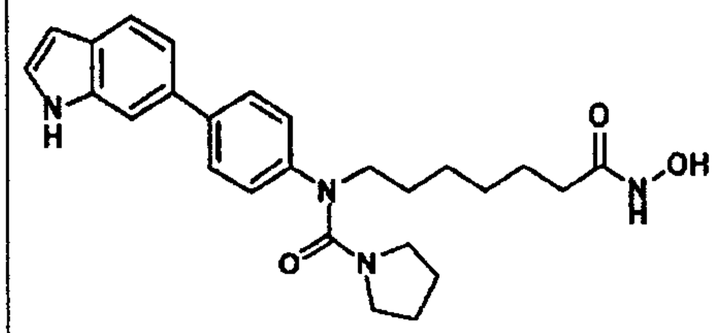
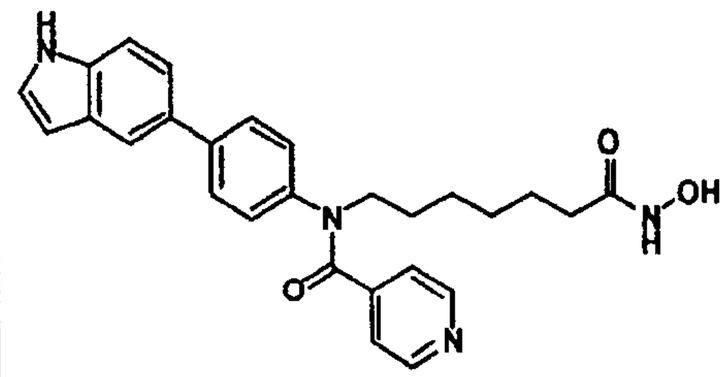
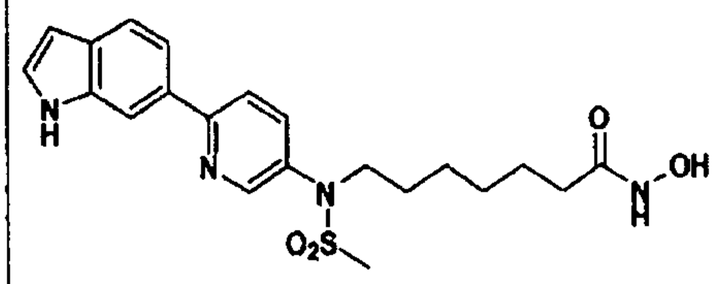
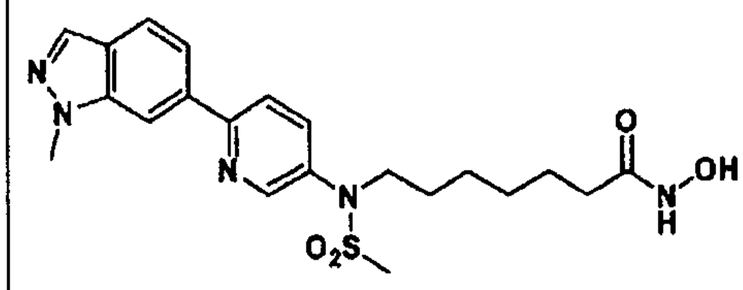
[Table 10]

Compound	Structure	Compound	Structure
293		294	
295		296	
299		300	
302		303	
304		305	

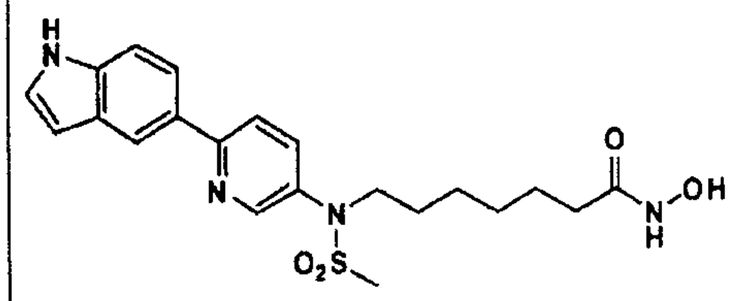
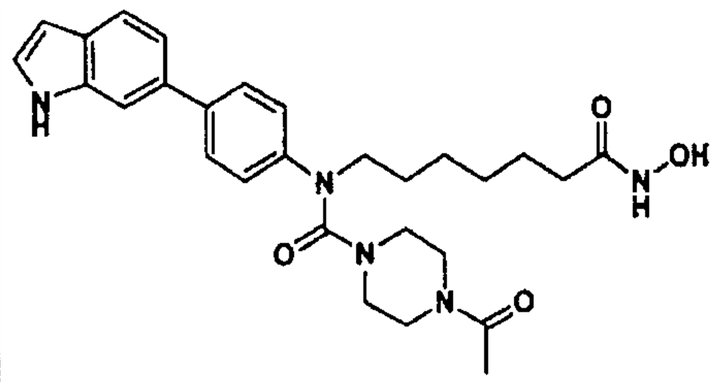
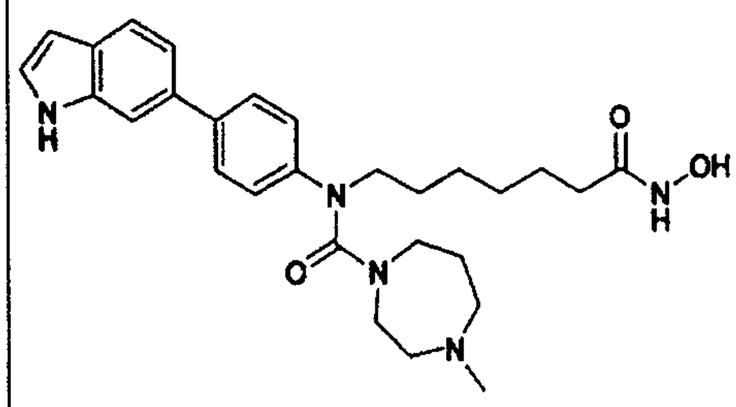
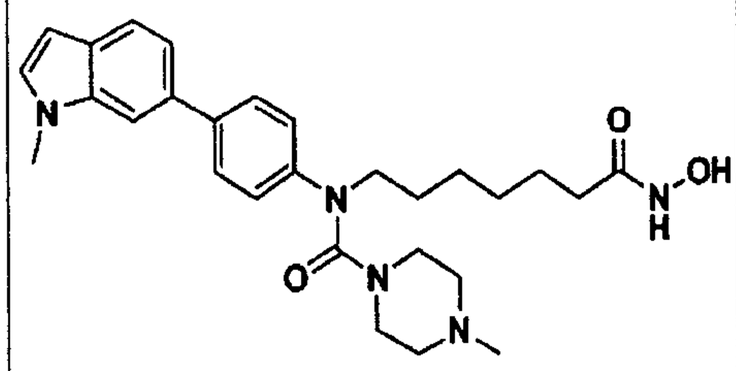
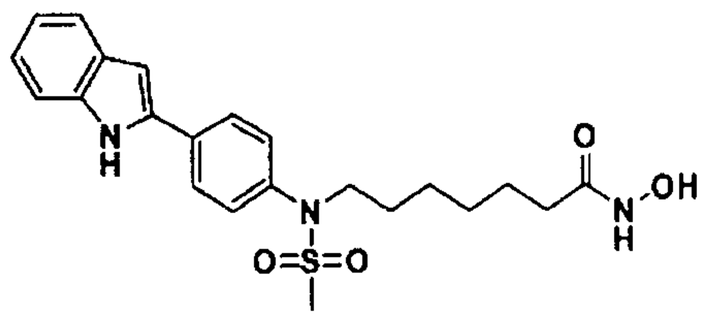
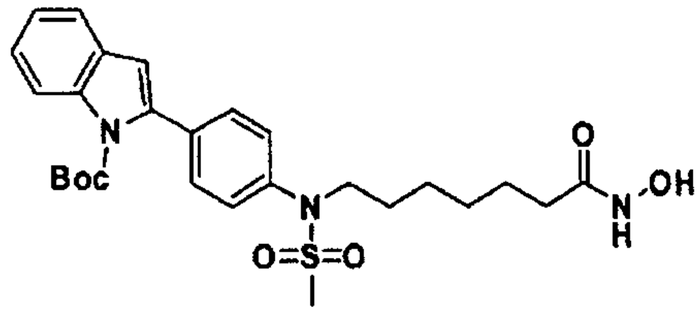
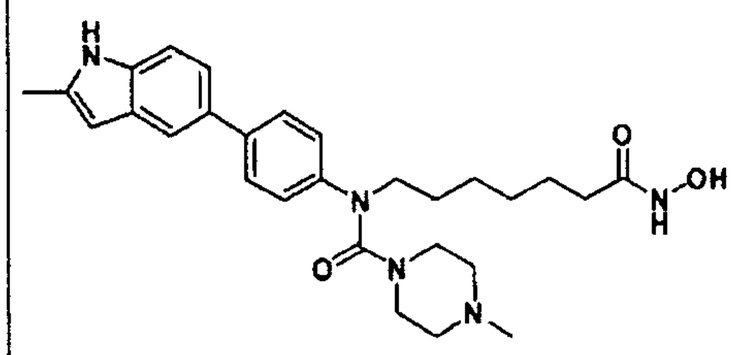
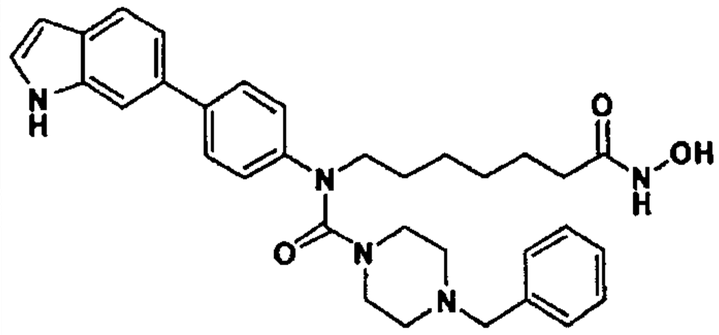
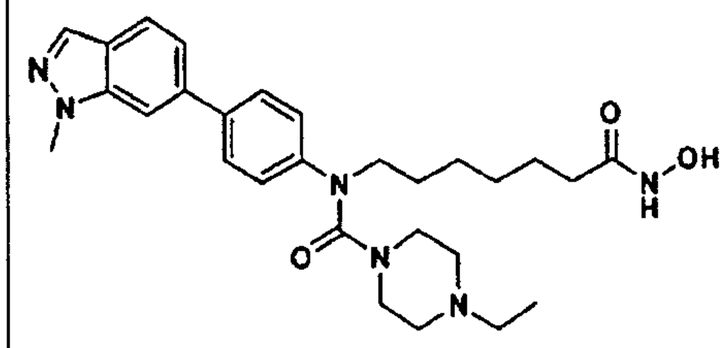
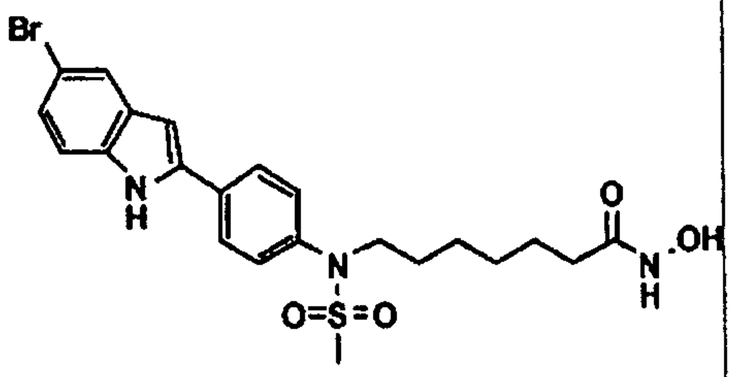
[Table 11]

Compound	Structure	Compound	Structure
306		307	
309		310	
311		312	
313		314	
315		316	

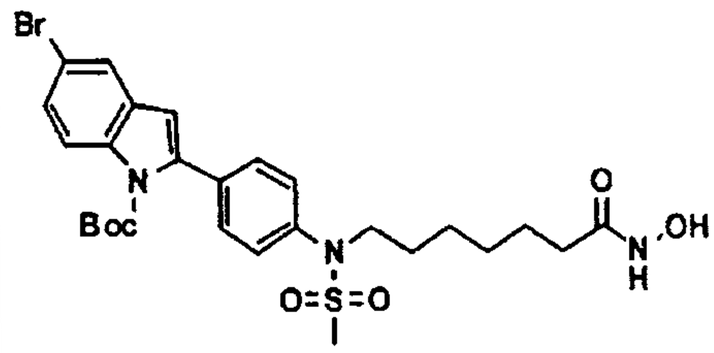
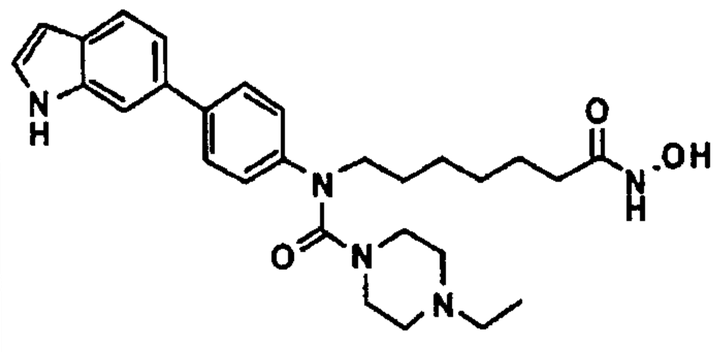
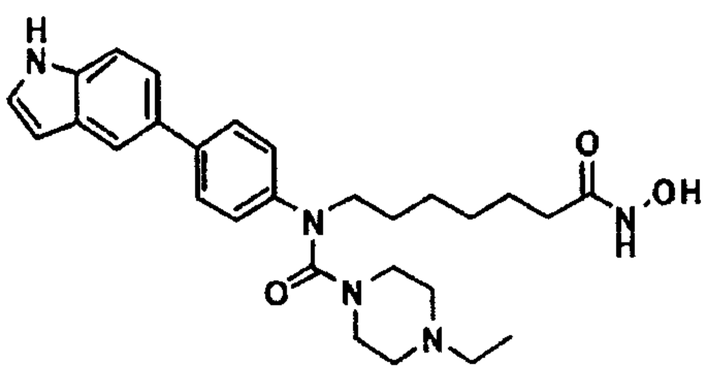
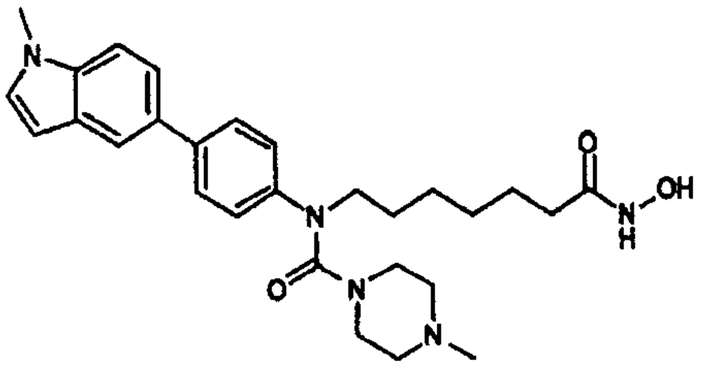
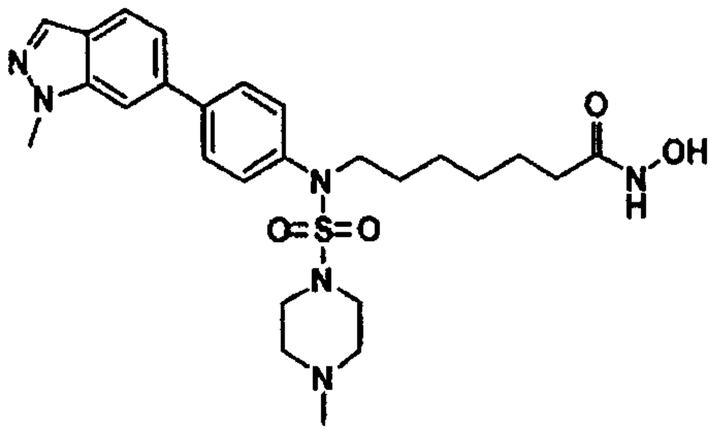
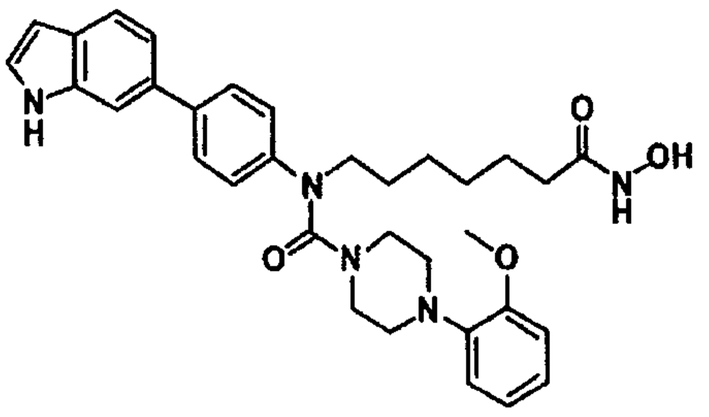
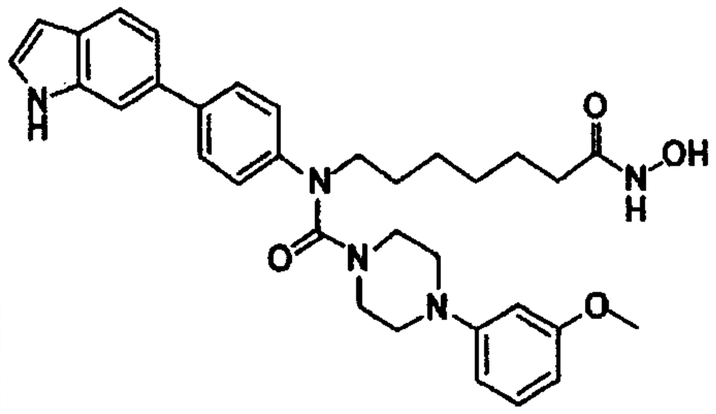
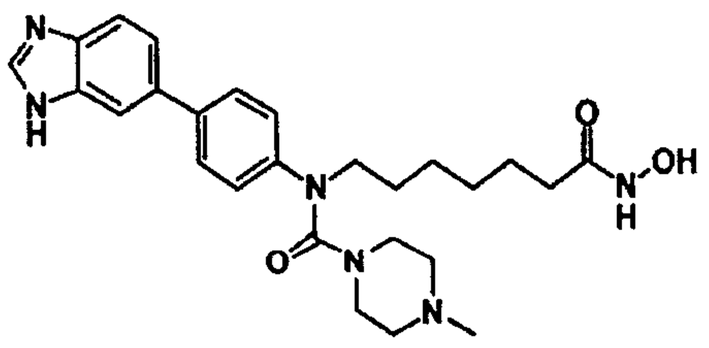
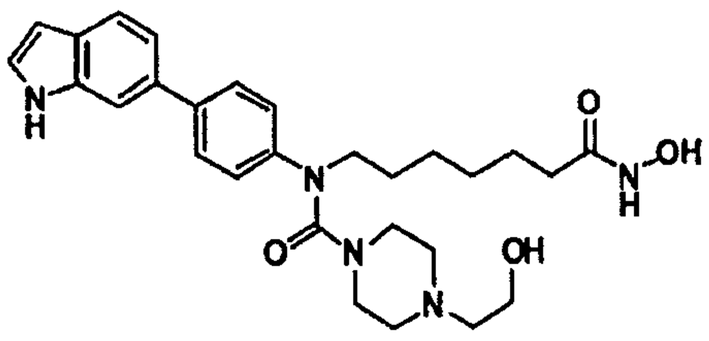
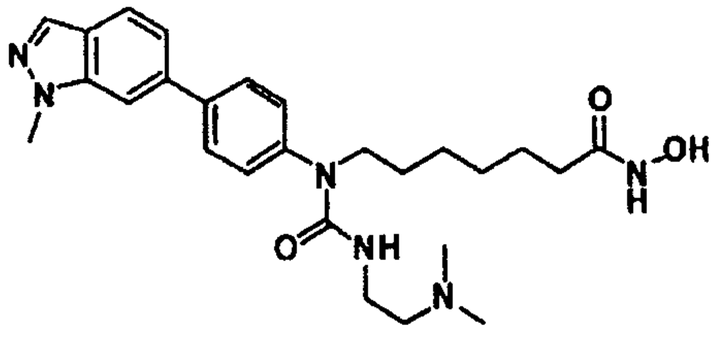
[Table 12]

Compound	Structure	Compound	Structure
317		318	
319		320	
321		323	
324		325	
326		327	

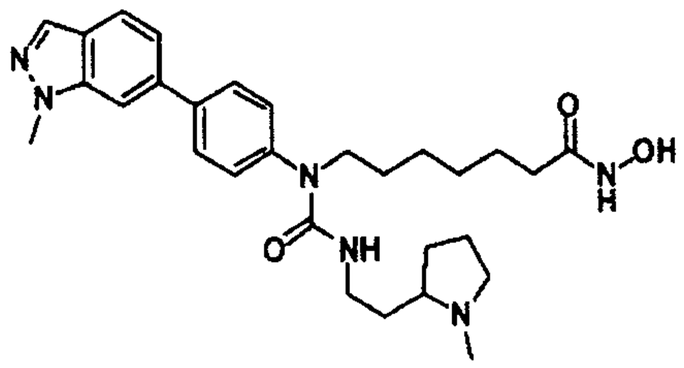
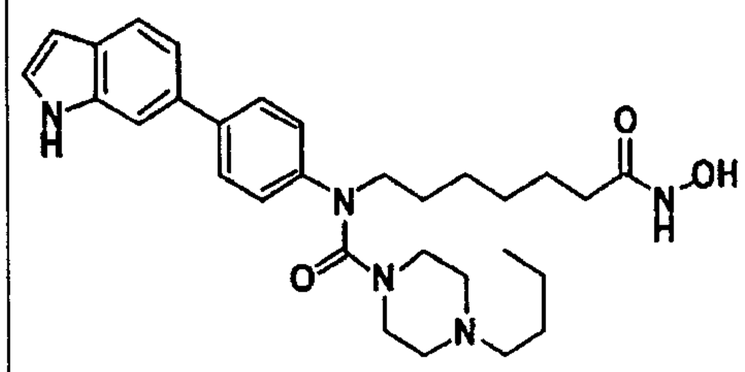
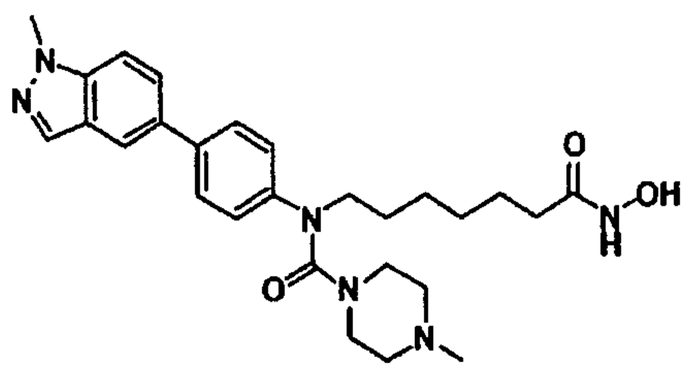
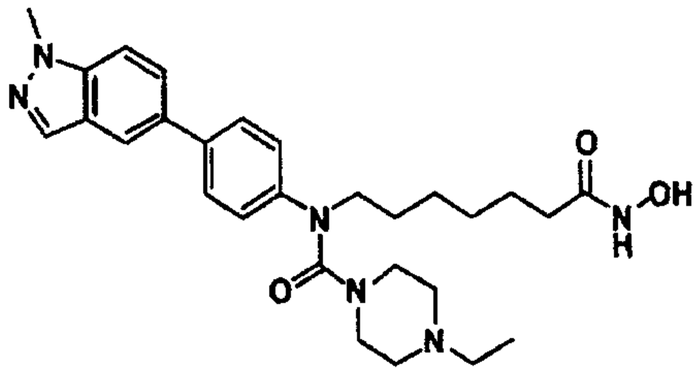
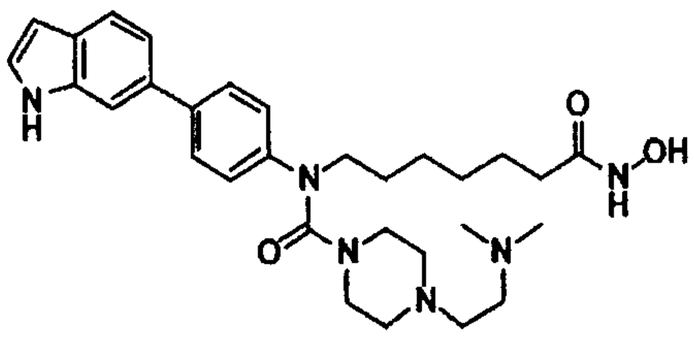
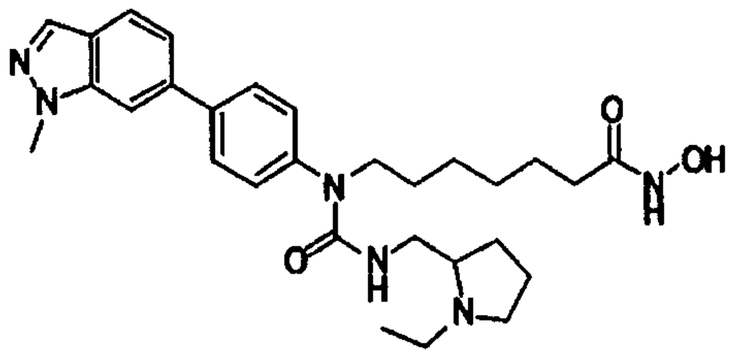
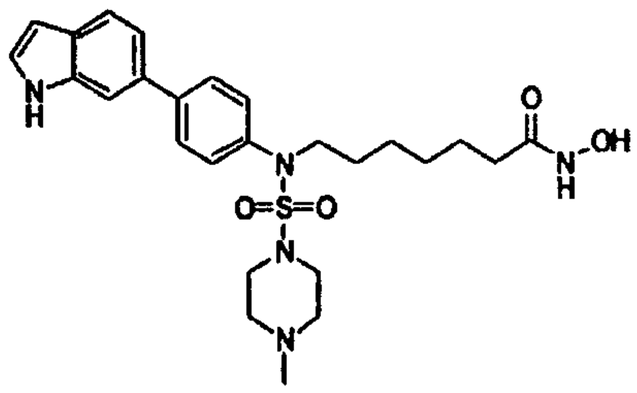
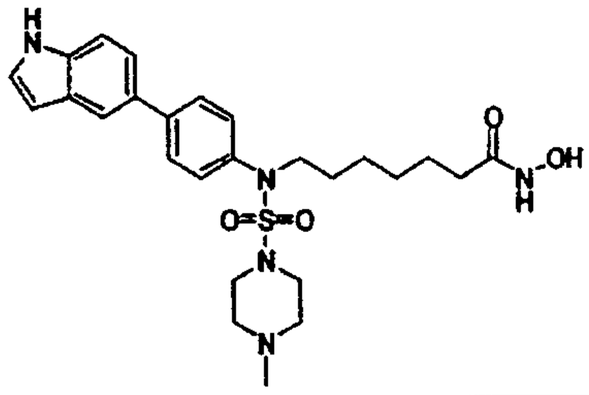
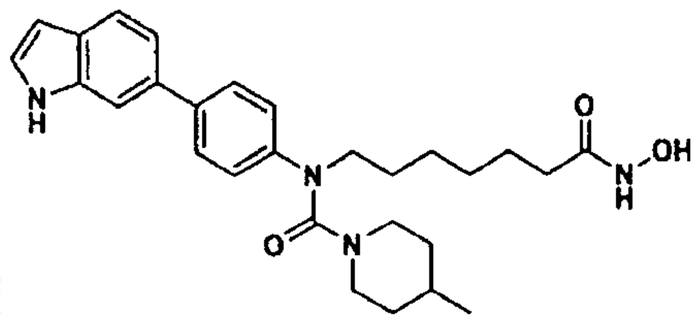
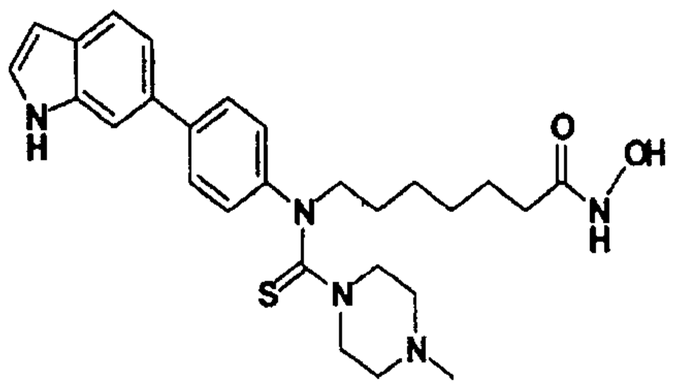
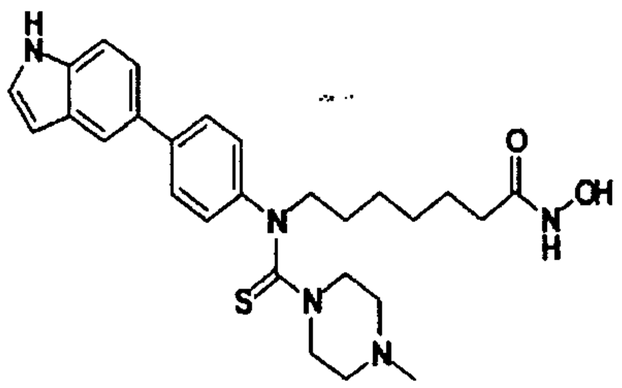
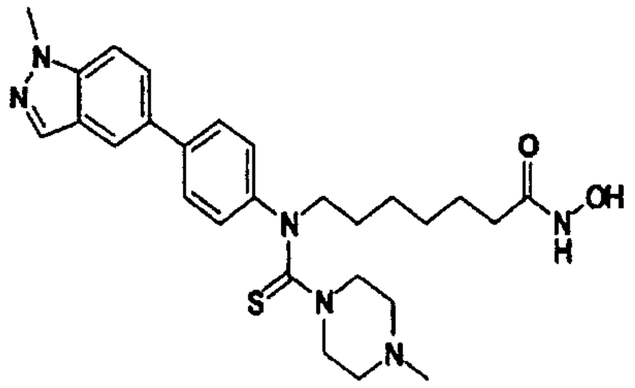
[Table 13]

Compound	Structure	Compound	Structure
328		329	
330		331	
332		333	
334		335	
336		337	

[Table 14]

Compound	Structure	Compound	Structure
338		339	
340		341	
342		343	
344		345	
346		347	

[Table 15]

Compound	Structure	Compound	Structure
348		349	
350		351	
352		353	
354		355	
356		357	
358		359	

Measurement of activities of inventive compounds – experimental protocols

1. Inhibitory effect on growth of HL60 cell line

In the culture of HL60 cells, 10% FBS-containing RPMI1640 medium was used. Each of test substances was serially diluted in DMSO to a concentration of 10 mg/ml and serially diluted in PBS to a final concentration ranging from 100 μg/ml to 0.03 μg/ml. 20 μl (micro-liter) of the serially diluted test substances and 180 μl (micro-liter) of a medium containing $6.0X10^4$ cells/ml were added to a 96-well plate and cultured under conditions of 37 °C and 5% CO_2 for 3 days. After completion of the culture, 50 μl (micro-liter) of a solution of 1.25 mg/ml MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) in PBS was added to each well of the plate and incubated at 37 °C for 3 hours. The formed formazan crystal was dissolved in 150 μl (micro-liter) of DMSO, and the absorbance at 570 nm was measured.

The inhibitory effects (IC_{50}) of the selected compounds of the present invention on the growth of the HL60 cell line are shown in Table 16 below.

[Table 16]

Compounds	HL-60 IC_{50} (μM)
SAHA	0.6 ~ 1.0
PXD 101	0.1 ~ 0.2
LBH 589	0.02 ~ 0.05
303, 306, 309 334, 340	0.01 ~ 0.02
180, 181, 263 264, 276, 305 313, 314, 326 328, 341, 342 350, 351, 358 359	0.02 ~ 0.05
211, 256, 260 265, 267, 270 275, 277, 284 295, 296, 312 327, 330, 336 357	0.05 ~ 0.1

The inhibitory effects of the test substances on the growth of the HL60 cell line are indicated by IC_{50} values. A lower IC_{50} value indicates a better effect on the inhibition of HL60 cancer cells.

As control drugs, SAHA (Merck), a currently commercially available anticancer agent, and LBH-589 (Novartis) and PXD-101 (Topo Target) that are not in clinical trials, were used. As can be seen from the results of evaluation of inhibitory effects shown in Table 16 above, all the tested compounds showed excellent inhibitory effects on the growth of cancer cells compared to SAHA, PXD 101 and LBH589, and the inhibitory effects of compounds 303, 306, 309, 334 and 340 were more than 50 times superior to that of SAHA, and more than 10 times superior to that of PXD 101.

2. Measurement of effects against HDAC enzymes

To measure effects against HDAC enzymes, a kit (BIOMOL International, LP) was used. Each of test substances was dissolved in DMSO to a concentration of 10 mg/ml, and an assay buffer, an enzyme solution, a substrate and a staining reagent were prepared. The enzyme solution was a mixture of assay buffer (2/3) and Hela nuclear extract (1/3), and the substrate was a mixture of assay buffer (23/24) and substrate stock (1/24). Also, the staining reagent was a mixture of assay buffer (19/20), developer (1/20) and TSA (1/100). The assay buffer, the enzyme solution, the test substance and the substrate were added sequentially to a 96-well plate, stirred on a rocker for 3 minutes, and then incubated at 37 °C for 1 hour. After completion of the incubation, the staining reagent was added, and the mixture was stirred on a rocker for 1 minute and then incubated at 37 °C for 20 minutes (the staining reagent was mixed before addition). After completion of the incubation, air bubbles were removed from the 96-well plate, after which the absorbance at 405 nm was measured.

The HDAC inhibitory activities (IC_{50}) of the selected compounds of the present invention are shown in Table 17 below.

[Table 17]

Compounds	HDAC IC_{50} (μM)
SAHA	0.2 ~ 0.5
PXD 101	0.1 ~ 0.2
LBH 589	0.01 ~ 0.05
263, 264, 279 284, 295, 296 303, 305, 306 309, 312, 313 326, 327, 328 334, 336, 340 341, 342, 350 351, 357, 358 359	0.001 ~ 0.01
180, 181, 211 256, 260, 267 277	0.01 ~ 0.05
265 270 275	0.05 ~ 0.1

The HDAC inhibitory activities of the test substances are indicated by IC_{50} values. A lower IC_{50} value indicates a better inhibitory effect against HDAC enzymes. As can be seen in Table 17 above, all the compounds of the present invention showed excellent inhibitory effects on the growth of cancer cells compared to SAHA and PXD 101, and the HDAC inhibitory activities of compounds 263, 264, 279, 284, 295, 303, 305, 306, 309, 312, 313, 326, 327, 328, 334, 336, 340, 341, 342, 350, 351, 357, 358 and 359 were more than 100 times higher than those of SAHA and PXD 101 and were more than 10 times higher than that of LBH 589 known to have the highest HDAC inhibitory activity.

3. Test Examples: Pharmaceutical effects of inventive compounds on mice

(1) Test animals

Male BALB/c nude mice (4-week old) used in human tumor transplantation studies were purchased from Central Animal Laboratory Inc. (Korea) or Orient Bio Inc. (Korea). The animals were permitted *ad libitum* access to sterile feed and water in a sterile breeding system at 23±0.5 °C.

(2) Cell lines

For use in tumor transplantation studies, the human cancer cell lines HCT116 (human colorectal carcinoma, CCL-247), PC-3 (human prostate adenocarcinoma, CRL-1435), and A549 (human lung carcinoma, CCL-185) were purchased from ATCC (American Type Culture Collection, Rockville, MD, USA).

HCT116 cells were cultured in an air incubator under conditions of 37 °C and 5% CO_2 using McCoy'5A medium (Gibco BRL) containing 10% heat-inactivated fetal bovine serum (Gibco BRL) and 1% antibiotics-antymycotics (Gibco BRL). Cell lines other than the HCT116 cell line were cultured in an air incubator under conditions of 37 °C and 5% CO_2 using RPM1640 medium (Gibco BRL) containing 10% heat-inactivated fetal bovine serum (Gibco BRL) and 1% antibiotics-antymycotics (Gibco BRL).

(3) *In vivo* anticancer activity

Studies on the *in vivo* transplantation of human cancer cells were carried out in the following manner. Human cancer cells (HCT116, PC-3, and A549) that proliferated *in vitro* were injected subcutaneously into the abdominal region of BALB/c nude mice and allowed to proliferate *in vivo*. 20-25 days after the injection, the mice were sacrificed by cervical dislocation, and the solid cancer that proliferated in each of the mice was isolated aseptically, and connective or necrotic tissue and skin was removed therefrom, thus collecting a fresh cancer tissue. 50 mg of a fragment was taken aseptically from the cancer tissue and inserted into a 16-gauge trocar which was then transplanted subcutaneously into the upper abdominal region of mice.

15-30 days after the human cancer cell lines have been transplanted into the BALB/c nude mice, only mice in which the cancer cells have proliferated to a given size were selected and used in the experiment. When the tumor size in each of the test groups reached 100-200 mm^3 after cancer cell transplantation, the experiment was started.

With respect to solvents used for the drugs upon abdominal administration, compounds 312, 334 and 336 were dissolved in saline, and LBH 589 and PXD 101 were dissolved in a mixture of cremophor: ethanol: saline (1:1:8), and each of the drugs was injected at a dose of 0.1 ml per 10 g of

mouse bodyweight according to each administration schedule. SAHA was dissolved in DMSO and injected at a dose of 10 microliter per 10 g of mouse bodyweight.

For oral administration, all the drugs were dissolved in 0.5% MC as a solvent and administered at a dose of 0.1 ml per 10 g of mouse bodyweight. The anticancer effect of each drug was evaluated based on the inhibition rate (IR%) of tumor volume that indicates the tumor volume at reference date in comparison with control groups. As the control drugs, commercially available anticancer drugs, SAHA (Merck), LBH-589 (Novartis), PXD-101 (Topo Target) and MGCD 0103 (Methylgene), were used in the evaluation.

Tumor size = (short diameter)^2 × (long diameter)/2

I.R.(%) = [1-(mean tumor size of drug-administered group)/(mean tumor size of control group)]x100

[Table 18]

Group (n=10)	Dose(/day)	Schedule	IR (%)
SAHA	100 mg/kg	qd x 5 2 wks ip	46
PXD 101	80 mg/kg		38
LBH 589	5 mg/kg		40
	10 mg/kg		65
Compound 312	20 mg/kg		51
	40 mg/kg		58
	60 mg/kg		70
	80 mg/kg		81

In this experiment, inhibitory effects against actual colon cancer cells (HCT 116), and the measurement results (IR(%) and tumor volume (㎣)) are shown in Table 18 above. A higher IR(%) value and a smaller tumor volume value indicate a better inhibitory effect against cancer cells. The drug administration schedule consisted of daily administration for 5 consecutive days, followed by a drug-rest interval of 2 days, for a total of 2 weeks. The test substances were compared with control groups, commercially available SAHA (Merck), and PXD 101 (Topo Target) and LBH 589 (Novartis), which are now in clinical trials. As a result, compound 312 showed excellent colon

cancer inhibitory effects over the entire dose range compared to the highest doses of SAHA and PXD 101, and showed excellent colon cancer inhibitory effects at doses of 60 and 80 mg/kg compared to the highest dose of LBH 589 having the most excellent inhibitory effect among the control groups. The maximum tolerated doses (MTDs) of the drugs were 100 mg/kg for SAHA, 80 mg/kg for PXD, and 10 mg/kg for LBH 589. At doses higher than maximum tolerated doses, the animals were dead due to toxicity.

[Table 19]

Group (n=10)	Dose(/day)	Schedule	IR (%)
LBH 589	5 mg/kg	qd x 5 2 wks ip	40
	10 mg/kg		65
Compound 334	40 mg/kg		47
	60 mg/kg		66
Compound 336	40 mg/kg		56
	60 mg/kg		75
	80 mg/kg		78

In this experiment, inhibitory effects against actual colon cancer cells (HCT 116) were measured. The drug administration schedule consisted of daily administration for 5 consecutive days, followed by a drug-rest interval of 2 days, for a total of 2 weeks. As a control group, LBH 589 (Novartis) known to have the most excellent inhibitory effect was used. As can be seen in Table 19, compounds 334 and 336 showed excellent inhibitory effects on colon cancer compared to the control compound LBH 589. In this experiment, the maximum tolerated doses (MTDs) of the drugs were 10 mg/kg for LBH 589, 60 mg/kg for compound 334, and 80 mg/kg for compound 336. At doses higher than maximum tolerated doses, the animals were dead due to toxicity.

[Table 20]

Group (n=4)	Dose(/day)	Schedule	IR (%)
LBH 589	10 mg/kg	qd x 5, 3 wks	58
Compound 312	60 mg/kg	b.i.wk(Mon,Thu) 3 wks ip	50
	80 mg/kg		56
	100 mg/kg		71

In this experiment, anticancer effects against non-small cell lung cancer (A549) were measured. In the administration schedule, compound 312 was administered twice (Monday and Thursday) a week for 3 weeks, and as a control group for comparison, LBH 589(Novartis) known to have the most excellent anticancer effect was administered five times a week, followed by a drug-rest interval of 2 days, for a total of 3 weeks. As can be seen from the results in FIG. 3, compound 312 was convenient to administer, because it showed an excellent inhibitory effect against non-small cell lung cancer (A549) even when it was administered twice a week. LBH 589 did not show a cancer inhibitory effect when it was administered twice a week.

[Table 21]

Group (n=4)	Dose(/day)	Schedule	IR (%)
LBH 589	10 mg/kg	qd x 5, 3 wks	48
Compound 312	60 mg/kg	b.i.wk(Mon,Thu) 3 wks ip	39
	80 mg/kg		39
	100 mg/kg		59

In this experiment, anticancer effects against prostate cancer (PC-3) were measured. In the drug administration schedule, compound 312 was administered twice (Monday and Thursday) a week for 3 weeks, and as a control group for comparison, LBH 589(Novartis) was administered five times a week, followed by a drug-rest interval of 2 days, for a total of 3 weeks. As can be seen from the results in FIG. 4, compound 312 was convenient to administered to administer and had excellent inhibitory effects against prostate cancer (PC-3), compared to the control compound LBH 589.

[Table 22]

Group (n=6)	Dose(/day)	Schedule	IR (%)
LBH 589	50 mg/kg	qd x 5, 3 wks p.o	0
MGCD 0103	120 mg/kg		50
SAHA	200mg/kg		26
Compound 312	150 mg/kg	b.i.wk(Mon,Thu) 3 wks	52
	180 mg/kg		55
	210 mg/kg	p.o	69

In this experiment, in order to develop anticancer drugs for oral (p.o) administration, cancer inhibitory effects against colon cancer (HCT116) upon oral administration were measured. In the drug administration schedule, compound 312 was administered orally twice (Monday and Thursday) a week for 3 weeks, and as a control group for comparison, LBH 589(Novartis) was administered orally five times a week, followed by a drug-rest interval of 2 days, for a total of 3 weeks. Also, SAHA, LBH 589, and MGCD 0103 having excellent anticancer effects upon oral administration were used as control groups for comparison. As can be seen from the results in FIG. 5, compound 312 was convenient to administered and showed an excellent inhibitory effect against colon cancer (HCT116), compared to the control compounds LBH 589, SAHA and MGCD0103.

4. P450 (CYP3A4) inhibitory activity

P450 (CYP3A4) is a metabolic enzyme, and non-inhibition of the enzyme by a test compound means that the test substance has a low possibility of causing side effects by interaction with other drugs. Each of compounds used in the test was dissolved in DMSO (10 mg/ml), and the dilution of each test substance to 2×10^{-2} mg/ml was additionally performed in 200 μl (micro-liter) of a test system containing an assay buffer. The final solvent concentration was not higher than 2%. The CYP3A4 protein inhibitory test system included a total assay volume (100 μl (micro-liter)) of a NADPH production system (3.3 mM glucose-6-phosphate, 0.4 units/ml glucose-6-phosphate dehydrogenase, 1.3 mM NADP+ and 3.3 mM $MgCl_2 \cdot 6H_2O$ in assay buffer) and a test compound in each well of a 96-well plate. After pre-incubation at 37 °C for 10 minutes, 100 μl (micro-liter) of a KPO4 assay buffer containing 1.0 pmol P450 protein and 50 uM BFC (7-benzyloxy-

trifluoromethylcoumarin) fluorescent probe substrate was added to the test system, and an enzyme reaction in the test system having a total assay volume of 200 μl (micro-liter) was initiated. After the test system has been incubated at 37 °C for 30 minutes, 75 μl (micro-liter) of Tris base (0.5M Tris base 18 ml + 72 ml acetonitrile) containing acetonitrile was added thereto to terminate the reaction. Irradiation with fluorescence was carried out at an excitation wavelength of 409 nm and an emission wavelength of 530 nm. As a reference compound, ketoconazole ($IC_{50} = 5 \times 10^{-8}$ M) was used in this experiment.

In this experiment, compound 312 was compared with the control compounds ketoconazole and LBH 589. The results are shown in FIG. 6, and as can be seen therein, compound 312 did not inhibit P450 3A4 in vivo, and the P450 3A4 inhibitory activity thereof was lower than that of LBH 589 having excellent anticancer effects, suggesting that compound 312 has a low possibility of causing side effects by interaction with other drugs.

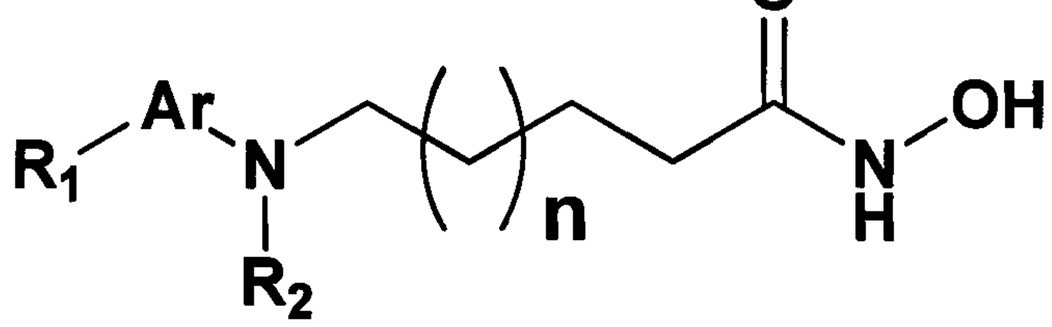
Industrial Applicability

As described above, the hydroxamate derivatives of the present invention have histone deacetylase inhibitory activity and kill the actively proliferating cells of malignant tumors. Thus, the hydroxamate derivatives of the present invention can be used as agents for treating malignant tumors, viral and bacterial infections, vascular restenosis, inflammatory diseases, autoimmune diseases, and psoriasis.

CLAIMS

1. Hydroxamate derivatives represented by the following formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof:

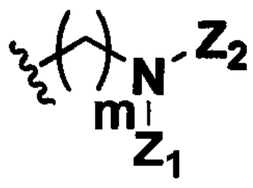
[Formula I]



wherein n is an integer of 2, 3 or 4;

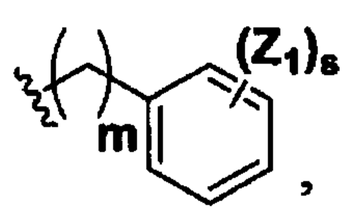
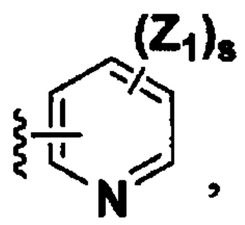
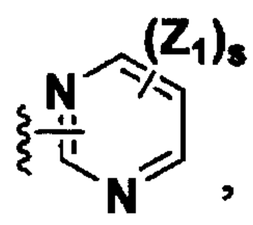
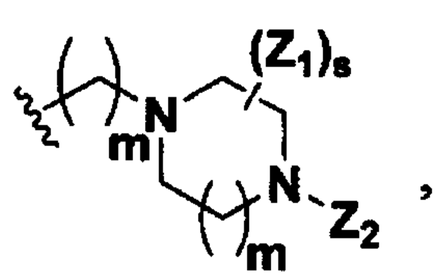
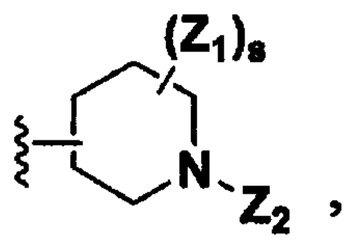
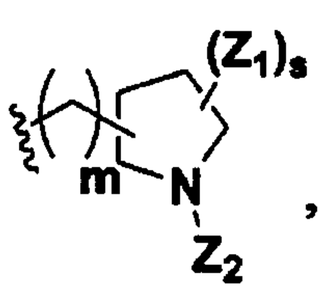
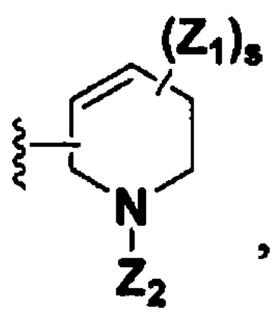
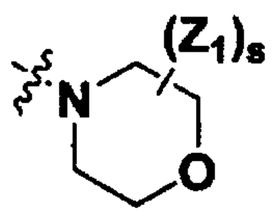
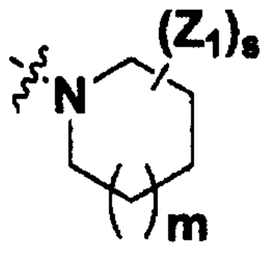
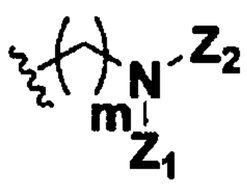
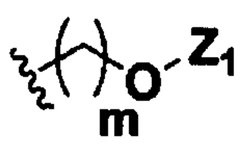
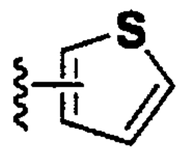
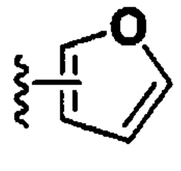
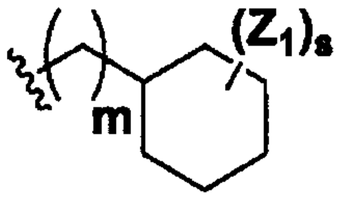
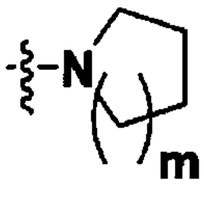
Ar is a phenylene, pyridinene or pyrimidinene group which is unsubstituted or substituted with one or more substituents selected from the group consisting of C_{1-6} alkyl, amino, nitro, thiomethyl, hydroxyl, nitrile, carboxyl, C_{1-4} alkyloxy, aryl C_{1-4} alkyloxy, halogen, trifluoromethyl, -O-CF_3, phenyl and phenoxy groups;

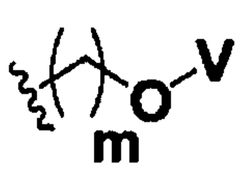
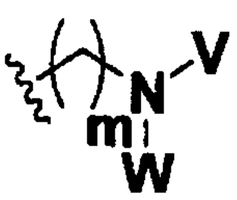
R_1 is an indole, indazole or benzimidazole group, which is unsubstituted or substituted with one or more substituents selected from the groups consisting of C_{1-6} alkyl, formyl, amino, nitro, thiomethyl, hydroxyl, C_{1-6} alkoxy, nitrile, carboxyl, halogen, trifluoromethyl, -O-CF_3 , -C(O)-R_5, -S(O_2)-R_5 and



; and

R_2 is hydrogen, hydroxy C_{1-6} alkyl, C_{1-8} alkyl, -C(O)-R_5, -C(O)NH-R_5, -S(O_2)-R_5, -C(S)-R_5 or -C(O_2)-R_5, in which R_5 is

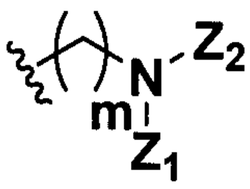
















naphthyl, C_{1-8} alkyl or C_{1-4} alkyloxy group, Z_1 and Z_2 are each independently hydrogen, C_{1-6} alkyl, amino, -O-C_{1-4} alkyl, -S(O_2)C_{1-4} alkyl, -C(O)C_{1-4} alkyl, -S-C_{1-4} alkyl, halogen, trifluoromethyl, -O-CF_3, phenyl, -O-phenyl, -O-C_{1-4} alkylaryl,  or 

V and W are each independently hydrogen or C_{1-6} alkyl,

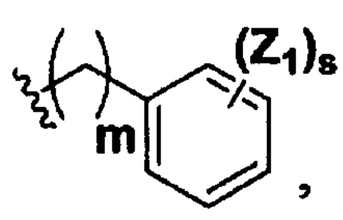
each s is independently an integer of 0, 1, 2, 3, 4 or 5, and

each m is independently an integer of 0, 1, 2 or 3.

2. The hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to claim 1, wherein R_1 is an indole or indazole group which is unsubstituted or substituted with one or more substituents selected from the group consisting of C_{1-6} alkyl, formyl, amino, nitro, thiomethyl, hydroxy, C_{1-6} alkoxy, nitrile, carboxy, halogen, trifluoromethyl, -O-CF_3 , -C(O)-R_5, -S(O_2)-R_5 and  .

3. The hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to claim 2, wherein Ar is a phenylene group which is unsubstituted or substituted with one or more substituents selected from the group consisting of C_{1-6} alkyl, amino, nitro, thiomethyl, hydroxyl, nitrile, carboxyl, C_{1-4} alkyloxyl, aryl C_{1-4} alkyloxy, halogen, trifluoromethyl, -O-CF_3, phenyl and phenoxy groups.

4. The hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to claim 3, wherein n is 3, Ar is an unsubstituted phenylene group, R_1 is an indole or indazole group which is substituted with hydrogen or one or more C_{1-6} alkyl groups, and R_2 is hydrogen, -C(O)-R_5 or -S(O_2)-R_5, in which R_5 is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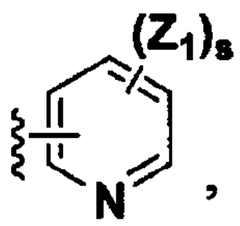
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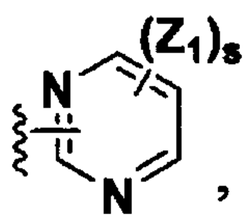
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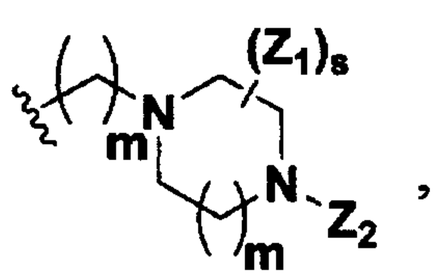
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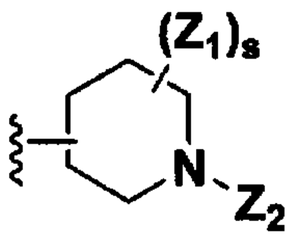
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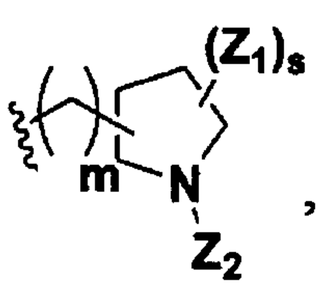
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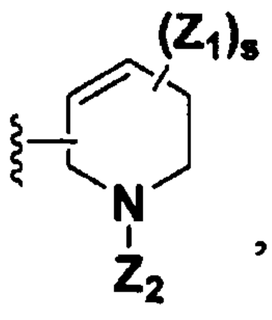
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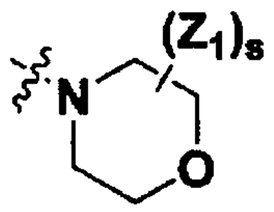
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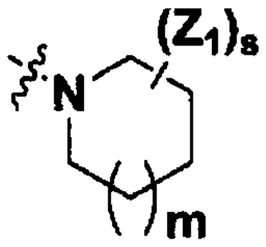
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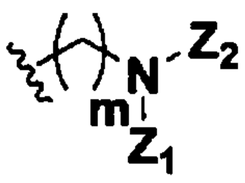
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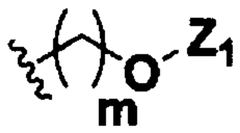
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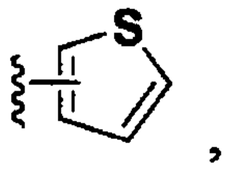
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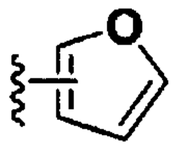
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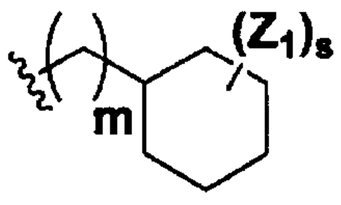
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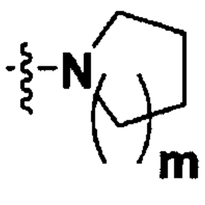
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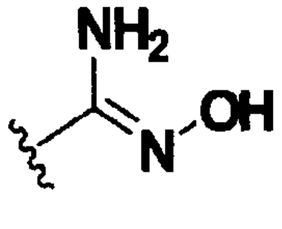
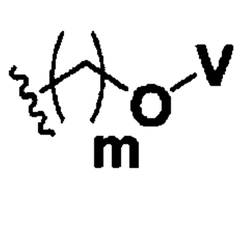
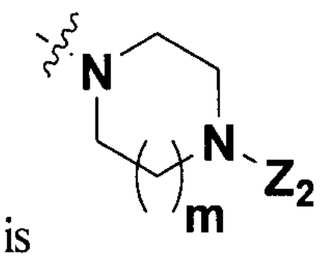
naphthyl, C_{1-8} alkyl or C_{1-4} alkyloxy group, Z_1 and Z_2 are each independently hydrogen, C_{1-6} alkyl, amino, -O-C_{1-4} alkyl, -S(O_2)C_{1-4} alkyl, -C(O)C_{1-4} alkyl, -S-C_{1-4} alkyl, halogen, trifluoromethyl, -O-CF_3, phenyl, -O-phenyl, -O-C_{1-4} alkylaryl, 
, 
or

V and W are each independently hydrogen or C_{1-6}alkyl,

each s is independently an integer of 0, 1, 2, 3, 4 or 5, and

each m is independently an integer of 0, 1, 2 or 3.

5. The hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to claim 4, wherein n is 3, Ar is an unsubstituted phenylene group, R_1 is an indole or indazole group which is substituted with hydrogen or one or more C_{1-6} alkyl groups, and R_2 is hydrogen, -C(O)-R_5 or -S(O_2)-R_5, in which R_5 is 

, in which Z_2 is hydrogen or C_{1-6}alkyl, and m is an integer of 0, 1, 2 or 3.

6. The hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to claim 1, wherein the hydroxamate derivatives are selected from the group consisting of the following compounds:

7-(4-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide;

N-hydroxy-7-(4-(1-methyl-1H-indol-5-yl) phenylamino) hydroxyheptanamide;

7-(3-(1H-indol-6-yl)phenylamino)-N-hydroxyheptanamide;

7-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyheptanamide;

7-(3-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide;

7-(4-(1H-indol-4-yl)phenylamino)-N-hydroxyheptanamide;

7-(2-(1H-indol-5-yl)phenylamino)-N-hydroxyheptanamide;

7-(5-(1H-indol-6-yl)pyridin-2-ylamino)-N-hydroxyheptanamide;

7-(6-(1H-indol-6-yl)pyridin-3-ylamino)-N-hydroxyheptanamide;

7-(3-(1H-indol-7-yl)phenylamino)-N- hydroxyheptanamide;

7-(5-(1H-indol-6-yl)pyrimidin-2-ylamino)-N- hydroxyheptanamide;

7-(4-(1H-indol-7-yl)phenylamino)-N- hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-phenylacetamido)-N-hydroxyheptanamide;

phenyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

benzyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

7-((4-(1H-indol-6-yl)phenyl)(2-hydroxyethyl)amino)-N-hydroxyheptanamide;

N-hydroxy-7-(4-(1-(phenylsulfonyl)-1H-indol-2-yl)phenylamino)heptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)thiophene-2-sulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)furan-2-carboxamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methoxyphenylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylbenzamide;

7-(N-(4-(1H-indol-6-yl)phenyl)phenylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)picolinamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3-methoxybenzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3,4,5-trimethylbenzamide;

N-(4-(1H-indol-6-yl)phenyl)-4-(dimethylamino)-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-aminoacetamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-6-chloro-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamnide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)isonicotinamide;

(Z)-N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(N'-hydroxycarbamimidoyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-2,6-difluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-4-fluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-6-(trifluoromethyl)nicotinamide;

6-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyhexanamide;

8-(4-(1H-indol-6-yl)phenylamino)-N-hydroxyoctanamide;

N-(4-(1H-indol-6-yl)phenyl)-4-ethoxy-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

7-((4-(1H-indol-6-yl)phenyl)(benzyl)amino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-2,4,6-trifluoro-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-4-amino-N-(7-(hydroxyamino)-7-oxoheptyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)piperidin-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxy-3-(trifluoromethyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(trifluoromethyl)benzamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-3,4-dimethoxybenzamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-3,4-dimethoxyphenylsulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-(methylsulfonyl)phenylsulfonamido)-N-hydroxyheptanamide;

7-(4-(1H-indol-6-yl)-3-(trifluoromethyl)phenylamino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)-3-(trifluoromethyl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide;

7-(N-(4-(1H-indol-6-yl)phenyl)naphthalene-2-sulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)-3-methylphenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methoxybenzamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(4-methoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3-methoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)acetamido)-N-hydroxyheptanamide;

methyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(2-methoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3,5-dimethoxyphenyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-5-amino-2-methoxyphenylsulfonamido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(thiophen-2-yl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)pyridine-3-sulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(dimethylamino)acetamido)-N-hydroxyheptanamide;

4-methoxyphenyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

ethyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

7-(1-(4-(1H-indol-6-yl)phenyl)-3,3-dimethylureido)-N-hydroxyheptanamide;

2-methoxyethyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)nicotinamide;

N-hydroxy-7-(4-(1-methyl-1H-indazol-6-yl)phenylamino)heptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)propionamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-1-methyl-1,2,5,6-tetrahydropyridine-3-carboxamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(pyridin-3-yl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-methylureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)ethylsulfonamido)-N-hydroxyheptanamide;

7-((4-(1H-indol-6-yl)phenyl)(N,N-dimethylsulfamoyl)amino)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)cyclohexanecarboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)cyclopropanecarboxamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-morpholinoacetamido)-N-hydroxyheptanamide;

(S)-N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)pyrrolidine-2-carboxamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-isopropylureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-isobutylureido)-N-hydroxyheptanamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indazol-6-yl)phenyl)methylsulfonamido)heptanamide;

7-((4-(1H-indol-6-yl)phenyl)(propyl)amino)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(4-methylpiperazin-1-yl)acetamido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-butylureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(4-methylpentyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(3-(dimethylamino)propyl)ureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-(cyclohexylmethyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)pentanamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)isobutyramido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-2-(4-(2-methoxyethyl)piperazin-1-yl)acetamido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3,3-diethylureido)-N-hydroxyheptanamide;

7-(1-(4-(1H-indol-6-yl)phenyl)-3-ethylureido)-N-hydroxyheptanamide;

N-hydroxy-7-(N-(4-(2-methyl-1H-indol-5-yl)phenyl)methylsulfonamido)heptanamide;

isobutyl 4-(1H-indol-6-yl)phenyl(7-(hydroxyamino)-7-oxoheptyl)carbamate;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)thiophene-2-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)picolinamide;

7-(N-(4-(1H-indol-5-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-1-methylpiperidine -4-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)picolinamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)morpholine-4-carboxamide;

7-(N-(4-(1,2-dimethyl-1H-indol-5-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine -1-carboxamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indazol-6-yl)phenyl)ethylsulfonamido)heptanamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)nicotinamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide;

7-(N-(4-(1H-indol-5-yl)phenyl)ethylsulfonamido)-N-hydroxyheptanamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)morpholine-4-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)morpholine-4-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethylmorpholine-4-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)morpholine-4-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-2,6-dimethylmorpholine-4-carboxamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indol-5-yl)phenyl)methylsulfonamido)heptanamide;

N-hydroxy-7-(N-(4-(1-methyl-1H-indol-6-yl)phenyl)methylsulfonamido)heptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-isopropylpiperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)pyrrolidine-1-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)isonicotinamide;

7-(N-(6-(1H-indol-6-yl)pyridin-3-yl)methylsulfonamido)-N-hydroxyheptanamide;

N-hydroxy-7-(N-(6-(1-methyl-1H-indazol-6-yl)pyridin-3-yl)methylsulfonamido)heptanamide;

7-(N-(6-(1H-indol-5-yl)pyridin-3-yl)methylsulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-4-acetyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-1,4-diazepane-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indol-6-yl)phenyl)piperazine-1-carboxamide;

7-(N-(4-(1H-indol-2-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

tert-butyl 2-(4-(N-(7-(hydroxyamino)-7-oxoheptyl)methylsulfonamido)phenyl)-1H-indole-1-carboxylate;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(2-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-4-benzyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazole-6-yl)phenyl)piperazine-1-carboxamide;

7-(N-(4-(5-bromo-1H-indol-2-yl)phenyl)methylsulfonamido)-N-hydroxyheptanamide;

tert-butyl 5-bromo-2-(4-(N-(7-(hydroxyamino)-7-oxoheptyl)methylsulfonamido)phenyl)-1H-indazole-1-carboxylate;

N-(4-(1H-indol-6-yl)phenyl)-4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(4-(1H-indol-5-yl)phenyl)-4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide;

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-sulfonamide)heptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(2-methoxyphenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(3-methoxyphenyl)piperazine-1-carboxamide;

N-(4-(3H-benzo[d]imidazol-5-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-(2-hydroxyethyl)piperazine-1-carboxamide;

7-(3-(2-(dimethylamino)ethyl)-1-(4-(1-methyl-1H-indazol-6-yl)phenyl)ureido)-N-hydroxyheptanamide;

N-hydroxy-7-(1-(4-(1-methyl-1H-indazol-6-yl)phenyl)-3-(2-(1-methylpyrolidin-2-yl)ethyl)ureido)heptanamide;

N-(4-(1H-indol-6-yl)phenyl)-4-butyl-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carboxamide;

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carboxamide;

N-(4-(1H-indol-6-yl)phenyl)-4-(2-(dimethylamino)ethyl)-N-(7-(hydroxyamino)-7-oxoheptyl)piperazine-1-carboxamide;

7-(3-((1-ethylpyrolidin-2-yl)methyl)-1-(4-(1-methyl-1H-indazol-6-yl)phenyl)ureido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methylpiperazine-1-sulfonamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-5-yl)phenyl)-4-methylpiperazine-1-sulfonamido)-N-hydroxyheptanamide;

N-(4-(1H-indol-6-yl)phenyl)-N-(7-(hydroxyamino)-7-oxoheptyl)-4-methylpiperazine-1-carboxamide;

7-(N-(4-(1H-indol-6-yl)phenyl)-4-methylpiperazine-1-carbothioamido)-N-hydroxyheptanamide;

7-(N-(4-(1H-indol-5-yl)phenyl)-4-methylpiperazine-1-carbothioamido)-N-hydroxyheptanamide;

and

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-5-yl)phenyl)piperazine-1-carbothioamido)heptaneamide.

7. The hydroxamate derivatives, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to claim 6, wherein the hydroxamate derivatives are selected from the group consisting of the following compounds:

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide;

N-(7-(hydroxyamino)-7-oxoheptyl)-4-methyl-N-(4-(2-methyl-1H-indol-5-yl)phenyl)piperazine-1-carboxamide;

4-ethyl-N-(7-(hydroxyamino)-7-oxoheptyl)-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-carboxamide; and

N-hydroxy-7-(4-methyl-N-(4-(1-methyl-1H-indazol-6-yl)phenyl)piperazine-1-sulfonamido)heptanamide.

8. Use of hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to any one of claims 1 to 6 for preparing pharmaceutical compositions for prevention or treatment of a disease associated with histone deacetylase activity.

9. Pharmaceutical compositions comprising hydroxamate derivatives of formula I, isomers thereof, pharmaceutically acceptable salts thereof, hydrates thereof or solvates thereof according to any one of claims 1 to 6 together with pharmaceutically acceptable carriers.

10. The pharmaceutical compositions according to claim 9, wherein the compositions are for prevention or treatment of a disease associated with histone deacetylase activity.

11. The pharmaceutical compositions according to claim 10, wherein the disease associated with histone deacetylase activity is malignant tumor, viral or bacterial infection, vascular restenosis, inflammatory disease, autoimmune disease or psoriasis.

12. Use of the pharmaceutical compositions as defined in claim 9, for prevention or treatment of disease associated with histone deacetylase activity.

13. A method for preparing hydroxamate derivatives of the following formula I-2, the method comprising the steps of:

allowing a compound of the following formula II to react with bromoaniline in the presence of an inorganic salt so as to prepare a compound of the following formula III;

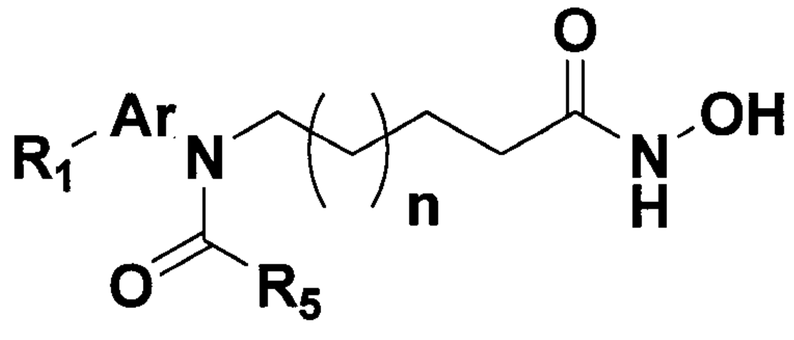
allowing the compound of formula III to react with 4-nitrophenylchloroformate so as to prepare a compound of the following formula VI;

subjecting the compound of formula VI to the Suzuki reaction with boronic acid R_1-$B(OH)_2$ in the presence of palladium to prepare a compound of the following formula VII;

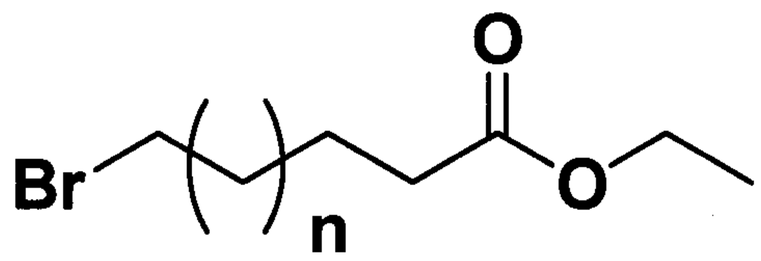
allowing the compound of formula VII to react with R_5-H in the presence of an inorganic salt so as to prepare a compound of the following formula VIII; and

treating the compound of formula VIII with a hydroxide salt, thus preparing a hydroxamate derivative of the following formula I-2:

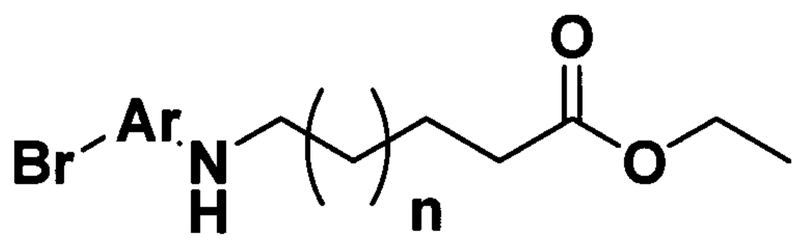
[Formula I-2]



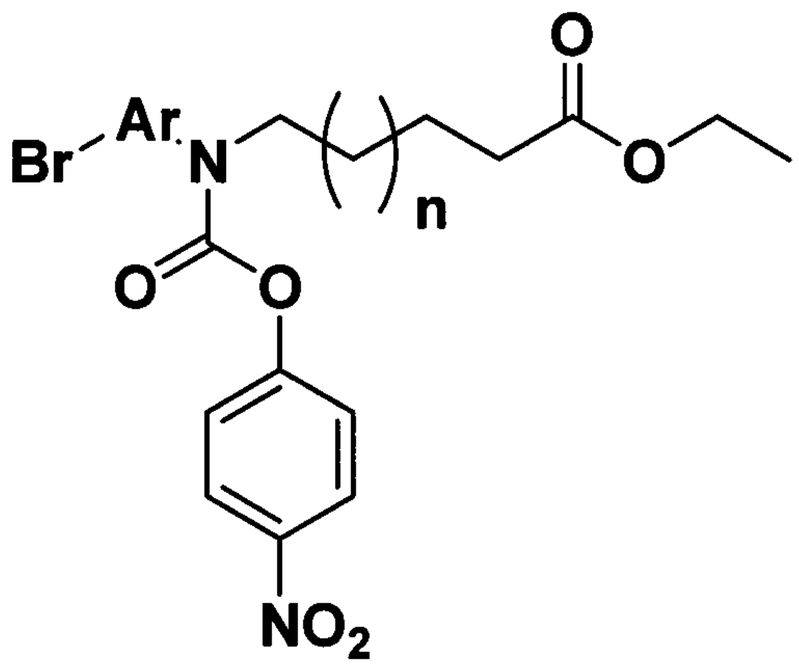
[Formula II]



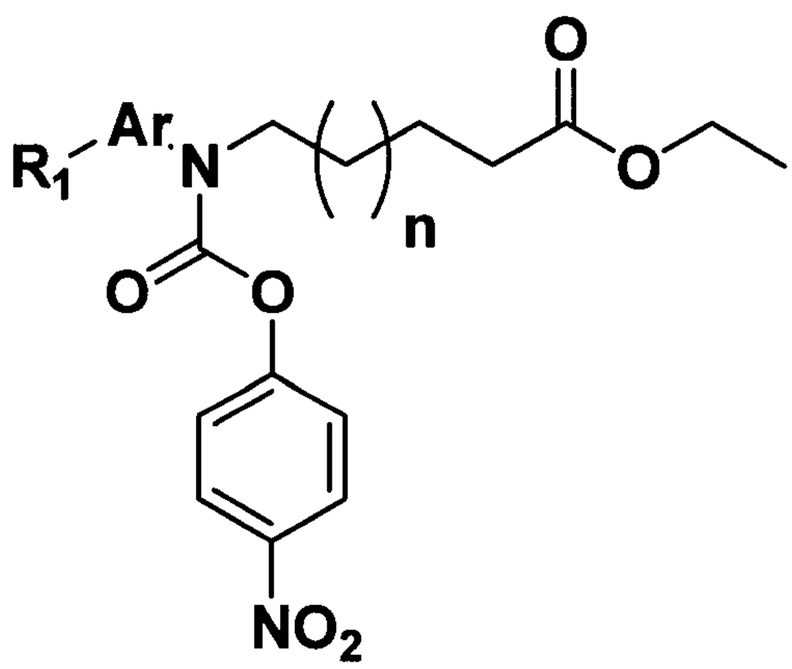
[Formula III]



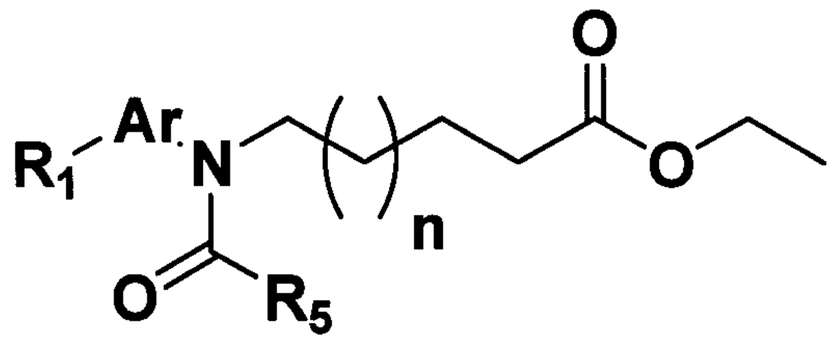
[Formula VI]



[Formula VII]



[Formula VIII]



wherein n is 3, Ar is phenylene, R_1 is 1H-indol-5-yl, 1-methyl-1H-indazol-6-yl, 1-methyl-1H-indazol-5-yl, 3H-benzo[d]imidazol-5-yl, or 1H-indol-6-yl, and R_5 is 1-methylpiperazine, morpholine, 2,6-dimethylmorpholine, 1-ethylpiperazine, N,N-dimethylethane-1,2-diamine, 2-(1-methylpyrrolidin-2-yl)ethanamine, (1-ethylpyrrolidin-2-yl)methanamine, 4-methoxy benzenamine, 3-methoxy benzenamine, 2-methoxy benzenamine, 3,5-dimethoxy benzenamine, thiophen-2-amine, dimethylamine, pyridine-3-amine, methylamine, isopropylamine, isobutylamine, butylamine, 4-methylpentylamine, N,N-dimethylpropane-1,3-diamine, cyclohexylmethylamine, diethylamine, ethylamine, 1-isopropylpiperazine, pyrrolidine, 1-(piperazin-1-yl)ethanone, 1-methylhomopiperazine, 1-benzylpiperazine, 1-(2-methoxyphenyl)piperazine, 1-(3-methoxyphenyl)piperazine, 2-(piperazin-1-yl)ethanol, 1-butylpiperazine, N,N-dimethyl-2-(piperazin-1-yl)ethanamine, or 4-methylpiperidine.

Fig. 1

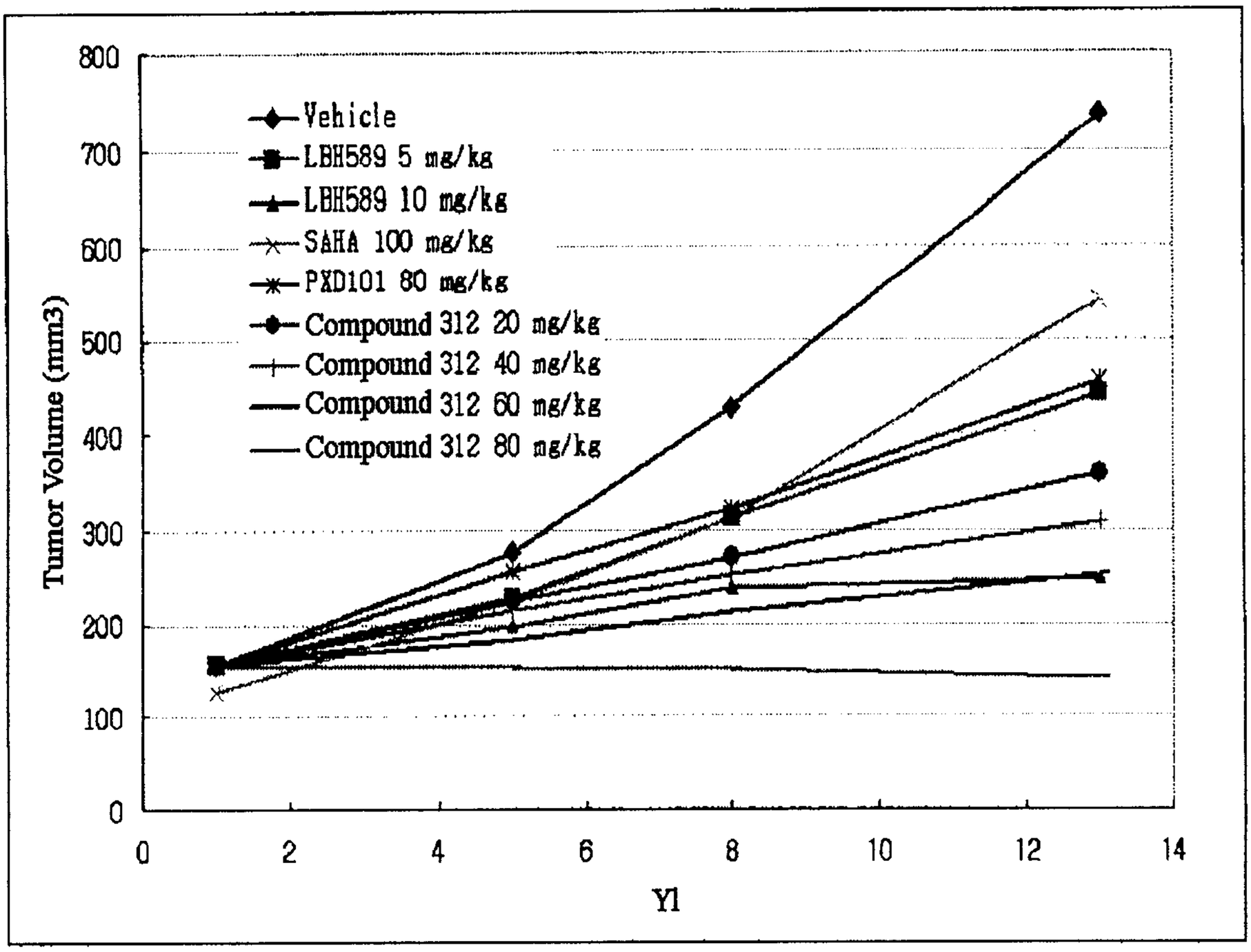

800
700
600
500
400
300
200
100
0
Tumor Volume (mm3)
Vehicle
LBH589 5 mg/kg
LBH589 10 mg/kg
SAHA 100 mg/kg
PXD101 80 mg/kg
Compound 312 20 mg/kg
Compound 312 40 mg/kg
Compound 312 60 mg/kg
Compound 312 80 mg/kg
0
2
4
6
8
10
12
14
YI

Fig. 2

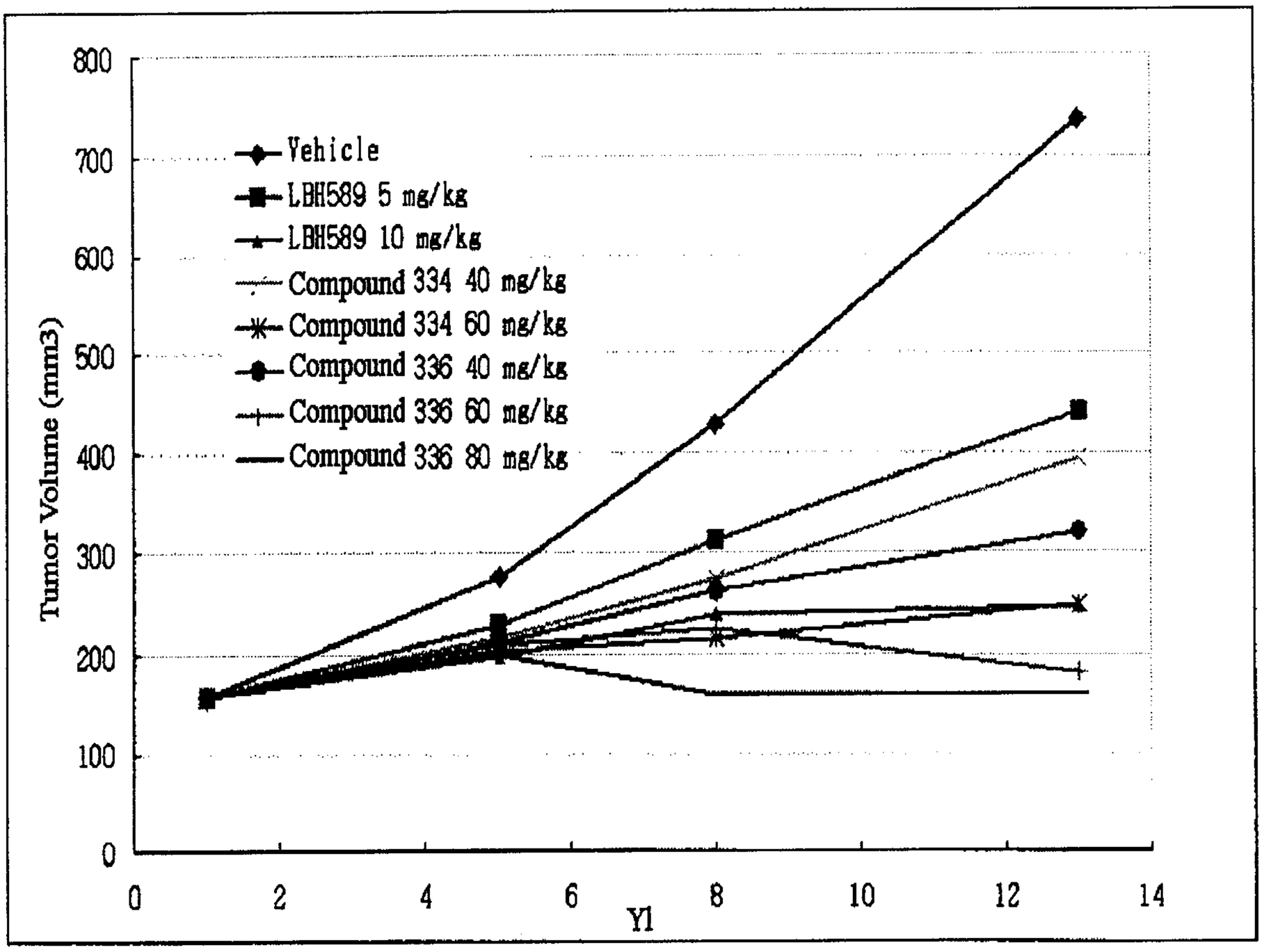

800
700
600
500
400
300
200
100
0
Tumor Volume (mm3)
Vehicle
LBH589 5 mg/kg
LBH589 10 mg/kg
Compound 334 40 mg/kg
Compound 334 60 mg/kg
Compound 336 40 mg/kg
Compound 336 60 mg/kg
Compound 336 80 mg/kg
0
2
4
6
8
10
12
14
Y1

Fig. 3

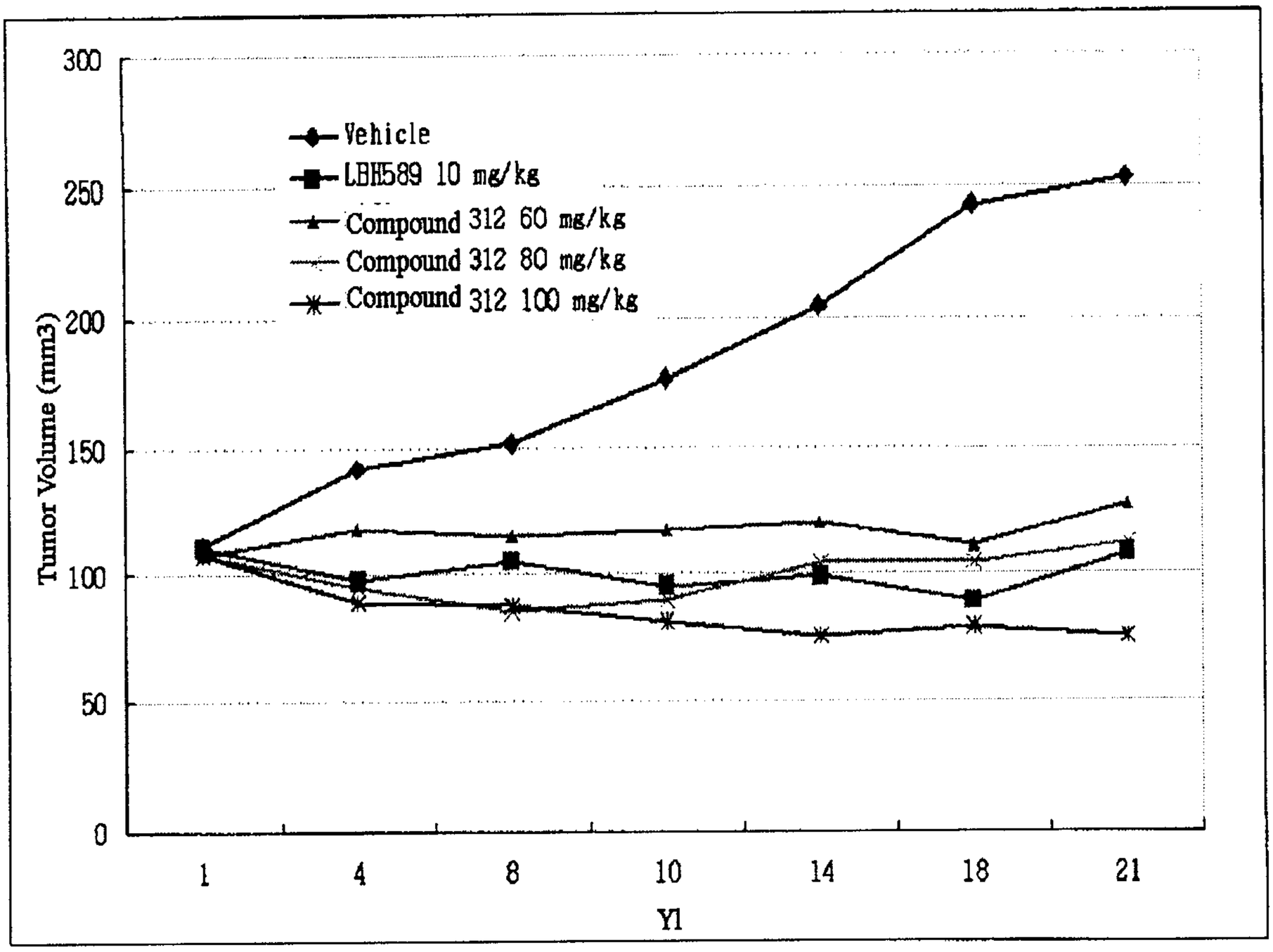

300
250
200
150
100
50
0
Tumor Volume (mm3)
Vehicle
LBH589 10 mg/kg
Compound 312 60 mg/kg
Compound 312 80 mg/kg
Compound 312 100 mg/kg
1
4
8
10
14
18
21
Y1

Fig. 4

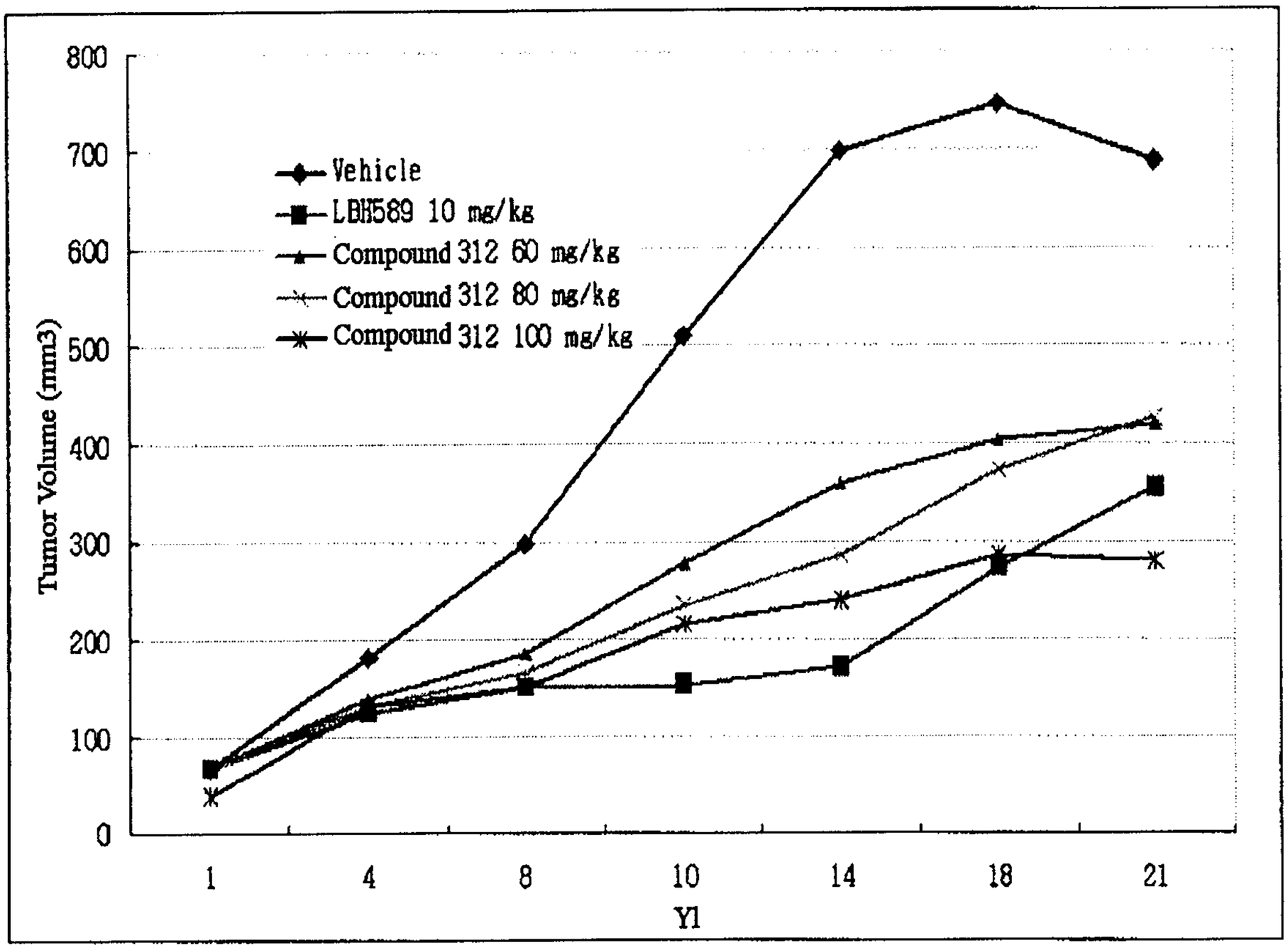

800
700
600
500
400
300
200
100
0
Tumor Volume (mm3)
Vehicle
LBH589 10 mg/kg
Compound 312 60 mg/kg
Compound 312 80 mg/kg
Compound 312 100 mg/kg
1
4
8
10
14
18
21
Y1

Fig. 5

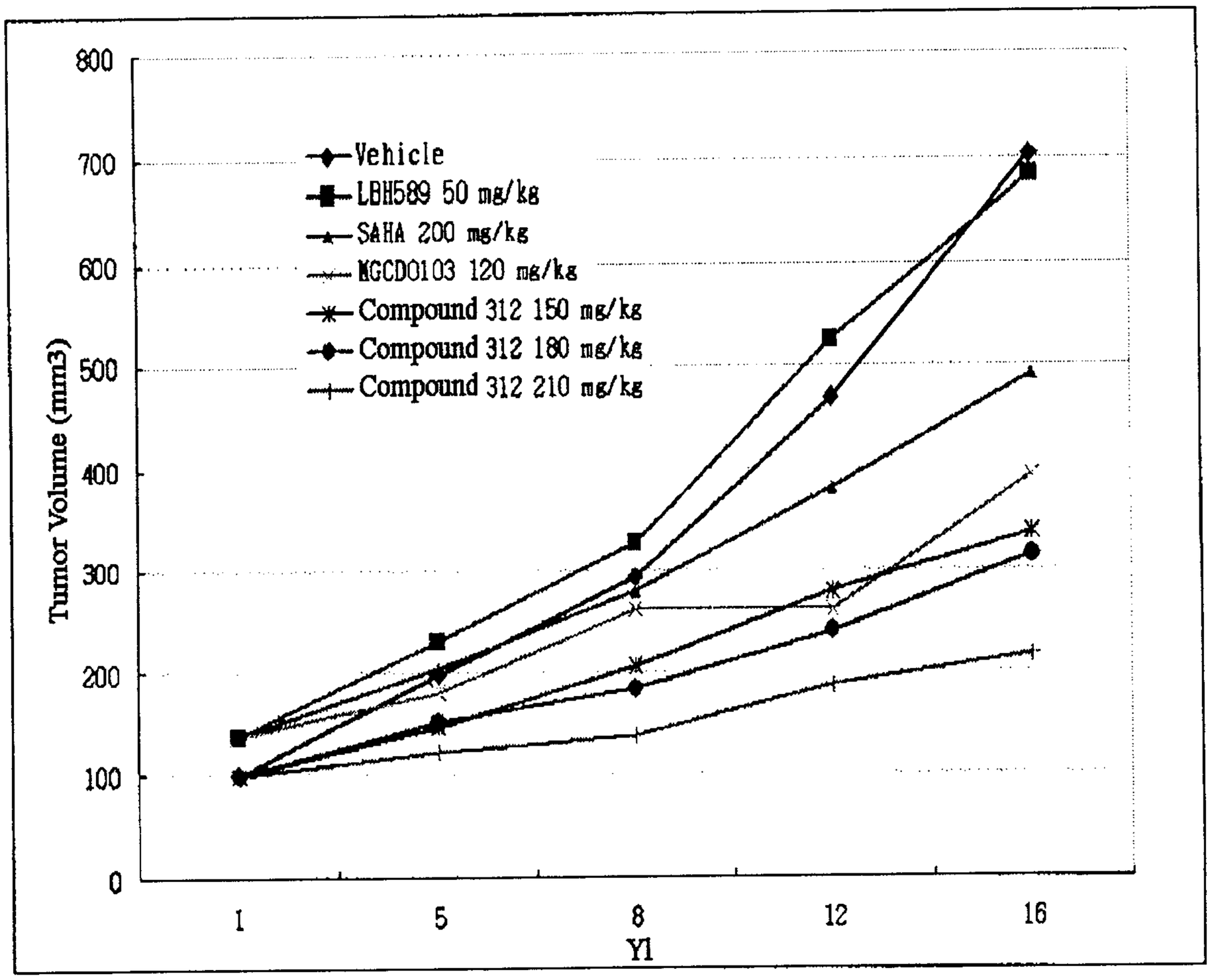
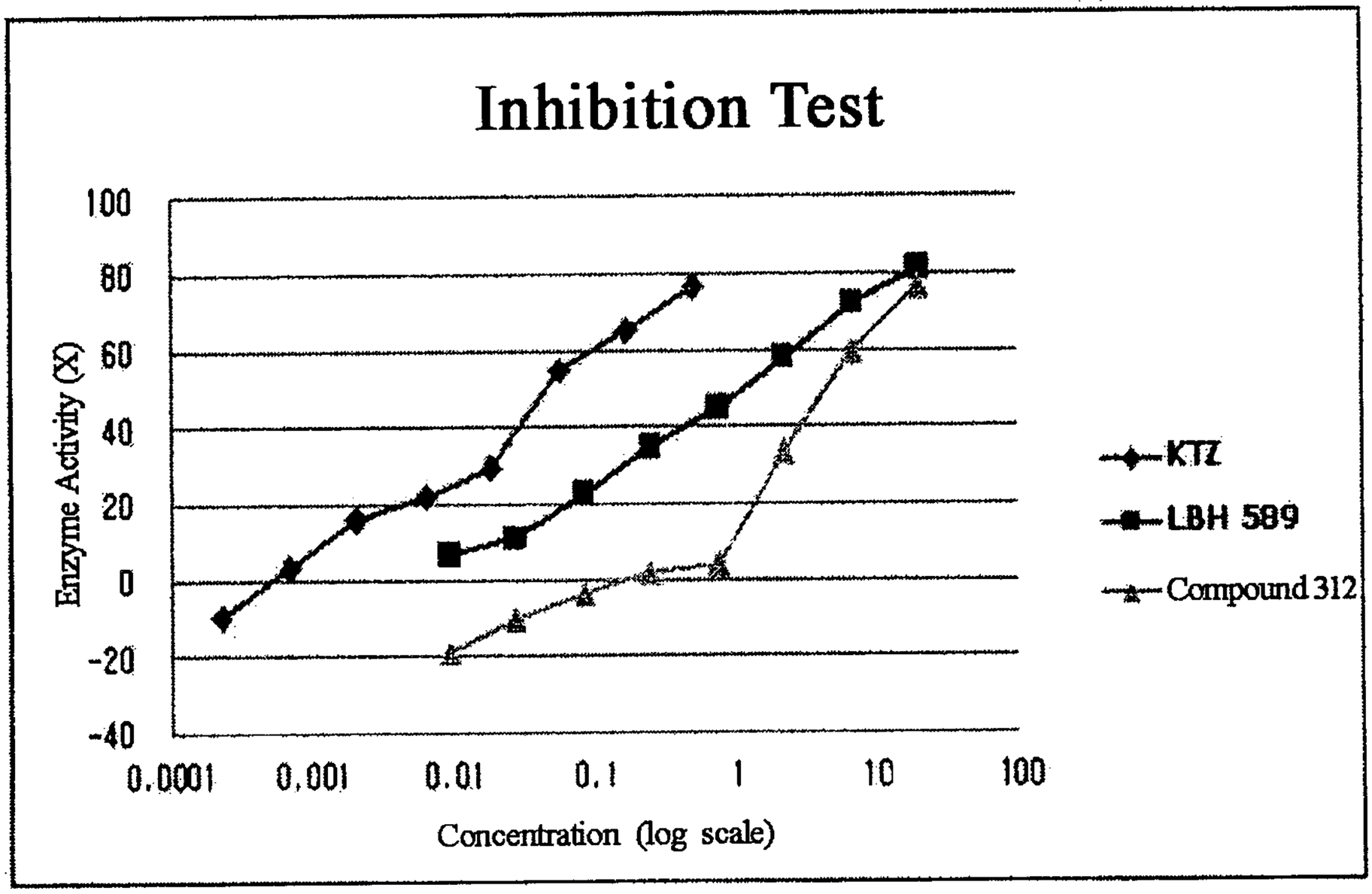

800
700
600
500
400
300
200
100
0
Tumor Volume (mm3)
Vehicle
LBH589 50 mg/kg
SAHA 200 mg/kg
MGCD0103 120 mg/kg
Compound 312 150 mg/kg
Compound 312 180 mg/kg
Compound 312 210 mg/kg
1
5
8
12
16
Y1

Fig. 6


Inhibition Test
Enzyme Activity (X)
100
80
60
40
20
0
-20
-40
0.0001
0.001
0.01
0.1
1
10
100
Concentration (log scale)
KTZ
LBH 589
Compound 312

[Formula I]