
P-Cadherin Ligands

5 FIELD OF THE INVENTION

The present invention is related to a P-cadherin (P-cad) binding compound; a composition comprising the P-cadherin binding compound; the P-cad binding compound and the composition, respectively, for use in a method for the diagnosis of a disease; the P-cad binding compound and the composition, respectively, for use in a method for the treatment of a disease; 10 the P-cad binding compound and the composition, respectively, for use in a method of diagnosis and treatment of a disease which is also referred to as "thera(g)nosis" or "thera(g)nostics"; the P-cad binding compound and the composition, respectively, for use in a method for delivering a radionuclide to a P-cad expressing tissue; a method for the diagnosis of a disease using the P-cad binding compound and the composition, respectively; a method for the treatment of a 15 disease using the P-cad binding compound and the composition, respectively; a method for the diagnosis and treatment of a disease which is also referred to as "thera(g)nosis" or "thera(g)nostics, using the P-cad binding compound and the composition, respectively; a method for the delivery of a radionuclide to a P-cad expressing tissue using the P-cad binding compound and the composition, respectively.

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BACKGROUND OF THE INVENTION

Despite the increasing availability of therapeutic options, cancer is still the second leading cause of death globally. The complexity and heterogeneity of cancerous tumors continue to pose severe obstacles. Thus, novel therapeutic approaches that target specific molecules critical to 25 cancer development and progression are continually sought after. P-cadherin, a member of the cadherin superfamily, has garnered considerable attention as a potential therapeutic target due to its important role in cell adhesion, allowing cells to bind together and form tissues.

The Cadherin Superfamily and P-cadherin

The name Cadherin was derived from the superfamily's main function, namely the "calcium-dependent adhesion". The superfamily comprises a group of transmembrane proteins involved 30 in cell-cell adhesion and communication. They play a crucial role in various cellular processes,

such as tissue morphogenesis, embryonic development, and maintenance of tissue integrity in adult organisms (van Roy, *Nat Rev Cancer*, **2014**, *14*, 121-134). Cadherins are characterized by the presence of extracellular cadherin domains responsible for homophilic calcium-dependent binding with cadherin molecules on adjacent cells (Niessen *et al.*, *Physiol Rev*, **2011**, *91*, 691-
5 731).

P-cadherin was described for the first time in 1986, as part of “a novel class of cadherins that appeared in developing mouse embryos” and its name is derived from the site where this adhesion molecule was firstly characterized, the placenta (Nose *et al.*, *J Cell Biol*, **1986**, *103*, 2649-2658). P-cadherin, which is also known as placental cadherin or cadherin-3, is a member
10 of the classical type I cadherins family, whose members are known for mainly mediating cell adhesion by homophilic interactions. P-cadherin is widely expressed in various tissues during embryonic development and has a more restricted distribution in adult tissues (Hirai *et al.*, *Development*, **1989**, *105*, 263-270). Notably, P-cadherin is particularly abundant in epithelial tissues and is significantly upregulated in numerous cancer types.

Additional members of the classical type I cadherin family are neural cadherin (N-cadherin), epithelial cadherin (E-cadherin), muscle cadherin (M-cadherin) and retinal cadherin (R-cadherin). While initially named after the tissues where they were initially discovered, it is important to note that the presence of cadherins extends beyond the confines of these specific tissues. Many subtypes have since been identified in other species and there are now more than
20 100 known members in this superfamily (Stemmler, *Mol Biosyst*, **2008**, *4*, 835-850). E-cadherin shares the highest sequence homology with P-cadherin (around 66%) (Nollet *et al.*, *J Mol Biol*, **2000**, *299*, 551-572). E-cadherin forms the key functional component of adherens junctions of epithelial cell and plays a vital role in the establishment and maintenance of intercellular adhesion, cell polarity, and tissue architecture.

25 *P-cadherin and Cancer*

In recent years, a growing body of evidence has linked P-cadherin to the onset and advancement of diverse cancers, encompassing breast, ovarian, lung, pancreatic, and gastric cancer, among others (see Table 1). Its overexpression has been associated with aggressive phenotypes, increased tumor invasiveness, and enhanced metastatic potential (Vieira *et al.*, *Mol Cancer*,
30 **2015**, *14*, 178). In tumor cells, P-cadherin promotes the loss of cell-cell adhesion, leading to enhanced cell motility and invasion, crucial steps in metastasis. Studies have also linked P-cadherin to cancer stem cell properties, conferring self-renewal and chemoresistance capabilities to the tumor cells (Ribeiro *et al.*, *Front Oncol*, **2014**, *4*, 371). Additionally,

P-cadherin has been shown to modulate various signaling pathways, including Wnt/ β -catenin, PI3K/AKT, and MAPK, further contributing to tumor growth and survival (Vieira *et al.*, *Mol Cancer*, **2015**, *14*, 178).

5 Table 1: P-cadherin expression in primary tumors and its relevance in malignancy. The tumor promoting or tumor suppressive effects associated with P-cadherin expression is dependent on the cellular and tissue context (Table modified from (Vieira *et al.*, *Mol Cancer*, **2015**, *14*, 178))

<i>Malignancy</i>	<i>Expression in neoplastic tissue/cells in comparison to normal tissue/cells</i>	<i>Behavior</i>
<i>Breast cancer</i>	Up-regulation	Tumor promoting
<i>Gastric cancer</i>	Up-regulation	Tumor promoting
<i>Endometrial cancer</i>	Up-regulation	Tumor promoting
<i>Ovarian cancer</i>	Up-regulation	Tumor promoting
<i>Pancreatic cancer</i>	Up-regulation	Tumor promoting
<i>Basocellular and squamous carcinoma of the skin</i>	Up-regulation	Tumor promoting
<i>Cholangiocarcinoma</i>	Up-regulation	Tumor promoting
<i>Colorectal carcinoma</i>	Up-regulation	Tumor promoting
	Down-regulation	Tumor suppressive
<i>Bladder cancer</i>	Up-regulation	Tumor promoting
	Down-regulation	Tumor suppressive
<i>Prostate cancer</i>	Up-regulation	Tumor promoting
	Down-regulation	Tumor suppressive
<i>Melanoma</i>	Down-regulation	Tumor suppressive
<i>Oral squamous cell carcinoma</i>	Down-regulation	Tumor suppressive
<i>Hepatocellular carcinoma</i>	Down-regulation	Tumor suppressive

Rationale for Targeting P-cadherin

Given the critical role of P-cadherin in promoting tumorigenesis and metastasis, its targeting presents a promising strategy for cancer therapy. Since P-cadherin is mainly expressed in the tumor cells rather than in surrounding stroma, it represents an attractive tumor-specific target, reducing potential off-target effects.

State of the Art

The main compound class so far for targeting P-cad are antibodies and their derivatives. They have been investigated for inhibiting expression or function of P-cad (e.g., WO2006114704A2), stimulating immune response (e.g., WO2016001810A1) or delivery of cytotoxic payloads (e.g., WO2016075670A1, WO2011099524A1). Typically, these antibody-based compounds of the prior art targeting P-cad suffer from at least one of the following shortcomings rendering them unsuitable for use in the diagnosis and/or treatment, respectively, of a subject such as a human being: immunogenicity, unfavorable pharmacokinetic behavior, insufficient pharmacological activity, and limited preclinical and/or clinical data. However, P-cad-modulating small molecules and peptide-based approaches have been scarcely described. WO2009025116A1 discloses immunogenic peptides that can serve as vaccine for cancers highly expressing P-cad.

Recent studies also point to the potential use of the anti-cancer protein azurin in P-cadherin overexpressing breast cancer models (Bernardes *et al.*, *PLoS One*, **2013**, 8, e69023; Bernardes *et al.*, *Int J Biochem Cell Biol*, **2014**, 50, 1-9; Warso *et al.*, *Br J Cancer*, **2013**, 108, 1061-1070).

DETAILED DESCRIPTION OF THE INVENTION

The problem underlying the present invention is the provision of a compound (a peptide, e.g., having a molecular weight of less than 10000) which is suitable as a diagnostic agent and/or a therapeutic agent, particularly if it comprises an effector such as a cytotoxic drug or a chelator comprising a diagnostically and/or therapeutically active radionuclide.

A further problem underlying the present invention is the provision of a compound which is suitable as a diagnostic agent and/or a therapeutic agent, particularly if it comprises a diagnostically and/or therapeutically active radionuclide, said compound having a pIC₅₀ of equal to or greater than 6.0 for P-cad, i.e., an IC₅₀ equal or less than 1.0 µM for P-cad.

A further problem underlying the present invention is the provision of a compound which is suitable as a diagnostic agent and/or a therapeutic agent, particularly if it comprises a

diagnostically and/or therapeutically active radionuclide, in the diagnosis and/or therapy of a disease where the diseased cells and/or diseased tissues express P-cad. A still further problem underlying the instant invention is the provision of a compound which is suitable for delivering a diagnostically and/or therapeutically effective radionuclide to a diseased cell and/or diseased tissue, respectively, and more particularly a P-cad-expressing diseased cell and/or diseased tissue, preferably the diseased tissue comprises cancer or tumor cells.

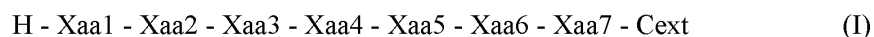
Also, a problem underlying the present invention is the provision of a method for the diagnosis of a disease, of a method for the treatment and/or prevention of a disease, and a method for the combined diagnosis and treatment of a disease; preferably such disease is a disease involving P-cad-expressing cells and/or tissues, more particularly a P-cad-expressing diseased cell and/or diseased tissue, preferably the diseased tissue comprises or contains cancer or tumor cells.

A still further problem underlying the present invention is the provision of a method for the identification of a subject, wherein the subject is likely to respond or likely not to respond to a treatment of a disease, a method for the selection of a subject from a group of subjects, wherein the subject is likely to respond or likely not to respond to a treatment of a disease; preferably, the disease is cancer, more preferably the disease is a solid tumor.

Also, a problem underlying the present invention is the provision of a pharmaceutical composition containing a compound having the characteristics as outlined above. Furthermore, a problem underlying the present invention is the provision of a kit which is suitable for use in any of the above methods.

The above problems are solved by the subject matter of the attached independent claims; preferred embodiments may be taken from the attached dependent claims. In particular, the present invention provides a compound which is suitable as a diagnostic agent and/or a therapeutic agent, particularly if it comprises a diagnostically and/or therapeutically active radionuclide.

The compound of the present invention comprises a peptide, which is represented by the following formula (I):



or a pharmaceutically acceptable salt thereof,

wherein,

Xaa1 is (a) a residue of an α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid, preferably a residue of an L- α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid,

5 wherein Nmod is a group containing one or more selected from hydrogen, carbon, nitrogen oxygen and sulfur and optionally comprises a group Z^{1a} ,

wherein the side chain of Xaa1 optionally comprises a group Z^{1b} ,

10 wherein the side chain of Xaa1 and the α -nitrogen atom of Xaa1 optionally form a heterocycle, with the proviso that if the side chain of Xaa1 and the α -nitrogen atom of Xaa1 form a heterocycle, the N-terminal modification group Nmod is absent, or

(b) a residue of an L- α -hydroxy acid comprising a side chain,

15 wherein the side chain optionally comprises a group Z^{1b} ,

H is a hydrogen atom which is covalently attached to (a) the α -nitrogen atom of Xaa1 if Xaa1 is a residue of an α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid, or (b) the oxygen atom of the α -hydroxy group of Xaa1 if Xaa1 is a residue of an L- α -hydroxy acid comprising a side chain,

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Xaa2 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

25 wherein the side chain comprises an optionally substituted indole or benzothiophene group,

Xaa3 is a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^2 ,

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Xaa4 is a residue of an L- α -amino acid comprising a hydrophobic side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain of Xaa4 and the α -nitrogen atom of Xaa4 optionally form a heterocycle,

Xaa5 is a residue of an α -amino acid comprising a side chain,

5 wherein the side chain optionally comprises a group Z^3 ,

Xaa6 is a residue of an α -amino acid comprising a side chain, preferably a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^4 ,

10 wherein the side chain of Xaa6 and the α -nitrogen atom of Xaa6 optionally form a heterocycle,

Xaa7 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

15 wherein the side chain comprises an aryl or heteroaryl group, preferably a bicyclic aryl or heteroaryl group,

Cext is a moiety covalently attached to the carbonyl group of Xaa7, which is represented by one of the formulae (Ia), (Ib), (Ic), (Id), and (Ie):

20	Cterm	(Ia)
	Xaa8 - Cterm	(Ib)
	Xaa8 - Xaa9 - Cterm	(Ic)
	Xaa8 - Xaa9 - Xaa10 - Cterm	(Id)
	Xaa8 - Xaa9 - Xaa10 - Xaa11	(Ie)

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wherein,

Xaa8 is a residue of glycine or a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^5 ,

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Xaa9 is a residue of an α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid, preferably Xaa9 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^6 ,

wherein the side chain of Xaa9 and the α -nitrogen atom of Xaa9 optionally form a heterocycle,

5 Xaa10 is a residue of an α -amino acid comprising a side chain, preferably a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^7 ,

wherein the side chain of Xaa10 and the α -nitrogen atom of Xaa10 optionally form a heterocycle,

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Xaa11 is a residue of a compound comprising an amino group and optionally comprising a carbonyl group, wherein the amino group is covalently attached to the carbonyl group of Xaa10,

wherein if the carbonyl group is present, said carbonyl group is covalently attached to a C-terminal modification group Cterm,

15 preferably Xaa11 is

(a) a residue of an α -amino acid comprising a side chain, a C-terminal modification group Cterm and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

20 wherein the side chain optionally comprises a group Z^8 ,

wherein the side chain of Xaa11 and the α -nitrogen atom of Xaa11 optionally form a heterocycle, or

(b) a residue of an optionally substituted β -amino alcohol, or

(c) a residue of a (C₁-C₆)alkylamine such as cyclohexylamine, or of a (C₂-C₆)alkyldiamine such as ethylenediamine,

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Cterm is a C-terminal modification group, which is selected from the group consisting of -NH₂, -OH, a group Z^9 , and -NHR^{cterm}, wherein R^{cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group,

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each group Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9 is independently an effector E, such as a chelator, which may optionally comprise a linker moiety L that covalently links the effector

E to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α 1) a phosphorophore and (α 2) a fluorophore such as fluorescein or rhodamine; and
- 5 (β) a chelator optionally comprising a radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

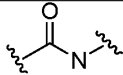
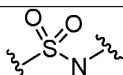
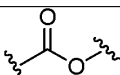
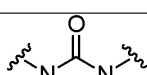
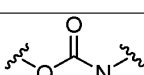
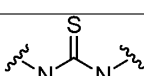
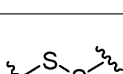
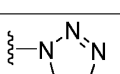
10 1. DEFINITIONS

Unless stated otherwise, the following terms and phrases as used herein are intended to have the following meanings.

The term “**linkage**” as used herein refers an attachment of two atoms of two independent moieties. A preferred linkage is a chemical bond or a plurality of chemical bonds. More preferably, a chemical bond is a covalent bond or a plurality of chemical bonds. Most preferably, the linkage is a covalent bond or a coordinate bond. As preferably used herein, an embodiment of a coordinate bond is a bond or group of bonds as realized when a metal is bound (e.g., chelated) by a chelator. Depending on the type of atoms linked and their atomic environment different types of linkages are created. These types of linkage are defined by the type of atom arrangements created by the linkage.

For instance, the linking of a moiety comprising an amine with a moiety comprising a carboxylic acid leads to a linkage named “amide” (which may also be referred to as amide linkage, -CO-N-, -N-CO-). It will be acknowledged by a person skilled in the art that this and the following examples of creating linkages are only prototypical examples and are by no means limiting the scope of the present invention. It will be acknowledged by a person in the art that the linking of a moiety comprising an isothiocyanate with a moiety comprising an amine leads to a thiourea (which may also be referred to as a thiourea linkage, -N-C(=S)-N-), and linking of a moiety comprising a C atom with a moiety comprising a thiol-group (-C-SH) leads to a thioether (which may also be referred to as a thioether linkage, -C-S-C-). A non-limiting list of linkages as used, for example, in connection with the effector and linker of the invention and their characteristic type of atom arrangement is given Table 2.

Table 2:

Linkage	Characteristic atom arrangement	Linkage	Characteristic atom arrangement
Amide		Ether	
Sulfonamide		Ester	
Urea		Carbamate	
Thioether		Thiourea	
Disulfide		Triazole	

Examples of reactive groups which, in some embodiments of the invention, are used in the formation of linkages, for example between the effector and the linker or directly between the effector and the rest of the compound of the invention (peptide), are summarized in Table 3. It will, however, be understood by a person skilled in the art that neither the linkages which may be realized in embodiments of the present invention are limited to the ones of Table 3 nor the reactive groups forming such linkages.

Table 3:

first reactive group	second reactive group	(type of) linkage
amino	carboxylic acid (carboxyl)	amide
amino	activated carboxylic acid	amide
amino	sulfonyl halide	sulfonamide
amino	isocyanate	urea
amino	p-nitrophenylcarbamate	urea
sulfhydryl	Michael acceptor (e.g. Maleimide)	thioether

first reactive group	second reactive group	(type of) linkage
bromo	sulfhydryl	thioether
isothiocyanate	amino	thiourea
hydroxyl	carboxylic acid (carboxyl)	ester
azide	alkyne	triazole
sulfhydryl	sulfhydryl	disulfide
sulfhydryl	2-Pyridine-disulfide	disulfide
carbonate ester	amino	carbamate
chloroformate	amino	carbamate
bromo	hydroxyl	ether

The following are reactive groups and functionalities which are utilized or amenable of forming linkages between moieties or structures as used in embodiments of the present invention: Primary or secondary amino, carboxylic acid (carboxyl), activated carboxylic acid, chloro, bromo, iodo, sulfhydryl, hydroxyl, sulfonic acid, activated sulfonic acid, sulfonic acid esters like mesylate or tosylate, Michael acceptors, strained alkenes like *trans* cyclooctene, isocyanate, isothiocyanate, azide, alkyne and tetrazine.

The term “**activated carboxylic acid**” as used herein refers to a carboxylic acid group with the general formula -CO-X, wherein X is a leaving group. For example, activated forms of a carboxylic acid group may include, but are not limited to, acyl chlorides, symmetrical or unsymmetrical anhydrides, and esters. Preferably, the activated carboxylic acid group is an ester with pentafluorophenol, nitrophenol, benzotriazole, azabenzotriazole, thiophenol or N-hydroxysuccinimide (NHS) as leaving group.

The expression “**mediating a linkage**” as used herein means that a linkage or a type of linkage is established, preferably a linkage between two moieties. In a preferred embodiment, the linkage and the type of linkage is as defined herein.

Unless indicated otherwise, when it is referred in the present disclosure to a range indicated by a lower integer and a higher integer such as, for example, 1-4, such range is a representation of the lower integer, the higher integer and any integer between the lower integer and the higher

integer. Insofar, the range is actually an individualized disclosure of said integer. In said example, the range of 1-4 thus means 1, 2, 3 and 4.

The term “**alkyl**” as used herein characterizes a saturated, straight-chain or branched hydrocarbon group and may be accompanied by a qualifier which specifies the number of carbon atoms it contains. For example, the expression (C₁-C₃)alkyl means each and individually any of methyl, ethyl, n-propyl and isopropyl. An alkyl group can be unsubstituted or substituted with one or more groups, including, but not limited to, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl. If the alkyl group comprises CH₂ groups, a CH₂ group can optionally be replaced by an S or O atom.

The term “**(C₁-C₂)alkyl**” as used herein refers any of methyl and ethyl.

The term “**(C₁-C₃)alkyl**” as used herein refers to any of methyl, ethyl, n-propyl and isopropyl.

The term “**(C₁-C₄)alkyl**” as used herein refers to a saturated or unsaturated, straight-chain or branched hydrocarbon group having from 1 to 4 carbon atoms. Representative examples of (C₁-C₄)alkyl include, but are not limited to, any of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, *sec*-butyl and *tert*-butyl.

The term “**(C₁-C₆)alkyl**” as used herein refers to a saturated or unsaturated, straight-chain or branched hydrocarbon group having from 1 to 6 carbon atoms. Representative examples of (C₁-C₆)alkyl include, but are not limited to, any of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, *sec*-butyl, *tert*-butyl, n-pentyl, 2-pentyl, 2-methyl-butyl, 3-methyl-butyl, 3-methyl-but-2-yl, 2-methyl-but-2-yl, 2,2-dimethylpropyl, n-hexyl, 2-hexyl, 2-methyl-pentyl, 3-methyl-pentyl, 4-methyl-pentyl, 3-hexyl, 2-ethyl-butyl, 2-methyl-pent-2-yl, 2,2-dimethyl-butyl, 3,3-dimethyl-butyl, 3-methyl-pent-2-yl, 4-methyl-pent-2-yl, 2,3-dimethyl-butyl, 3-methyl-pent-3-yl, 2-methyl-pent-3-yl, 2,3-dimethyl-but-2-yl and 3,3-dimethyl-but-2-yl. A (C₁-C₆)alkyl group can be unsubstituted or substituted with one or more groups, including, but not limited to, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl.

The term “**(C₁-C₈)alkyl**” as used herein refers to a saturated or unsaturated, straight-chain or branched hydrocarbon group having from 1 to 8 carbon atoms. Representative (C₁-C₈)alkyl groups include, but are not limited to, any of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, *sec*-butyl, *tert*-butyl, n-pentyl, 2-pentyl, 2-methyl-butyl, 3-methyl-butyl, 3-pentyl, 3-

methyl-but-2-yl, 2-methyl-but-2-yl, 2,2-dimethylpropyl, n-hexyl, 2-hexyl, 2-methyl-pentyl, 3-methyl-pentyl, 4-methyl-pentyl, 3-hexyl, 2-ethyl-butyl, 2-methyl-pent-2-yl, 2,2-dimethyl-butyl, 3,3-dimethyl-butyl, 3-methyl-pent-2-yl, 4-methyl-pent-2-yl, 2,3-dimethyl-butyl, 3-methyl-pent-3-yl, 2-methyl-pent-3-yl, 2,3-dimethyl-but-2-yl, 3,3-dimethyl-but-2-yl, n-heptyl,

5 2-heptyl, 2-methyl-hexyl, 3-methyl-hexyl, 4-methyl-hexyl, 5-methyl-hexyl, 3-heptyl, 2-ethyl-pentyl, 3-ethyl-pentyl, 4-heptyl, 2-methyl-hex-2-yl, 2,2-dimethyl-pentyl, 3,3-dimethyl-pentyl, 4,4-dimethyl-pentyl, 3-methyl-hex-2-yl, 4-methyl-hex-2-yl, 5-methyl-hex-2-yl, 2,3-dimethyl-pentyl, 2,4-dimethyl-pentyl, 3,4-dimethyl-pentyl, 3-methyl-hex-3-yl, 2-ethyl-2-methyl-butyl, 4-methyl-hex-3-yl, 5-methyl-hex-3-yl, 2-ethyl-3-methyl-butyl, 2,3-dimethyl-pent-2-yl,

10 2,4-dimethyl-pent-2-yl, 3,3-dimethyl-pent-2-yl, 4,4-dimethyl-pent-2-yl, 2,2,3-trimethyl-butyl, 2,3,3-trimethyl-butyl, 2,3,3-trimethyl-but-2-yl, n-octyl, 2-octyl, 2-methyl-heptyl, 3-methyl-heptyl, 4-methyl-heptyl, 5-methyl-heptyl, 6-methyl-heptyl, 3-octyl, 2-ethyl-hexyl, 3-ethyl-hexyl, 4-ethyl-hexyl, 4-octyl, 2-propyl-pentyl, 2-methyl-hept-2-yl, 2,2-dimethyl-hexyl, 3,3-dimethyl-hexyl, 4,4-dimethyl-hexyl, 5,5-dimethyl-hexyl, 3-methyl-hept-2-yl,

15 4-methyl-hept-2-yl, 5-methyl-hept-2-yl, 6-methyl-hept-2-yl, 2,3-dimethyl-hex-1-yl, 2,4-dimethyl-hex-1-yl, 2,5-dimethyl-hex-1-yl, 3,4-dimethyl-hex-1-yl, 3,5-dimethyl-hex-1-yl, 3,5-dimethyl-hex-1-yl, 3-methyl-hept-3-yl, 2-ethyl-2-methyl-1-yl, 3-ethyl-3-methyl-1-yl, 4-methyl-hept-3-yl, 5-methyl-hept-3-yl, 6-methyl-hept-3-yl, 2-ethyl-3-methyl-pentyl, 2-ethyl-4-methyl-pentyl, 3-ethyl-4-methyl-pentyl, 2,3-dimethyl-hex-2-yl, 2,4-dimethyl-hex-2-yl,

20 yl, 2,5-dimethyl-hex-2-yl, 3,3-dimethyl-hex-2-yl, 3,4-dimethyl-hex-2-yl, 3,5-dimethyl-hex-2-yl, 4,4-dimethyl-hex-2-yl, 4,5-dimethyl-hex-2-yl, 5,5-dimethyl-hex-2-yl, 2,2,3-trimethyl-pentyl, 2,2,4-trimethyl-pentyl, 2,3,3-trimethyl-pentyl, 2,3,4-trimethyl-pentyl, 2,4,4-trimethyl-pentyl, 3,3,4-trimethyl-pentyl, 3,4,4-trimethyl-pentyl, 2,3,3-trimethyl-pent-2-yl, 2,3,4-trimethyl-pent-2-yl, 2,4,4-trimethyl-pent-2-yl, 3,4,4-trimethyl-pent-2-yl, 2,2,3,3-tetramethyl-

25 butyl, 3,4-dimethyl-hex-3-yl, 3,5-dimethyl-hex-3-yl, 4,4-dimethyl-hex-3-yl, 4,5-dimethyl-hex-3-yl, 5,5-dimethyl-hex-3-yl, 3-ethyl-3-methyl-pent-2-yl, 3-ethyl-4-methyl-pent-2-yl, 3-ethyl-hex-3-yl, 2,2-diethyl-butyl, 3-ethyl-3-methyl-pentyl, 4-ethyl-hex-3-yl, 5-methyl-hept-3-yl, 2-ethyl-3-methyl-pentyl, 4-methyl-hept-4-yl, 3-methyl-hept-4-yl, 2-methyl-hept-4-yl, 3-ethyl-hex-2-yl, 2-ethyl-2-methyl-pentyl, 2-isopropyl-pentyl, 2,2-dimethyl-hex-3-yl, 2,2,4-trimethyl-pent-3-yl and 2-ethyl-3-methyl-pentyl. A (C₁-C₈)alkyl group can be unsubstituted or substituted

30 with one or more groups, including, but not limited to, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl.

The term “(C₂-C₄)alkyl” as used herein refers to a saturated or unsaturated, straight-chain or branched hydrocarbon group having from 2 to 4 carbon atoms. Representative examples of (C₂-C₄)alkyl include, but are not limited to, any of ethyl, n-propyl, isopropyl, n-butyl, isobutyl, *sec*-butyl and *tert*-butyl.

- 5 The term “(C₃-C₅)alkyl” as used herein refers to a saturated or unsaturated, straight-chain or branched hydrocarbon group having from 3 to 4 carbon atoms. Representative examples of (C₃-C₄)alkyl include, but are not limited to, any of n-propyl, isopropyl, n-butyl, isobutyl, *sec*-butyl, *tert*-butyl, n-pentyl, 2-pentyl, 2-methyl-butyl, 3-methyl-butyl, 3-pentyl, 3-methyl-but-2-yl, 2-methyl-but-2-yl and 2,2-dimethylpropyl. A (C₃-C₅)alkyl group can be unsubstituted or
- 10 substituted with one or more groups, including, but not limited to, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl.

- The term “(C₃-C₈)alkyl” as used herein refers to a saturated or unsaturated, straight-chain or
- 15 branched hydrocarbon group having from 3 to 8 carbon atoms. Representative (C₃-C₈)alkyl groups include, but are not limited to, any of n-propyl, isopropyl, n-butyl, isobutyl, *sec*-butyl, *tert*-butyl, n-pentyl, 2-pentyl, 2-methyl-butyl, 3-methyl-butyl, 3-pentyl, 3-methyl-but-2-yl, 2-methyl-but-2-yl, 2,2-dimethylpropyl, n-hexyl, 2-hexyl, 2-methyl-pentyl, 3-methyl-pentyl, 4-methyl-pentyl, 3-hexyl, 2-ethyl-butyl, 2-methyl-pent-2-yl, 2,2-dimethyl-butyl, 3,3-dimethyl-
- 20 butyl, 3-methyl-pent-2-yl, 4-methyl-pent-2-yl, 2,3-dimethyl-butyl, 3-methyl-pent-3-yl, 2-methyl-pent-3-yl, 2,3-dimethyl-but-2-yl, 3,3-dimethyl-but-2-yl, n-heptyl, 2-heptyl, 2-methyl-hexyl, 3-methyl-hexyl, 4-methyl-hexyl, 5-methyl-hexyl, 3-heptyl, 2-ethyl-pentyl, 3-ethyl-pentyl, 4-heptyl, 2-methyl-hex-2-yl, 2,2-dimethyl-pentyl, 3,3-dimethyl-pentyl, 4,4-dimethyl-pentyl, 3-methyl-hex-2-yl, 4-methyl-hex-2-yl, 5-methyl-hex-2-yl, 2,3-dimethyl-pentyl,
- 25 2,4-dimethyl-pentyl, 3,4-dimethyl-pentyl, 3-methyl-hex-3-yl, 2-ethyl-2-methyl-butyl, 4-methyl-hex-3-yl, 5-methyl-hex-3-yl, 2-ethyl-3-methyl-butyl, 2,3-dimethyl-pent-2-yl, 2,4-dimethyl-pent-2-yl, 3,3-dimethyl-pent-2-yl, 4,4-dimethyl-pent-2-yl, 2,2,3-trimethyl-butyl, 2,3,3-trimethyl-butyl, 2,3,3-trimethyl-but-2-yl, n-octyl, 2-octyl, 2-methyl-heptyl, 3-methyl-heptyl, 4-methyl-heptyl, 5-methyl-heptyl, 6-methyl-heptyl, 3-octyl, 2-ethyl-hexyl,
- 30 3-ethyl-hexyl, 4-ethyl-hexyl, 4-octyl, 2-propyl-pentyl, 2-methyl-hept-2-yl, 2,2-dimethyl-hexyl, 3,3-dimethyl-hexyl, 4,4-dimethyl-hexyl, 5,5-dimethyl-hexyl, 3-methyl-hept-2-yl, 4-methyl-hept-2-yl, 5-methyl-hept-2-yl, 6-methyl-hept-2-yl, 2,3-dimethyl-hex-1-yl, 2,4-dimethyl-hex-1-yl, 2,5-dimethyl-hex-1-yl, 3,4-dimethyl-hex-1-yl, 3,5-dimethyl-hex-1-yl, 3,5-dimethyl-hex-1-yl, 3-methyl-hept-3-yl, 2-ethyl-2-methyl-1-yl, 3-ethyl-3-methyl-1-yl,

4-methyl-hept-3-yl, 5-methyl-hept-3-yl, 6-methyl-hept-3-yl, 2-ethyl-3-methyl-pentyl, 2-ethyl-4-methyl-pentyl, 3-ethyl-4-methyl-pentyl, 2,3-dimethyl-hex-2-yl, 2,4-dimethyl-hex-2-yl, 2,5-dimethyl-hex-2-yl, 3,3-dimethyl-hex-2-yl, 3,4-dimethyl-hex-2-yl, 3,5-dimethyl-hex-2-yl, 4,4-dimethyl-hex-2-yl, 4,5-dimethyl-hex-2-yl, 5,5-dimethyl-hex-2-yl, 2,2,3-trimethyl-pentyl, 2,2,4-trimethyl-pentyl, 2,3,3-trimethyl-pentyl, 2,3,4-trimethyl-pentyl, 2,4,4-trimethyl-pentyl, 3,3,4-trimethyl-pentyl, 3,4,4-trimethyl-pentyl, 2,3,3-trimethyl-pent-2-yl, 2,3,4-trimethyl-pent-2-yl, 2,4,4-trimethyl-pent-2-yl, 3,4,4-trimethyl-pent-2-yl, 2,2,3,3-tetramethyl-butyl, 3,4-dimethyl-hex-3-yl, 3,5-dimethyl-hex-3-yl, 4,4-dimethyl-hex-3-yl, 4,5-dimethyl-hex-3-yl, 5,5-dimethyl-hex-3-yl, 3-ethyl-3-methyl-pent-2-yl, 3-ethyl-4-methyl-pent-2-yl, 3-ethyl-hex-3-yl, 2,2-diethyl-butyl, 3-ethyl-3-methyl-pentyl, 4-ethyl-hex-3-yl, 5-methyl-hept-3-yl, 2-ethyl-3-methyl-pentyl, 4-methyl-hept-4-yl, 3-methyl-hept-4-yl, 2-methyl-hept-4-yl, 3-ethyl-hex-2-yl, 2-ethyl-2-methyl-pentyl, 2-isopropyl-pentyl, 2,2-dimethyl-hex-3-yl, 2,2,4-trimethyl-pent-3-yl and 2-ethyl-3-methyl-pentyl. A (C₃-C₈)alkyl group can be unsubstituted or substituted with one or more groups, including, but not limited to, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl.

The term “**carbocycle**” as used herein refers to a saturated or unsaturated non-aromatic hydrocarbon ring and is usually accompanied by a qualifier which specifies the number of carbon atoms it may contain. For example, representative (C₃-C₄)carbocycles include but are not limited to any of a cyclopropyl and cyclobutyl group. A carbocycle may contain one ring or two or more rings that are fused together. A carbocycle can be unsubstituted or substituted with one or more groups, including, but not limited to, -(C₁-C₈)alkyl, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl. A ring CH₂ group of the carbocycle can optionally be replaced by an S or O atom.

The term “**heterocycle**” as used herein refers to a saturated or unsaturated non-aromatic heterocyclic ring and is usually accompanied by a qualifier which specifies the number of carbon atoms it may contain. For example, representative (C₅-C₆)heterocycles include but are not limited to any of a tetrahydrofuranyl, tetrahydrothiophenyl, pyrrolidinyl, oxathiolanyl, sulfolanyl, thianyl, tetrahydropyranyl, piperidinyl, morpholinyl, thiomorpholinyl, dioxanyl, dithianyl and trithianyl group. A heterocycle may contain one ring or two or more rings that are fused together, preferably it contains one ring.

The term “**(C₃-C₄)carbocycle**” as used herein refers to a 3- or 4-membered saturated or unsaturated non-aromatic carbocyclic ring. Representative (C₃-C₄)carbocycles include, but are not limited to, any of a cyclopropyl, cyclobutyl, and cyclobutenyl group. A (C₃-C₄)carbocycle group can be unsubstituted or substituted with one or more groups, including, but not limited to, (C₁-C₈)alkyl, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl. A CH₂ group of the (C₃-C₄)carbocycle ring can optionally be replaced by an S or O atom.

The term “**(C₃-C₇)carbocycle**” as used herein refers to a 3-, 4-, 5-, 6- or 7-membered saturated or unsaturated non-aromatic carbocyclic ring. Representative (C₃-C₇)carbocycles include, but are not limited to, any of a cyclopropyl, cyclobutyl, cyclobutenyl, cyclopentyl, cyclopentadienyl, cyclohexyl, cyclohexenyl, 1,3-cyclohexadienyl, 1,4-cyclohexadienyl, cycloheptyl, 1,3-cycloheptadienyl and 1,3,5-cycloheptatrienyl group. A (C₃-C₇)carbocycle group can be unsubstituted or substituted with one or more groups, including, but not limited to, (C₁-C₈)alkyl, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl. A CH₂ group of the (C₃-C₇)carbocycle ring can optionally be replaced by an S or O atom.

The term “**(C₅-C₆)carbocycle**” as used herein refers to a 5- or 6-membered saturated or unsaturated non-aromatic carbocyclic ring. Representative (C₅-C₆)carbocycles include, but are not limited to, any of a cyclopentyl, cyclopentenyl, cyclopentadienyl, cyclohexyl, cyclohexenyl, 1,3-cyclohexadienyl and 1,4-cyclohexadienyl group. A (C₅-C₆)carbocycle group can be unsubstituted or substituted with one or more groups, including, but not limited to, (C₁-C₈)alkyl, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl. A CH₂ group of the (C₅-C₆)carbocycle ring can optionally be replaced by an S or O atom. The term “**(C₁-C₆)alkylamine**” as used herein refers to a saturated or unsaturated, straight-chain, branched or cyclic hydrocarbon group having from 1 to 6 carbon atoms, which is substituted with one -NH₂ group. Representative (C₁-C₆)alkylamines include, but are not limited to, any of cyclohexylamine, cyclopentylamine, cyclobutylamine, n-hexylamine, n-pentylamine, n-butylamine, n-propylamine, n-ethylamine, methylamine, isopropylamine, isobutylamine, isopentylamine, isohexylamine, tert-butylamine, neopentylamine and neohexylamine.

The term “**(C₂-C₆)alkyldiamine**” as used herein refers to a saturated or unsaturated, straight-chain, branched or cyclic hydrocarbon group having from 1 to 6 carbon atoms, which is substituted with two -NH₂ groups, preferably in vicinal positions. Representative (C₂-C₆)alkyldiamines include, but are not limited to, any of ethylenediamine, 1,2-diaminopropane, 1,2-diaminobutane, 1,2-diaminopentane, 1,2-diaminohexane, 2,3-diaminobutane, 2,3-diaminopentane, 2,3-diaminohexane, 3,4-diaminohexane, 1,2-diaminocyclohexane, 1,2-diaminocyclopentane and 1,2-diaminocyclobutane.

The term “**aliphatic**” as used herein refers to an alkyl or carbocycle group as defined herein.

The term “**(C₃-C₇)heterocycle**” as used herein refers to a 3-, 4-, 5-, 6- or 7-membered saturated or unsaturated non-aromatic heterocyclic ring. Representative (C₃-C₇)heterocycles include, but are not limited to, any of a aziridinyl, oxiranyl, thiiranyl, azetidiny, oxetanyl, thietanyl, tetrahydrofuranyl, tetrahydrothiophenyl, pyrrolidinyl, oxathiolanyl, sulfolanyl, thianyl, tetrahydropyranyl, piperidinyl, morpholinyl, thiomorpholinyl, dioxanyl, dithianyl, trithianyl, oxepanyl, thiepanyl and azepanyl, group. A (C₃-C₇)heterocycle group can be unsubstituted or substituted with one or more groups, including, but not limited to, (C₁-C₈)alkyl, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl.

The term “**aryl**” or “**aryl ring**” as used herein refers to a carbocyclic aromatic group, wherein the carbocyclic aromatic group is selected from the group consisting of aromatic groups with a single ring and aromatic groups with two or more fused rings, preferably two rings. Examples of carbocyclic aromatic groups with a single benzene ring include, but are not limited to, phenyl, and examples of carbocyclic aromatic groups with two or more fused benzene rings include, but are not limited to naphthyl and anthracenyl. For example, representative (C₆-C₁₀)aryl groups include but are not limited to any of a phenyl and naphthyl group. A carbocyclic aromatic group can be unsubstituted or substituted with one or more groups including, but not limited to, -(C₁-C₈)alkyl, -O-[(C₁-C₈)alkyl], -aryl, -CO-R', -O-CO-R', -CO-OR', -CO-NH₂, -CO-NHR', -CO-NR'₂, -NH-CO-R', -SO₂-R', -SO-R', -OH, -halogen, -N₃, -NH₂, -NHR', -NR'₂ and -CN; where each R' is independently selected from -(C₁-C₈)alkyl and aryl. In a more preferred embodiment the carbocyclic aromatic group comprises two of the aforementioned one or more substituent groups, wherein the first of said two groups is attached to a first ring atom of the carbocyclic aromatic group, and the second of said two groups is attached either to a second ring atom of the carbocyclic aromatic group directly adjacent to said first ring atom or to a second ring atom

of the carbocyclic aromatic group, the second ring atom being separated from the first ring atom by a further ring atom.

The term “**heteroaryl**” or “**heteroaryl ring**” as used herein refers to a heterocyclic aromatic group, wherein the heterocyclic aromatic group is selected from the group consisting of heterocyclic aromatic groups with a single ring and heterocyclic aromatic group with two or more fused rings, preferably two rings. Examples of heterocyclic aromatic groups with a single ring include, but are not limited to, furanyl, thienyl, pyrrolyl, pyrazolyl, oxazolyl, thiazolyl, imidazolyl, pyridinyl pyrimidinyl and examples of heterocyclic aromatic groups with two or more fused rings include, but are not limited to benzothiophenyl, benzofuranyl, indolyl and quinolinyl. A heterocyclic aromatic group can be unsubstituted or substituted with one or more groups including, but not limited to, $-(C_1-C_8)alkyl$, $-O-[(C_1-C_8)alkyl]$, $-aryl$, $-CO-R'$, $-O-CO-R'$, $-CO-OR'$, $-CO-NH_2$, $-CO-NHR'$, $-CO-NR'_2$, $-NH-CO-R'$, $-SO_2-R'$, $-SO-R'$, $-OH$, $-halogen$, $-N_3$, $-NH_2$, $-NHR'$, $-NR'_2$ and $-CN$, wherein each R' is independently selected from $-(C_1-C_8)alkyl$ and $aryl$. In a more preferred embodiment the heterocyclic aromatic group comprises two of the aforementioned one or more substituent groups, wherein the first of said two groups is attached to a first ring atom of the heterocyclic aromatic group, and the second of said two groups is attached either to a second ring atom of the heterocyclic aromatic group directly adjacent to said first ring atom or to a second ring atom of the heterocyclic aromatic group, the second ring atom being separated from the first ring atom by a further ring atom.

The expression “**hydrophobic group**” as used herein refers to a group that comprises an aliphatic, a heterocyclic, an aryl or a heteroaryl group as defined herein wherein the ratio of heteroatoms to carbon atoms is up to 1:3 and wherein said aliphatic, heterocyclic, aryl or heteroaryl group each and individually can be substituted by no more than one polar or charged group, preferably no polar or charged group is present. Representative hydrophobic groups include, but are not limited to, any of an ethyl, n-propyl, iso-propyl, n-butyl, isobutyl, t-butyl, phenyl, naphthyl, thienyl, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, thietanyl, tetrahydrothiophenyl and thianyl.

The expression “**hydrophobic side chain**” as used herein refers to a side chain wherein the side chain comprises a “hydrophobic group” as defined herein.

The expressions “**aromatic residue**” or/and “**aromatic ring**” as used herein refer to an aryl as defined herein.

The expression “**aromatic side chain**” as used herein refers to a side chain wherein the side chain comprises an “aromatic ring” as defined herein.

The expression “**bicyclic aromatic ring**” as used herein refers to an aryl as defined herein, wherein the carbocyclic aromatic group of the aryl is selected from the group of aromatic groups with two or more fused rings, preferably two rings.

The expression “**bicyclic aromatic side chain**” as used herein refers to a side chain wherein
5 the side chain comprises a “bicyclic aromatic ring” as defined herein.

The term “**polar group**” as used herein refers to a group of atoms that feature an uneven distribution of electrons between them due to differences in the electronegativity between the elements of a bond. Elements with higher electronegativity can withdraw bonding electrons from their neighbour, resulting in that the former presents a partial negative charge and the
10 latter a partial positive charge. Polar groups typically contain one or more atoms selected from the group consisting of O, N, S and P. Examples of polar groups include, but are not limited to, -OH, -OR', -CONH₂, -CO-NHR', -CO-NR'R'', -NHC(O)NH₂, -NHC(NH)NH₂, -COOH, -O-CO-R', -CO-OR', -SO₃H, SO₃R', -CN, -NH₂, -NHR', -NR'R'', -SO-, -SO₂-, -SO₂NH₂, -NO₂, -P(O)(OH)₂, and tetrazole, wherein each R' and R'' independently represent a group
15 comprising one or more atoms selected from C, N, O, and S, preferably a group selected from -(C₁-C₈)alkyl and aryl. Preferred examples of polar groups as used herein include -OH, -OR', -CONH₂, -CO-NHR', -CO-NR'R'', -NHC(O)NH₂, -NHC(NH)NH₂, -COOH, -O-CO-R', -CO-OR', -SO₃H, -SO₃R', -CN, -NH₂, -NHR', -NR'R'', -SO-, -SO₂-, -SO₂NH₂, -NO₂, -P(O)(OH)₂, and tetrazole, wherein each of R and R' is independently selected from -(C₁-C₈)alkyl and aryl.
20 More preferred examples of polar groups as used herein include -OH, -CONH₂, -COOH, -SO₃H, -CN, -NH₂, -SO-, -SO₂-, and NO₂.

The expression “**polar side chain**” as used herein refers to a side chain wherein the side chain comprises an “polar group” as defined herein.

The expression “**charged group**” as used herein refers to a functional group which can be
25 charged at a certain pH, esp. in the range of 4 to 8. Examples of groups that can be positively charged include, but are not limited to, guanidine, ammonium and amino nitrogen. Examples of groups that can be negatively charged include, but are not limited to, COOH, phosphate, phosphonate, sulfate and sulfonate.

The expression “**positively charged side chain**” as used herein refers to a side chain wherein
30 the side chain comprises an “positively charged group” as defined herein, and the expression “**negatively charged side chain**” refers to a side chain wherein the side chain comprises an “negatively charged group” as defined herein.

Unless specified otherwise, atoms with unspecified atomic mass numbers in any structural formula or in any passage of the instant specification including the claims are either of unspecified isotopic composition, naturally occurring mixtures of isotopes or individual isotopes. This applies in particular to carbon, oxygen, nitrogen, sulfur, phosphorus, halogens
5 and metal atoms, including but not limited to C, O, N, S, F, P, Cl, Br, At, Sc, Cr, Mn, Co, Fe, Cu, Ga, Sr, Zr, Y, Mo, Tc, Ru, Rh, Pd, Pt, Ag, In, Sb, Sn, Te, I, Pr, Pm, Dy, Sm, Gd, Tb, Ho, Dy, Er, Yb, Tm, Lu, Sn, Re, Rd, Os, Ir, Au, Pb, Bi, Po, Fr, Ra, Ac, Th and Fm.

The term “**chelator**” as used herein refers to a compound or a moiety which is capable of forming a chelate, whereby a chelate is a compound or a moiety, preferably a cyclic compound
10 wherein a metal or a moiety having an electron gap or a lone pair of electrons participates in the formation of the ring. More preferably, a chelator is a kind of compound or moiety wherein a single ligand occupies more than one coordination site at a central atom or ion.

The expression “**Z group**” (or “group Z”, or “group Zⁿ” with n=1 to 9) as used herein refers to an effector, such as a chelator, which optionally comprises a linker that covalently links the
15 effector to the rest of the compound (peptide). The group and position, respectively, of the compound of the invention where a Z group may be covalently attached, is also referred to herein as Z group attachment point.

In accordance with the present invention, Z group attachment points are in particular one or more of the following ones: the N-terminal modification group Nmod which comprises an
20 attachment point for one Z group (Z^{1a}); the side chain of Xaa1 which comprises an attachment point for one Z group (Z^{1b}); the side chain of Xaa3 comprising an attachment point for one Z group (Z²); the side chain of Xaa5 comprising an attachment point for one Z group (Z³); the side chain of Xaa6 comprising an attachment point for one Z group (Z⁴); the side chain of Xaa8 comprising an attachment point for one Z group (Z⁵); the side chain of Xaa9 comprising an
25 attachment point for one Z group (Z⁶); the side chain of Xaa10 comprising an attachment point for one Z group (Z⁷); the side chain of Xaa11 comprising an attachment point for one Z group (Z⁸); and the carbonyl group of Xaa7, Xaa8, Xaa9, Xaa10, Xaa11 which provide an attachment point for the C-terminal modification group Cterm, which can comprise or consist of one Z-group (Z⁹).

30 More preferred Z group attachment points are one or more, i.e., one, two or three, of the following ones: the side chain of Xaa5 comprising one Z-group (Z³); the side chain of Xaa6 comprising one Z group (Z⁴), and the side chain of Xaa8 comprising one Z-group (Z⁵). An even more preferred Z group attachment point is the side chain of Xaa5 comprising one Z group (Z³).

As will be appreciated by a person skilled in the art, the chemical nature of the effector and of the linker, if present, define the kind of amino acid residue to be used for attaching any one of them to the compound of the invention. Typically, the effector and the linker, if present, comprise a functional group suitable for reacting with another functional group in the amino acid residue, whereby such functional group is preferably selected from the group comprising a carboxylic acid group and an amino group.

The term “**amino acid residue**” as used herein refers to all atoms of an amino acid, which remain in a peptide chain after the combination of said amino acid with one or more other amino acids, an N-terminal end group, an N-terminal modification group Nmod, a C-terminal modification group C-term, a C-terminal end group and/or a Z group to the α -nitrogen atom and/or the carbonyl group of said amino acid.

The term “**N-terminal end group**” as used herein refers to an atom or moiety that is covalently attached to the N atom of the N-terminus of the peptide chain or to the N atom of the N-terminus of an amino acid residue and is usually an N-terminal blocking group or simply an H atom. N-terminal blocking groups when attached to the peptide N-terminus cap the peptide N-terminus and prevent elongation of the peptide chain in N-terminal direction during synthesis. Representative N-terminal blocking groups include, but are not limited to, any of an acetyl group, hexyl group, n-butyloxycarbonyl group (Boc), allyloxycarbonyl (Alloc), 9-fluorenylmethoxycarbonyl (Fmoc), n-butylcarbamoyl group and n-butylsulfonyl group. If a peptide or an amino acid has a free N-terminus, the N-terminal end group is an H atom. In contrast, the term “**N-terminal modification group**” (also referred to as “Nmod”) as used herein refers specifically to a moiety that is covalently attached to the α -nitrogen atom of Xaa1 and is different from the N-terminal end group attached to Xaa1 which is an H atom in compounds of formula (I).

The term “**C-terminal end group**” as used herein refers to a moiety that is covalently attached to the C atom of the carbonyl group of the C-terminal (last) amino acid residue of the peptide chain and is usually NH₂ or OH. In contrast, the term “**C-terminal modification group**” (also referred to as “Cterm”) as used herein refers to a moiety that can be covalently attached to the carboxy terminus of the peptide chain of formula (I), i.e., specifically to the C atom of the carbonyl group of Xaa7, Xaa8, Xaa9, Xaa10, or Xaa11. If Cterm is a Z group (i.e. a group Z⁹), Cterm can comprise a linker to which a chelator is covalently attached, e.g. Cterm can be the Z group -Ttds-Lys(DOTA)-NH₂ attached to the carbonyl group of Xaa11, wherein the C-terminal

end group is -NH₂ which is attached to the carbonyl group of the very C-terminal Lys(DOTA) residue.

The terms “**L-configuration**” and “**D-configuration**” as used herein refer to the stereo configuration of the α -carbon atom of an α -amino acid or a residue of an α -amino acid. The same nomenclature can be used accordingly for an α -hydroxy acid or a residue of an α -hydroxy acid.

The term “**side chain**” as used herein refers to all atoms of an amino acid residue that are not comprised in the “main chain” (or “backbone”) portion of said amino acid residue. The “main chain” refers to the structure that is formed by the consecutive connection of at least a first amino acid and a second amino acid, whereby the α -nitrogen atom of an α -amino acid being the second amino acid, the β -nitrogen atom of a β -amino acid being the second amino acid, the γ -nitrogen of a γ -amino acid being the second amino acid, the δ -nitrogen atom of a δ -amino acid being the second amino acid, the ϵ -nitrogen of an ϵ -amino acid being the second amino acid or the ω -nitrogen of an ω -amino acid being the second amino acid is connected or covalently linked to the C-1 carbonyl group of a preceding amino acid being the first amino acid.

The term “**linking**”, “**linked**” or “**link**” as used herein refers to or describes a scenario, where two or more moieties are connected either directly or indirectly with an interspersed group. Typically, and as preferably used herein, such moieties are an effector, such as a chelator, and an amino acid residue. In a more preferred embodiment, such interspersed group is a linker.

The term “**interspersed**” as used herein refers to or describes a scenario in which a group, preferably a linker, is inserted between a first moiety and a second moiety. Such moieties, for example, can be an amino acid residue and an effector such as a chelator. The inserted group is covalently attached to both of the moieties.

Compounds of the invention typically contain amino acid sequences as provided herein. Conventional amino acids, also referred to as natural amino acids are identified according to their standard three-letter codes, as set forth in Table 4.

Table 4: Conventional amino acids and their abbreviations

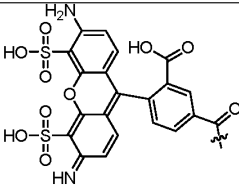
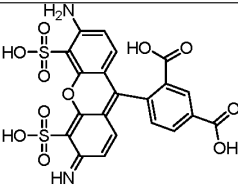
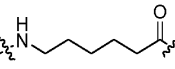
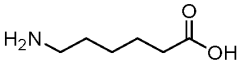
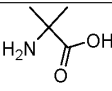
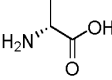
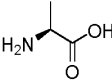
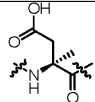
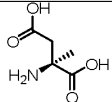
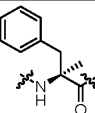
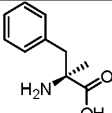
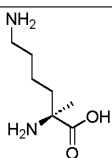
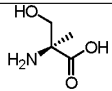
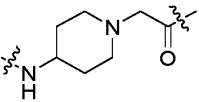
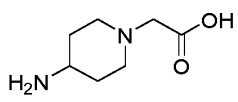
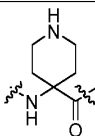
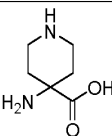
3-letter codes	Amino acid	3-letter codes	Amino acid
Ala	Alanine	Met	Methionine
Cys	Cysteine	Asn	Asparagine
Asp	Aspartic acid	Pro	Proline
Glu	Glutamic acid	Gln	Glutamine
Phe	Phenylalanine	Arg	Arginine
Gly	Glycine	Ser	Serine
His	Histidine	Thr	Threonine
Ile	Isoleucine	Val	Valine
Lys	Lysine	Trp	Tryptophan
Leu	Leucine	Tyr	Tyrosine

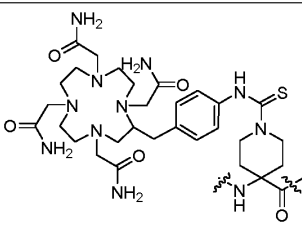
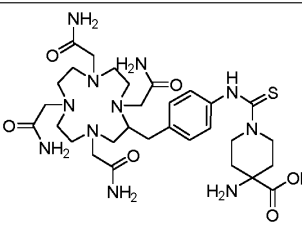
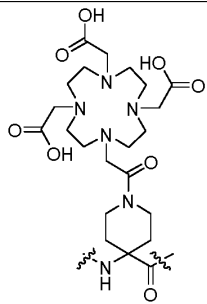
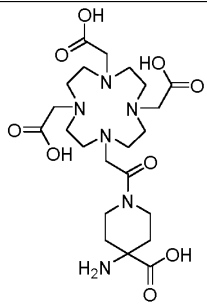
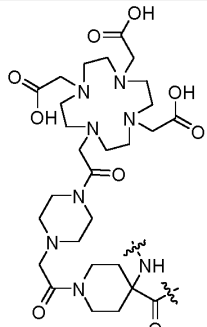
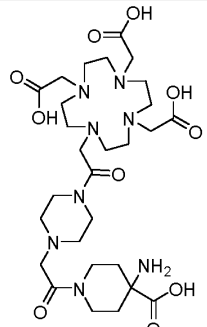
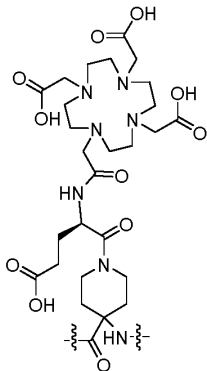
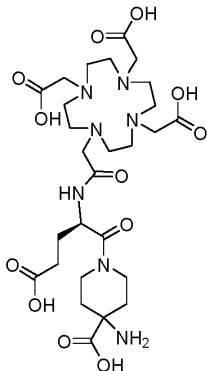
A “**non-conventional amino acid**”, also referred to as “**non-natural amino acid**”, is any kind of non-oligomeric compound, which comprises an amino group and a carboxylic group and is not a conventional amino acid.

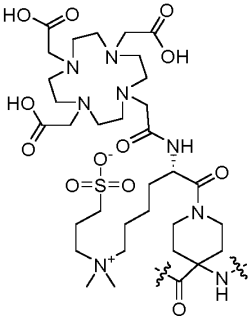
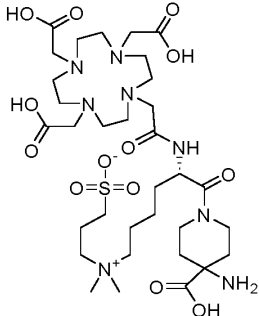
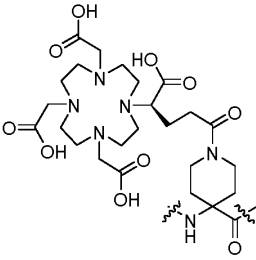
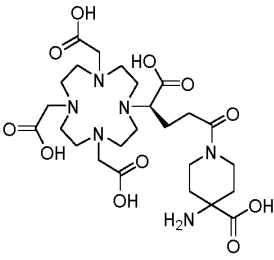
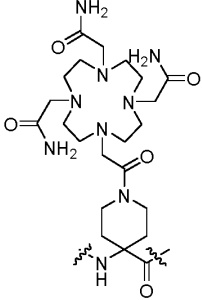
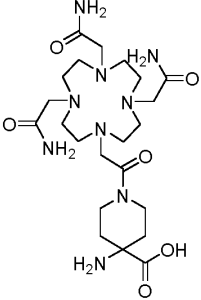
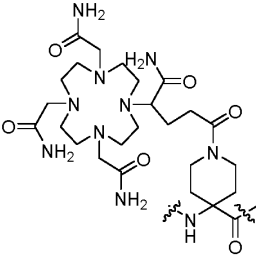
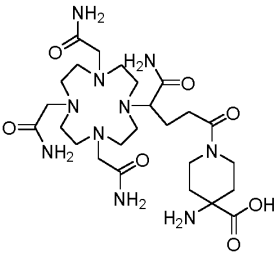
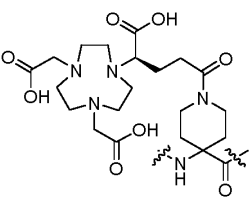
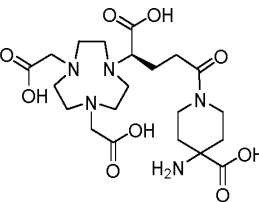
Examples of conventional amino acids, non-conventional amino acids and other building blocks as used for the description of compounds of the invention are identified according to their abbreviation or name found in Table 5. The structures of some building blocks are depicted as residues of the corresponding amino acids (amino acid residues) or these building blocks are shown as residue, which is completely attached to another structure like a peptide or amino acid residue. Structures of amino acids are shown as building blocks and as residues of the corresponding amino acids how they are present after implementation in the peptide sequence. Some larger chemical moieties consisting of more than one moiety are also shown for the reason of clarity (e.g. Apc(DOTA)).

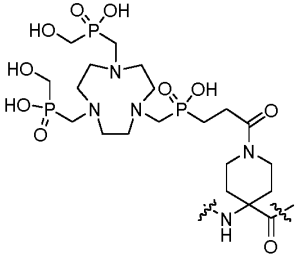
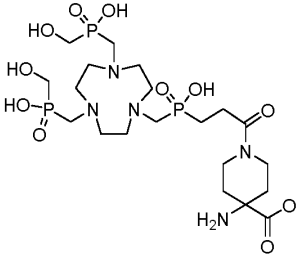
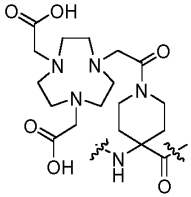
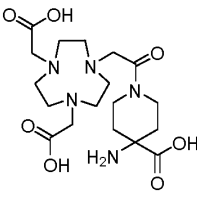
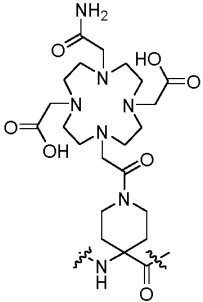
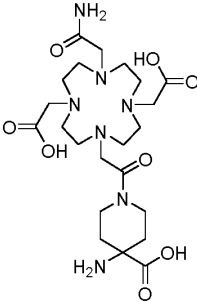
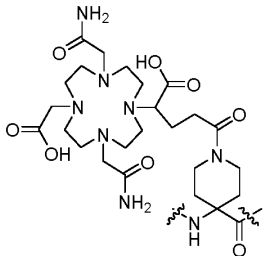
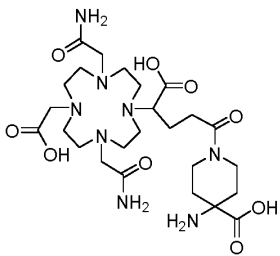
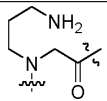
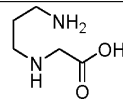
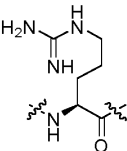
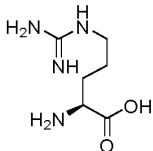
Table 5: Abbreviation, name and structure of non-natural amino-acid and other building blocks and chemical moieties

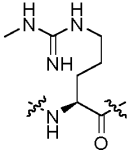
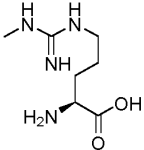
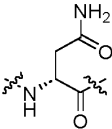
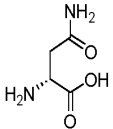
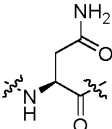
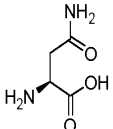
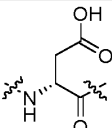
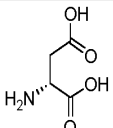
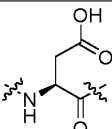
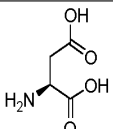
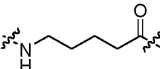
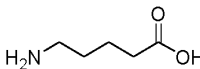
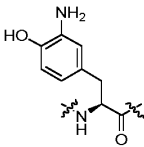
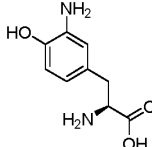
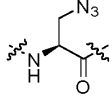
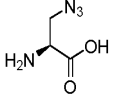
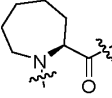
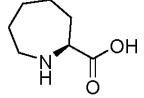
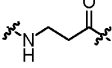
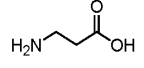
Abbr.	Name	Residue	Building Block
1Ni	3-(1-naphthyl)-L-alanine		
2Ni	3-(2-naphthyl)-L-alanine		
4Amc	tranexamic acid		
6Clw	6-chloro-L-tryptophan		
7Clw	7-chloro-L-tryptophan		
Abu	2S-aminobutyric acid		
Ac	Acetyl		
Aeg	(2-aminoethyl) glycine		
Af3	3-amino-L-phenylalanine		

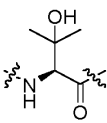
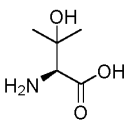
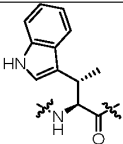
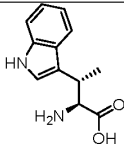
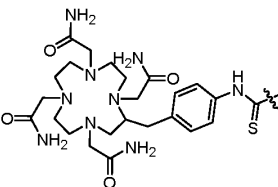
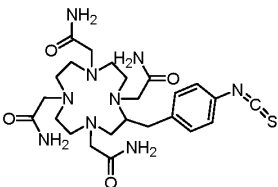
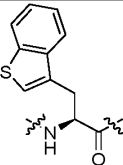
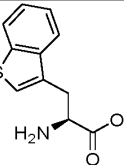
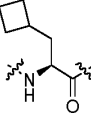
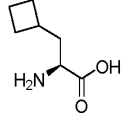
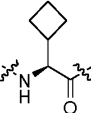
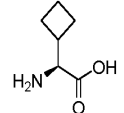
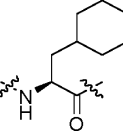
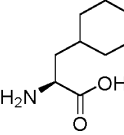
Abbr.	Name	Residue	Building Block
AF488	Alexa Fluor 488 Dye		
Ahx	6-aminohexanoic acid		
Aib	1-amino-isobutyric acid		
ala	D-alanine		
Ala	L-alanine		
Amd	α -methyl-L-aspartic acid		
Amf	α -methyl-L-phenylalanine		
Amk	α -methyl-L-lysine		
Ams	α -methyl-L-serine		
APAc	2-(4-aminopiperidin-1-yl)acetic acid		
Apc	4-aminopiperidine-4-carboxylic acid		

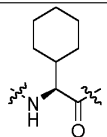
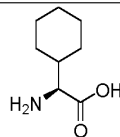
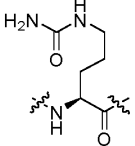
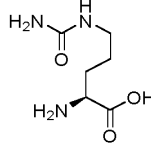
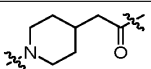
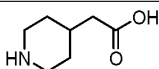
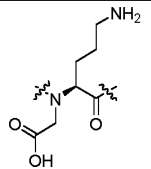
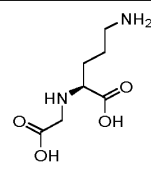
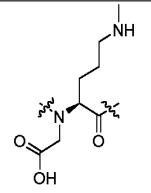
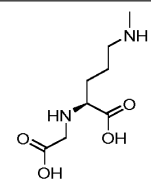
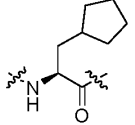
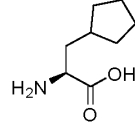
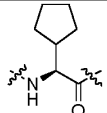
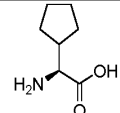
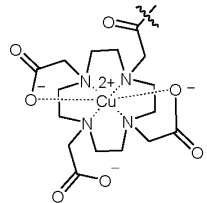
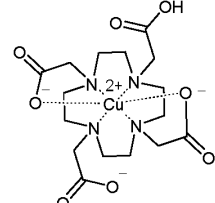
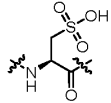
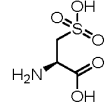
Abbr.	Name	Residue	Building Block
Apc (BnTCMC)	4-aminopiperidine-4-carboxylic acid BnTCMC conjugate		
Apc(DOTA)	4-aminopiperidine-4-carboxylic acid DOTA conjugate		
Apc(DOTA-PPAc)	Apc - PPAc- DOTA conjugate		
Apc(DOTA-glu)	Apc - D-glutamate- DOTA conjugate		

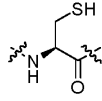
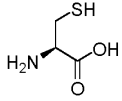
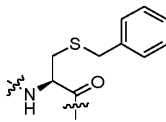
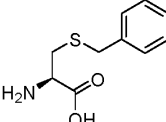
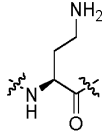
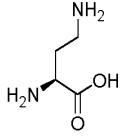
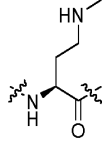
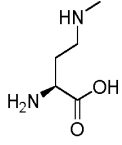
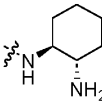
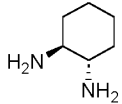
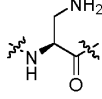
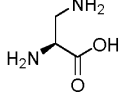
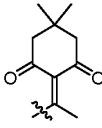
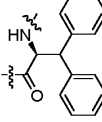
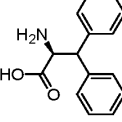
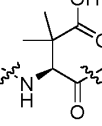
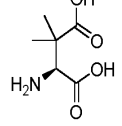
Abbr.	Name	Residue	Building Block
Apc(DOTA-Kzw)	Apc - Kzw-DOTA conjugate		
Apc (DOTAGA)	4-aminopiperidine-4-carboxylic acid DOTAGA conjugate		
Apc (DOTAM)	4-aminopiperidine-4-carboxylic acid DOTAM conjugate		
Apc (DOTAMGAM)	4-aminopiperidine-4-carboxylic acid DOTAMGAM conjugate		
Apc (NODAGA)	4-aminopiperidine-4-carboxylic acid NODAGA conjugate		

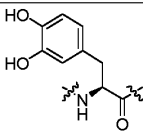
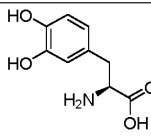
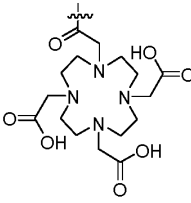
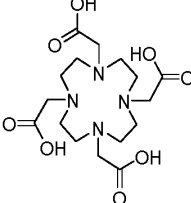
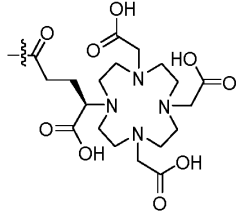
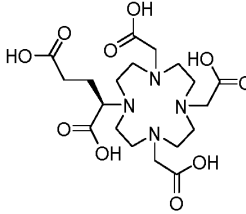
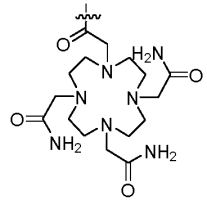
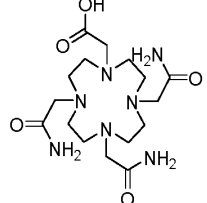
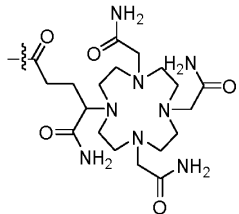
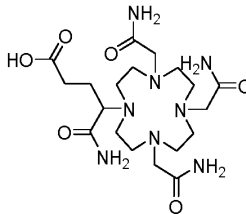
Abbr.	Name	Residue	Building Block
Apc(NOPO)	4-aminopiperidine-4-carboxylic acid NOPO conjugate		
Apc(NOTA)	4-aminopiperidine-4-carboxylic acid NOTA conjugate		
Apc(PSC)	4-aminopiperidine-4-carboxylic acid PSC conjugate		
Apc(PSCGA)	4-aminopiperidine-4-carboxylic acid PSCGA conjugate		
Apg	(2-aminopropyl) glycine		
Arg	L-arginine		

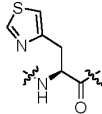
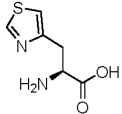
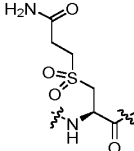
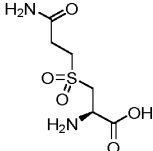
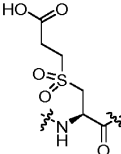
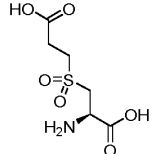
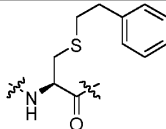
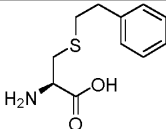
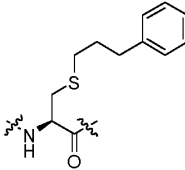
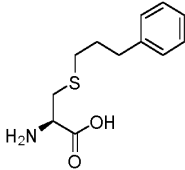
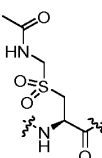
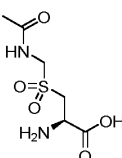
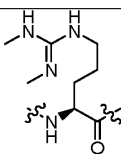
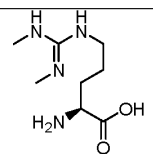
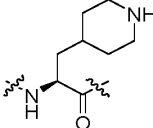
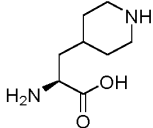
Abbr.	Name	Residue	Building Block
Arg(Me)	<i>N</i> -ω-methyl-L-arginine		
asn	D-asparagine		
Asn	L-asparagine		
asp	D-aspartic acid		
Asp	L-aspartic acid		
Ava	5-aminopentanoic acid		
Ay3	3-amino-L-tyrosine		
Aza	β-azido-L-alanine		
Azp	(<i>S</i>)-azepane-2-carboxylic acid		
Bal	β-alanine		

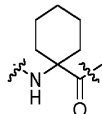
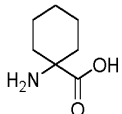
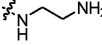
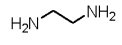
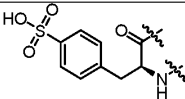
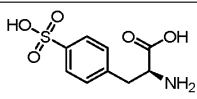
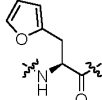
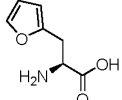
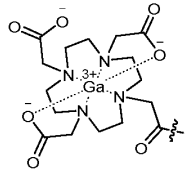
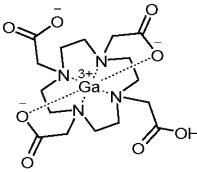
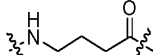
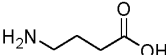
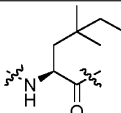
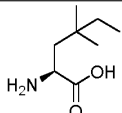
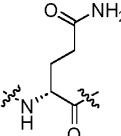
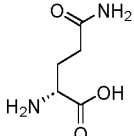
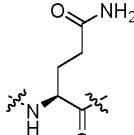
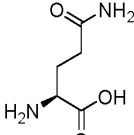
Abbr.	Name	Residue	Building Block
Bmt	(<i>S</i>)-2-amino-3-hydroxy-3-methylbutanoic acid		
Bmw	(2 <i>S</i> ,3 <i>S</i>)- β -methyl tryptophan		
BnTCMC	<i>S</i> -2-(4-isothiocyanatobenzyl)-1,4,7,10-tetraaza-1,4,7,10-tetra(2-carbamoylmethyl)cyclododecane		
Bta	3-(3-benzothienyl)-L-alanine		
Bzl	benzyl		
Cba	L-cyclobutyl alanine		
Cbg	L-cyclobutyl glycine		
Cha	L-cyclohexyl alanine		

Abbr.	Name	Residue	Building Block
Chg	L-cyclohexyl glycine		
Cit	L-citrulline		
Cmp	4-carboxymethyl- piperidine		
Cmo	<i>N</i> _α -carboxy- methyl-L- ornithine		
Cmo(Me)	<i>N</i> _α -carboxy- methyl- <i>N</i> _δ - methyl-L- ornithine		
Cpa	L-cyclopentyl alanine		
Cpg	L-cyclopentyl- glycine		
CuDOTA	Cu(II) DOTA complex		
Cya	L-cysteic acid		

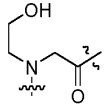
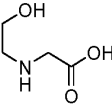
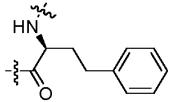
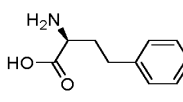
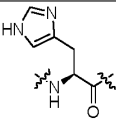
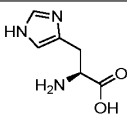
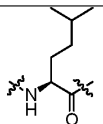
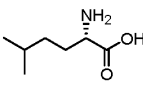
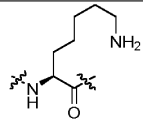
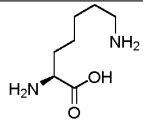
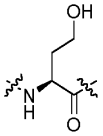
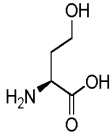
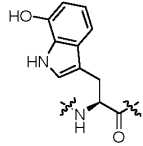
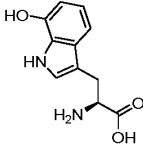
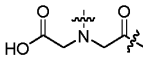
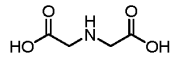
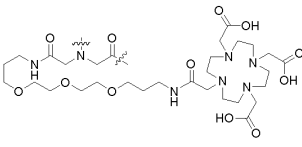
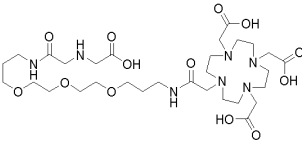
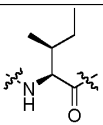
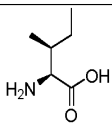
Abbr.	Name	Residue	Building Block
Cys	L-cysteine		
Cys(Bzl)	<i>S</i> -benzyl-L-cysteine		
Dab	(<i>S</i>)-2,4-Diaminobutyric acid		
Dab(Me)	(<i>S</i>)-2-amino-4-(methylamino)butanoic acid		
DachSS	(1 <i>S</i> ,2 <i>S</i>)-(+)-1,2-diaminocyclohexane (used as C-terminus)		
Dap	(<i>S</i>)-2,3-Diaminopropionic acid		
Dde	1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)ethyl		
Dip	3,3-diphenyl-L-alanine		
Dmd	β,β -dimethyl-L-aspartic acid		

Abbr.	Name	Residue	Building Block
Dopa	Levodopa / L-3,4-dihydroxyphenylalanine		
DOTA	2,2',2'',2'''-(1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrayl)tetraacetic acid		
DOTAGA	(R)-2-(4,7,10-tris(carboxymethyl)-1,4,7,10-tetraazacyclododecan-1-yl)pentanedioic acid		
DOTAM	2-(4,7,10-tris(2-amino-2-oxoethyl)-1,4,7,10-tetraazacyclododecan-1-yl)acetic acid		
DOTAMGAM	5-amino-5-oxo-4-(4,7,10-tris(2-amino-2-oxoethyl)-1,4,7,10-tetraazacyclododecan-1-yl)pentanoic acid		

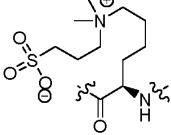
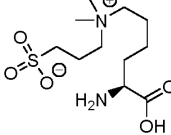
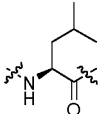
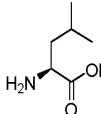
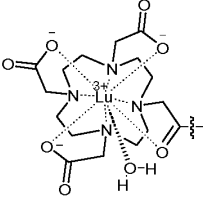
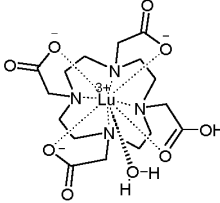
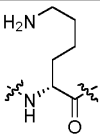
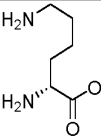
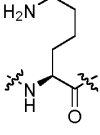
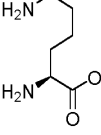
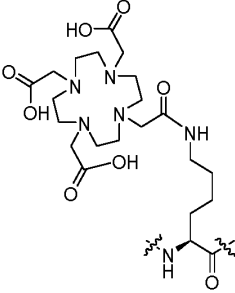
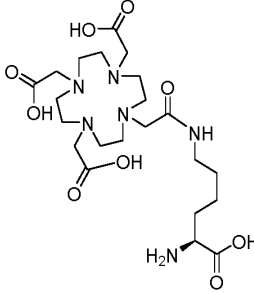
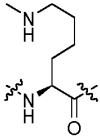
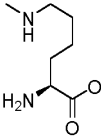
Abbr.	Name	Residue	Building Block
Ead	3-(4-thiazolyl)-l-alanine		
Ecm	<i>S</i> -(3-propionamide)-L-cysteine sulfone		
Edf	<i>S</i> -(2-carboxyethyl)-L-cysteine sulfone		
Edp	<i>S</i> -(2-phenylethyl)-L-cysteine		
Een	<i>S</i> -(3-phenylpropyl)-L-cysteine		
Eep	<i>S</i> -(acetamidomethyl)-L-cysteine sulfone		
Egd	<i>N</i> _ω , <i>N</i> _{ω'} -dimethyl-L-arginine		
Egg	3-(4-piperidiny)-L-alanine		

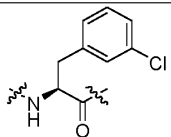
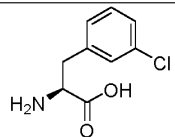
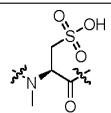
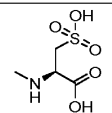
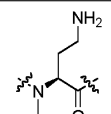
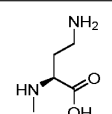
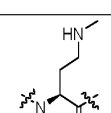
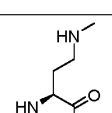
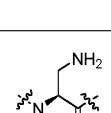
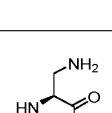
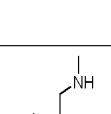
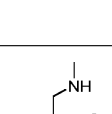
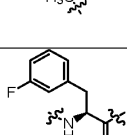
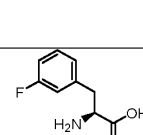
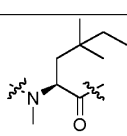
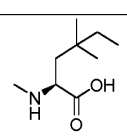
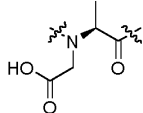
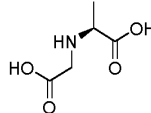
Abbr.	Name	Residue	Building Block
Egz	1-amino-1-cyclohexanecarboxylic acid		
en	ethylenediamine (used as C-terminus)		
Fso	4-sulfo-L-phenylalanine		
Fura	3-(2-furanyl)-L-alanine		
GaDOTA	Ga(III) DOTA complex		
Gab	γ -aminobutyric acid		
Gel	L- γ -ethyl-leucine		
gln	D-glutamine		
Gln	L-glutamine		

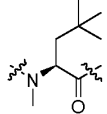
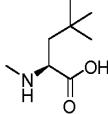
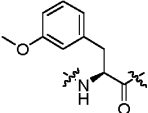
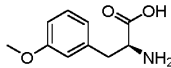
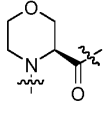
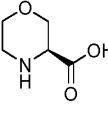
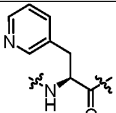
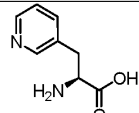
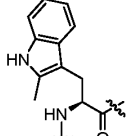
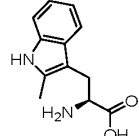
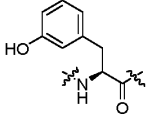
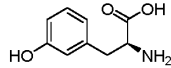
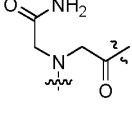
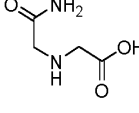
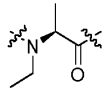
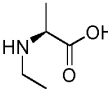
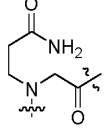
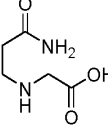
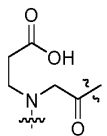
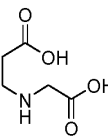
Abbr.	Name	Residue	Building Block
glu	D-glutamic acid		
Glu	L-glutamic acid		
glu(Tris)	D-glutamate Tris conjugate		
Glu(Tris)	L-glutamate Tris conjugate		
Gly	glycine		
Guf	4-guanidino-L-phenylalanine		
H	hydrogen (at the N-terminus)		
Har	L-homoarginine		
Hci	L-homocitrulline		

Abbr.	Name	Residue	Building Block
Heg	(2-hydroxyethyl) glycine		
Hfe	L-homophenyl alanine		
His	L-histidine		
Hle	L-homoleucine		
Hly	L-homolysine		
Hse	L-homoserine		
Hyw7	7-hydroxy-L- tryptophan		
Ida	iminodiacetic acid		
Ida(O3TdN2-DOTA)	Ida-O3TdN2-DOTA conjugate		
Ile	L-isoleucine		

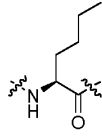
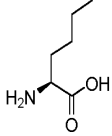
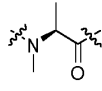
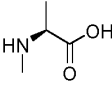
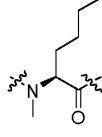
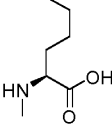
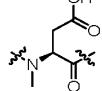
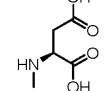
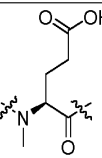
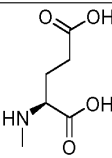
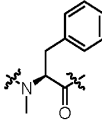
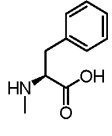
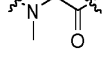
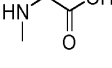
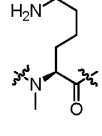
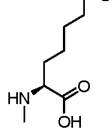
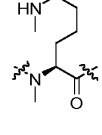
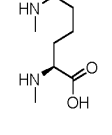
Abbr.	Name	Residue	Building Block
InDOTA	In(III) DOTA complex		
Inp	isonipecotic acid		
Kip	N_{ϵ} -isopropyl-L-lysine		
KMe2	$N_{\epsilon}, N_{\epsilon'}$ -dimethyl-L-lysine		
KMe2a	N_{α} -methyl- $N_{\epsilon'}$ -methyl-L-lysine		
KMe3	$N_{\epsilon}, N_{\epsilon'}, N_{\epsilon''}$ -trimethyl-L-lysine		
KMe3a	N_{α} -methyl- $N_{\epsilon'}, N_{\epsilon''}$ -dimethyl-L-lysine		
KMe4	N_{α} -methyl- $N_{\epsilon}, N_{\epsilon'}, N_{\epsilon''}$ -trimethyl-L-lysine		

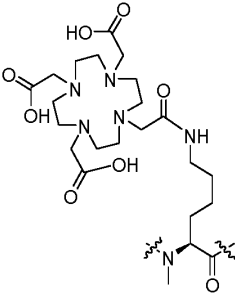
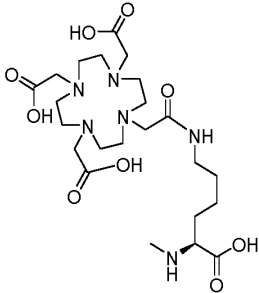
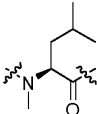
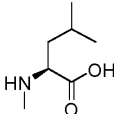
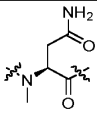
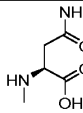
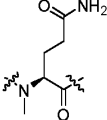
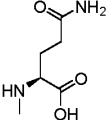
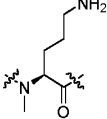
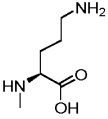
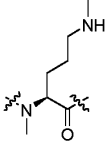
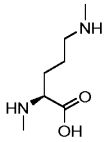
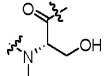
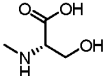
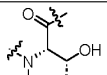
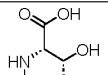
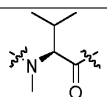
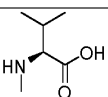
Abbr.	Name	Residue	Building Block
Kzw	(<i>S</i>)-3-((5-amino-5-carboxypentyl)dimethylammonio)propane-1-sulfonate		
Lac	L-lactic acid		
Leu	L-leucine		
LuDOTA	Lu(III) DOTA complex		
lys	D-lysine		
Lys	L-lysine		
Lys(DOTA)	L-lysine DOTA conjugate		
Lys(Me)	<i>N</i> _ε -methyl-L-lysine		

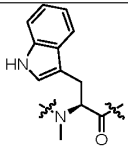
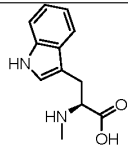
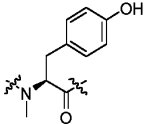
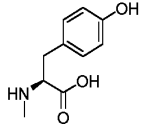
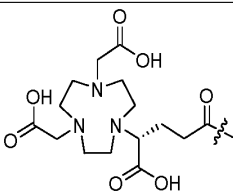
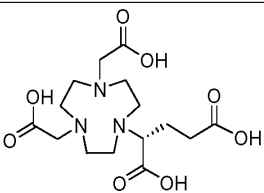
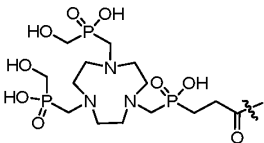
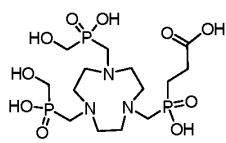
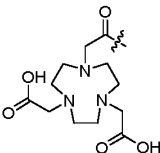
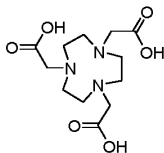
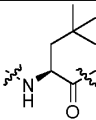
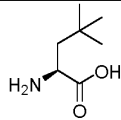
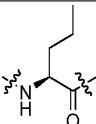
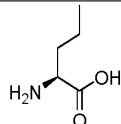
Abbr.	Name	Residue	Building Block
Mcf	3-chloro-L-phenylalanine		
Mcy	<i>N</i> -methyl-L-cysteic acid		
Mdab	(<i>S</i>)-4-amino-2-(methylamino)butanoic acid		
Mdab(Me)	(<i>S</i>)-2,4-bis(methylamino)butanoic acid		
Mdap	(<i>S</i>)-3-amino-2-(methylamino)propanoic acid		
Mdap(Me)	(<i>S</i>)-2,3-bis(methylamino)propanoic acid		
Me	methyl		
Mff	3-fluoro-L-phenylalanine		
Mgel	<i>N</i> -methyl-L-γ-ethyl-leucine		
Mida	<i>N</i> -carboxymethyl-L-alanine		

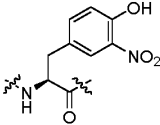
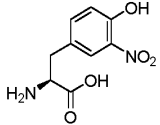
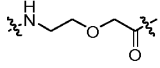
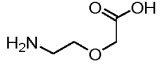
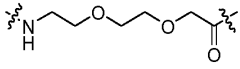
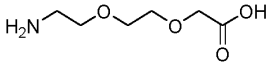
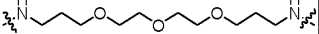
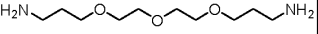
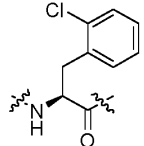
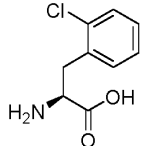
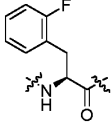
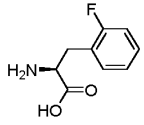
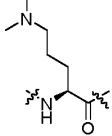
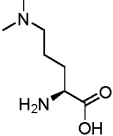
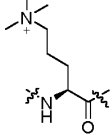
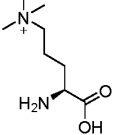
Abbr.	Name	Residue	Building Block
Mnpg	<i>N</i> -methyl-L-neopentyl-glycine		
Mof	L-(3-methoxy)phenylalanine		
Mor	(<i>S</i>)-morpholine-3-carboxylic acid		
Mpa	3-pyridyl-alanine		
Mw2	2-methyl-L-tryptophan		
My	L-3-hydroxyphenylalanine		
Nasn	(2-amino-2-oxoethyl)glycine		
Nea	<i>N</i> -ethyl-L-alanine		
Ngln	3-((2-amino-2-oxoethyl)amino)propanoic acid		
Nglu	3-((carboxymethyl)amino)propanoic acid		

Abbr.	Name	Residue	Building Block
NH ₂	usually represents a C-terminus of a peptide sequence		
NHBz	benzylamine at C-terminus		
NHcHex	cyclohexylamine at C-terminus		
NHEt	ethylamine at C-terminus		
NHEtPh	2-phenylethylamine at C-terminus		
NHEtTh	2-(2-thienyl)ethylamin e at C-terminus		
NHHex	n-hexylamine at C-terminus		
NHMe	methylamine at C-terminus		
NHPr	n-propylamine at C-terminus		
NHPrPh	3-phenylpropylamin e at C-terminus		
NHiPen	iso-pentylamine at C-terminus		
Nipa	<i>N</i> -isopropyl-L- alanine		

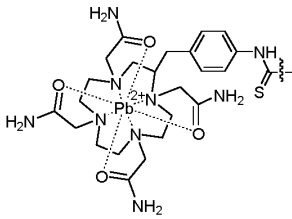
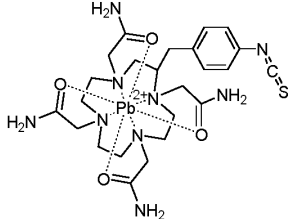
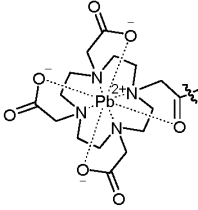
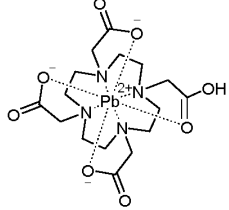
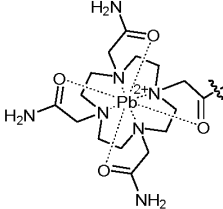
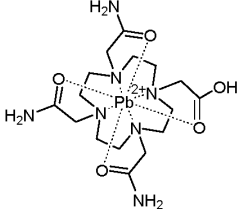
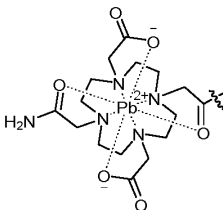
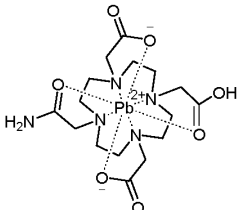
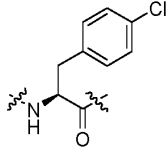
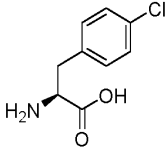
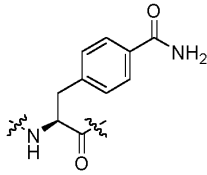
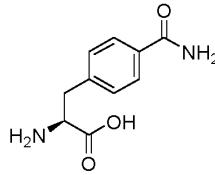
Abbr.	Name	Residue	Building Block
Nle	L-norleucine		
Nma	<i>N</i> -methyl-L-alanine		
NMB	<i>N</i> -methyl-L-norleucine		
Nmd	<i>N</i> -methyl-L-aspartic acid		
Nme	<i>N</i> -methyl-L-glutamic acid		
Nmf	<i>N</i> -methyl-L-phenylalanine		
Nmg	<i>N</i> -methyl-glycine		
Nmk	<i>N</i> _α -methyl-L-lysine		
Nmk(Me)	<i>N</i> _α -methyl- <i>N</i> _ε -methyl-L-lysine		

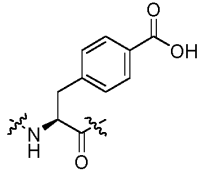
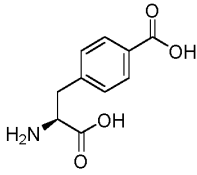
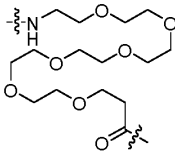
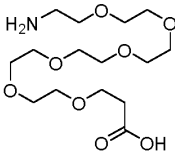
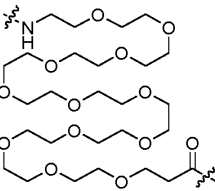
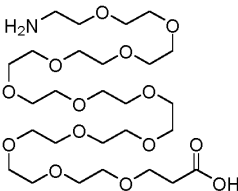
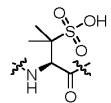
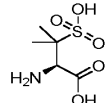
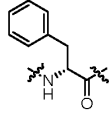
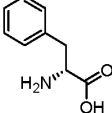
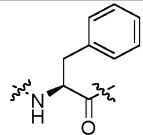
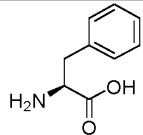
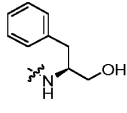
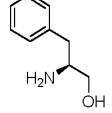
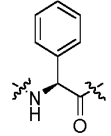
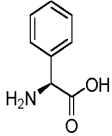
Abbr.	Name	Residue	Building Block
Nmk(DOTA)	<i>N</i> _α -methyl-L-lysine-DOTA-conjugate		
Nml	<i>N</i> -methyl-L-leucine		
Nmn	<i>N</i> -methyl-L-asparagine		
Nmq	<i>N</i> -methyl-L-glutamine		
Nmo	<i>N</i> _α -methyl-L-ornithine		
Nmo(Me)	<i>N</i> _α -methyl- <i>N</i> _δ -methyl-L-ornithine		
Nms	<i>N</i> -methyl-L-serine		
Nmt	<i>N</i> -methyl-L-threonine		
Nmv	<i>N</i> -methyl-L-valine		

Abbr.	Name	Residue	Building Block
Nmw	<i>N</i> -methyl-L-tryptophan		
Nmy	<i>N</i> -methyl-L-tyrosine		
NODAGA	(<i>R</i>)-1,4,7-triazacyclononane, 1-glutaric acid-4,7-acetic acid		
NOPO	3-(((4,7-bis((hydroxy(hydroxymethyl)phosphoryl)methyl)-1,4,7-triazonan-1-yl)methyl)(hydroxy)phosphoryl)propanoic acid		
NOTA	1,4,7-triazacyclononane-1,4,7-triacetic acid		
Npg	L-neopentyl-glycine		
Nva	L-norvaline		

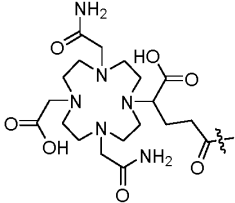
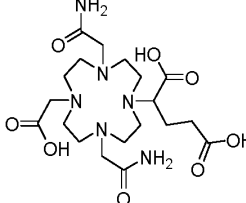
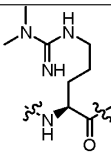
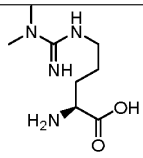
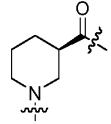
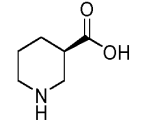
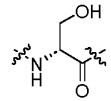
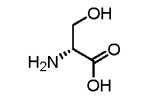
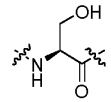
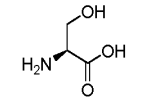
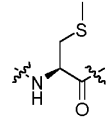
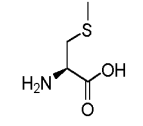
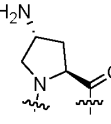
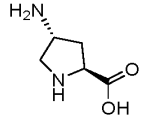
Abbr.	Name	Residue	Building Block
Ny3	3-nitro-L-tyrosine		
O1Pen	5-amino-3-oxapentanoic acid		
O2Oc	8-amino-3,6-dioxaoctanoic acid		
O3TdN2	4,7,10-trioxa-1,13-tridecandiamine		
Ocf	2-chloro-L-phenylalanine		
Off	2-fluoro-L-phenylalanine		
OH	usually represents a C-terminus of a peptide sequence		
OMe2	<i>N</i> _δ , <i>N</i> _δ -dimethyl-L-ornithine		
OMe3	<i>N</i> _δ , <i>N</i> _δ , <i>N</i> _δ -trimethyl-L-ornithine		

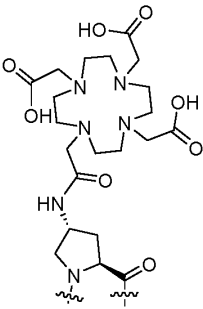
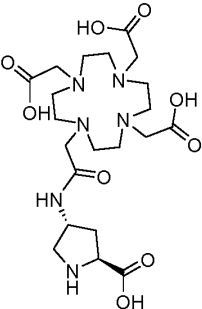
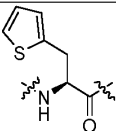
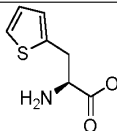
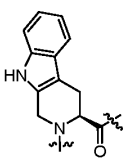
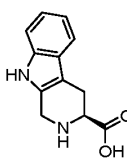
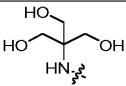
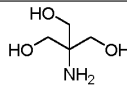
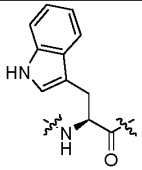
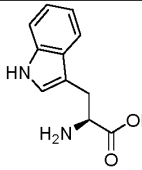
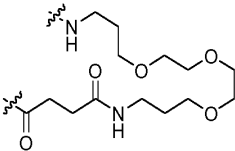
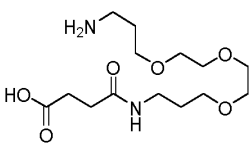
Abbr.	Name	Residue	Building Block
Onf	2-cyano-L-phenylalanine		
Opa	2-pyridyl-L-alanine		
Opy	γ -(2-pyridyl)-L-ornithine		
Orn	L-ornithine		
Orn(DOTA)	L-ornithine DOTA conjugate		
Orn(PSC)	L-ornithine PSC conjugate		
Orn(Me)	<i>N</i> δ -methyl-L-ornithine		

Abbr.	Name	Residue	Building Block
PbBnTCMC	Pb(II) BnTCMC complex		
PbDOTA	Pb(II) DOTA complex		
PbDOTAM	Pb(II) DOTAM complex		
PbPSC	Pb(II) PSC complex		
Pcf	4-chloro-L-phenylalanine		
Pcnf	4-carbamoyl-L-phenylalanine		

Abbr.	Name	Residue	Building Block
Pcof	4-carboxy-L-phenylalanine		
PEG6	1-amino-3,6,9,12,15,18-hexaoxahenicosan-21-oic acid		
PEG12	1-amino-3,6,9,12,15,18,21,24,27,30,33,36-dodecaoxanonatriacontan-39-oic acid		
Penox	β,β -dimethyl-L-cysteic acid		
phe	D-phenylalanine		
Phe	L-phenylalanine		
Pheol-OH	L-phenylalaninol (at C-terminus)		
Phg	L-phenylglycine		

Abbr.	Name	Residue	Building Block
Pip	(<i>S</i>)-Pipecolic Acid		
Pmy	4-methoxy-L-phenylalanine		
Ppa	4-pyridyl-L-alanine		
PPAc	4-Carboxymethyl piperazine		
Ppaz	(<i>S</i>)-piperazine-2-carboxylic acid		
Ppaz(DOTA)	(<i>S</i>)-piperazine-2-carboxylic acid-DOTA-conjugate		
pro	D-proline		
Pro	L-proline		
PSC	2,2',2''-(10-(2-amino-2-oxoethyl)-1,4,7,10-tetraazacyclododecane-1,4,7-triyl)triacetic acid		

Abbr.	Name	Residue	Building Block
PSCGA	2-(4,10-bis(2-amino-2-oxoethyl)-7-(carboxymethyl)-1,4,7,10-tetraazacyclododecan-1-yl)pentanedioic acid		
RMe2	<i>N</i> _ω , <i>N</i> _ω -dimethyl-L-arginine		
Rni	(<i>R</i>)-nipecotic acid		
ser	D-serine		
Ser	L-serine		
Smc	<i>S</i> -methyl-L-cysteine		
Tap	(2 <i>S</i> ,4 <i>R</i>)-4-amino-1-pyrrolidin-2-carboxylic acid		

Abbr.	Name	Residue	Building Block
Tap(DOTA)	(2 <i>S</i> ,4 <i>R</i>)-4-amino-1-pyrrolidin-2-carboxylic acid-DOTA-conjugate		
Thi	2-thienyl-L-alanine		
Thr	L-threonine		
Tle	L-tert-leucine		
Tpi	L-1,2,3,4-tetrahydronorharman-3-carboxylic acid		
Tris	tris(hydroxymethyl)aminomethane		
Trp	L-tryptophan		
Ttds	1,13-diamino-4,7,10-trioxatridecan-succinamic acid		

Abbr.	Name	Residue	Building Block
tyr	D-tyrosine		
Tyr	L-tyrosine		
Tyr(Bzl)	O-benzyl-L-tyrosine		
TzaOH	(4-(hydroxymethyl)-1H-1,2,3-triazol-1-yl)-L-alanine		
Val	L-valine		

The amino acid sequences of the peptides disclosed herein are depicted in typical peptide sequence format, as will be understood by a person skilled in the art. For example, the three-letter code for a residue of a conventional amino acid, the code for a residue of a non-conventional amino acid or the abbreviation for a residue of a building block other than a conventional or non-conventional amino acid indicates the presence of the residue, of the amino acid residue or the presence of the residue of the building block at a specified position within the peptide sequence. The code for a residue of an amino acid and the abbreviation for a residue of a building block, respectively, is connected to the code for a subsequent residue of an amino acid and/or to the code for a preceding residue of an amino acid and, respectively, is connected to the abbreviation for a subsequent residue of a building block and/or to the abbreviation for a preceding residue of a building block, respectively, in the peptide sequence by a hyphen which typically represents an amide linkage. For example, if the hyphen is located before the code for a residue of an amino acid, this usually symbolizes that the amino group (as indicated in the

corresponding entry in Table 5) of the residue of the amino acid is covalently attached to a carbonyl group of a preceding residue of an amino acid, and if the hyphen is located after the code for a residue of an amino acid, this usually symbolizes that the carbonyl group (as indicated in the corresponding entry in Table 5) of the residue of the amino acid is covalently
5 attached to an amino group of a subsequent residue of an amino acid.

Depending on the spacing between the amino- and the carboxy group in amino acids they are classified into α -, β -, γ -, δ -, ϵ -, (and so forth) -amino acids, which means that these groups are typically are spaced apart by 1, 2, 3, 4, and 5 heavy-atoms (typically carbon), respectively.

For amino acids, in their abbreviations the first letter indicates the stereochemistry of the C- α -atom if applicable. For example, a capital first letter indicates that the L-form of the amino
10 acid is present in the peptide sequence, while a lower case first letter indicating that the D-form of the correspondent amino acid is present in the peptide sequence. If the abbreviation starts with a number, the first letter in the abbreviation will be characteristic for the stereochemistry, if applicable. However, for enhanced clarity it is at any abbreviation an option to further clearly
15 specify the stereochemistry of an amino acid abbreviation by adding for instance the prefix "D-". As example "lys", "D-Lys" or "D-lys" describe all a D-configured Lys.

For someone skilled in the art it is evident that many amino acids can be N-methylated at their amino group. These N-methyl amino acid feature can occur in combination with some other attributes like L- α - or D- α -N-methyl amino acids which are N-methylated L- α - or D- α -amino
20 acids.

The term " **α,α -dialkylamino acid**" as used herein refers to amino acid which comprise independently two alkyl groups at the α -carbon atom which maybe in some cases form a ring-structure with each other. Representative α,α -dialkylamino acids include, but are not limited to, any of Aib, Deg, Egz, Apc, and Thp.

25 The term "**aromatic amino acid**" as used herein refers to an amino acid, which comprises an aromatic structure and this includes a heteroaromatic structure whereas the term "non-aromatic amino acid" refers to an amino acid which is devoid of any aromatic structure. Examples of aromatic amino acids include, but are not limited to, phenylalanine, tyrosine, 2-chloro phenylalanine, 4-guanidino phenylalanine, 1-naphthylalanine, 4-carboxymethyl phenylalanine,
30 3-fluoro phenylalanine, phenyl glycine, homophenylalanine and Levodopa.

The term "**heteroaromatic amino acid**" as used herein refers to an amino acid, which comprises any kind of heteroaromatic structure. Examples of heteroaromatic amino acids include, but are not limited to, histidine, tryptophan, 2-thienyl alanine, thiazolyl alanine, 3-

pyridyl alanine, 7-chloro tryptophan, benzothienyl alanine, furanyl alanine, 4-pyridyl alanine and 2-quinolyl alanine.

An “**aliphatic amino acid**” is a non-aromatic amino acid, which comprises an aliphatic group. Examples of aliphatic amino acids include, but are not limited to, noreleucine, leucine, isoleucine, valine, cyclohexyl alanine, α -aminobutyric acid, tert-leucine, neopentyl glycine and 2-cyclopropyl glycine.

A “**polar amino acid**” is any kind of amino acid, which comprises apart from the amino and carboxy group one or more polar groups as defined herein. Examples of polar amino acids include, but are not limited to, serine, threonine, asparagine, glutamine, citrulline, aspartic acid, glutamic acid, lysine, arginine and homoglutamine.

A “**charged amino acid**” is any kind of amino acid which comprises, apart from the amino and carboxy group, one or more charged groups as defined herein. Such charged groups can be positively or negatively charged and a charged amino acid can as well be zwitterionic, i.e. comprising both positively and negatively charged groups at the same time. Examples of positively charged amino acids include, but are not limited to, lysine, arginine, ornithine, homoarginine, KMe3, Lys(Me), Dab, Dap and KMe2. Examples of negatively charged amino acids include, but are not limited to, aspartic acid, glutamic acid, cysteic acid, Pcof, Fso and γ -carboxyglutamic acid. Examples of zwitterionic amino acids include, but are not limited to, Kzw and ϵ -(γ -glutamyl)-lysine.

If an amino acid contains more than one amino and/or carboxy group all orientations of this amino acid are in principle possible for formation of a covalent bond, but in α -amino acid the utilization of the α -amino and the α -carboxy group is preferred for the attachment to the neighbouring moieties and if other orientations are preferred they are explicitly specified.

Those skilled in the art will recognize if a stereocenter exists in the compounds disclosed herein irrespective thereof whether such stereocenter is part of an amino acid moiety or any other part or moiety of the compound of the invention. When a compound is desired as a single enantiomer or diastereomer, it may be obtained by stereospecific synthesis or by resolution of the final product or any convenient intermediate. Resolution of the final product, an intermediate, or a starting material may be affected by any suitable method known in the art. See, for example, "Stereochemistry of Organic Compounds" by E. L. Eliel, S. H. Wilen, and L. N. Mander (Wiley-Interscience, 1994).

The term “**aromatic L- α -amino acid**” as used herein refers any kind of L- α -amino acid, which comprises an aryl group.

The term “**heteroaromatic L- α -amino acid**” as used herein any kind of L- α -amino acid which comprises a heteroaryl group.

The term “**L- α -hydroxy acid**” as used herein refers to any kind of non-oligomeric compound, which comprises a hydroxy group and a carboxylic group that are linked by one stereogenic (α) carbon atom in L-configuration. In some aspects, the L- α -hydroxy acid represents the derivative of an L- α -amino acid in which the α -amino group has been replaced by a hydroxy group. Examples of L- α -hydroxy acids include, but are not limited to, L-lactic acid, L-malic acid, and (S)-2-hydroxyhexanoic acid.

The expression “**residue of an L- α -hydroxy acid**” as used herein characterizes a substance that remains when an L- α -hydroxy acid is combined with one or more amino acids to form an amino acid derivative or a peptide derivative or analog. For example, the C-atom of the carbonyl group of an L- α -hydroxy acid Xaa1 such as Lac can be covalently attached to the α -nitrogen of an amino acid Xaa2 to form an amino acid derivative Xaa1-Xaa2. Similarly, the C-atom of the carbonyl group of an L- α -hydroxy acid Xaa1 can be covalently attached to the amino terminus of a peptide Xaa2-[...]-Xaa(n-1) (wherein n-1 represents the number of amino acids forming the peptide) to form a peptide Xaa1-Xaa2-[...]-Xaa(n-1). Since the N-terminal end group (which usually is an H atom) is attached to the O atom of the L- α -hydroxy acid, the residue of an L- α -hydroxy acid only contains the O atom of the OH group.

The term “ **β -amino alcohol**” as used herein refers to any kind of non-oligomeric compound, which comprises a hydroxy group and an amino group on adjacent carbon atoms. Examples of β -amino alcohols include, but are not limited to, ethanolamine, alaninol, phenylalaninol, tyrosinol, 2-thienylalaninol, leucinol, valinol, tert-leucinol and norleucinol. Furthermore, the expression “**residue of a β -amino alcohol**” as used herein characterizes a substance that remains when a β -amino alcohol is combined with, e.g., an amino acid to form a derivative. For example, the N-atom of the amino group of a β -amino alcohol can be covalently attached to the carboxyl group of an amino acid to form a derivative.

Unless indicated to the contrary, the amino acid sequences are presented herein in N- to C-terminus direction (from left to right).

Linear Peptides

A general linear peptide is typically written from N-to C-terminal direction (from left to right) as shown below:

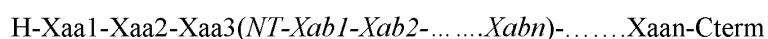


Therein

- A) “Xaax” is the abbreviation, descriptor or symbol for amino acids or building blocks at specific sequence position x as shown in Table 5,
- B) “H” is the hydrogen atom that is covalently attached to the α -nitrogen of Xaa1 (when Xaa1 represents (a) a residue of an L- α -amino acid comprising a side chain) or to the oxygen atom comprised in the hydroxy group of Xaa1 (when Xaa1 represents (b) a residue of an L- α -hydroxy acid comprising a side chain), and
- C) “Cterm” is the C-terminal group, which is typically -NH₂, -OH, a group Z⁹ or -NHR^{Cterm} and linked to the C-terminal amino acid code (Xaan) via a hyphen.
- In the context of the statement 2, it is understood that “H” is an atom that is naturally present in Xaa1, i.e., “H” may be considered as forming part of the amino group (when Xaa1 represents (a) a residue of an L- α -amino acid comprising a side chain) or hydroxyl group (when Xaa1 represents (b) a residue of an L- α -hydroxy acid comprising a side chain) of Xaa1.

Branched peptides with side chains modified by specific building blocks or peptides

- Linear, branched peptides are written from the N-to C-terminal direction as shown below:



- Therein, the statements 1. – 3. of the description of linear peptides for the specification of “Xaax”, “H” and “C-term” in the main chain of the branched peptide apply. An individual branch is specified by an expression in parentheses, wherein the positioning of the branch within the peptide sequence/structure is indicated by the positioning of the parenthesized expression right next to an “Xaax” abbreviation (e.g., “Xaa3”). Branches typically either occur at lysine (Lys) residues or 4-aminopiperidine-4-carboxylic acid (Apc) (or similar), which means that the branch is attached to side chain ϵ -amino function of the lysine or to the nitrogen atom within the piperidine ring of 4-aminopiperidine-4-carboxylic acid via an amide bond.
- The content of the parentheses describes the sequence/structure of the peptide branch “NT-Xab1-Xab2-.....Xabn”. Herein
- I.** “Xabx” is the abbreviation, descriptor or symbol for amino acids or building blocks at specific sequence position x of the branch as shown in Table 5, whereby the linear connection of individual Xabx is indicated by a hyphen,
- II.** “NT” is an N-terminal group, e.g. an abbreviation for a specific terminating carboxylic acid like ‘Ac’ for acetyl or other chemical group or structural formula of chemical groups,

more specifically “*NT*” is a Z group, linked to the N-terminal amino acid code (*XabI*) via a hyphen and the last building block of the branch “*Xabn*”, which connects the branch with the main chain by forming an amide bond with its own carboxyl function with the side chain amino function of this lysine or 4-aminopiperidine-4-carboxylic acid (or
5 similar residue).

The term “**effector**” as used herein characterizes a chemical moiety and/or element (e.g., a naturally occurring or synthetic substance) attached to the compound for the purpose of diagnostic and/or therapeutic intervention with P-cadherin-related diseases and/or cancer cells. In some embodiments, the term “effector” is to be understood as a moiety (e.g., chromophore,
10 fluorophore, radiolabeled moiety, chelator comprising a chelated diagnostically active nuclide) that enables and/or facilitates the detection and/or visualization of a complementary moiety to which it is attached. For instance, the moiety can be detected and/or visualized by molecular imaging techniques known in the art such as single photon emission computed tomography (SPECT), positron emission tomography (PET), etc. In some embodiments, the term “effector”
15 is to be understood as a pharmacologically active substance (e.g., chelator comprising a chelated therapeutically active nuclide, cytotoxic drug, immune cell engaging effector) which can inhibit or prevent the function of cells and/or kill cells. In some embodiments, the term “effector” is to be understood as being synonymous with other terms commonly used in the art such as “cytotoxic agent”, “toxin” or “drug” used in the field of cancer therapy. In some embodiments,
20 it is to be understood that the “effector” does not itself exert the therapeutically exploited cytotoxic effect, but that it rather attracts and stimulates effector cells of the immune system (e.g. T cells, NK cells, phagocytotic immune cells) that directly or indirectly trigger immune cell mediated killing of the cancer cells.

The term “**chromophore**” as used herein refers to an organic or metal-organic compound which
25 is able to absorb electromagnetic radiation in the range of from 350 nm to 1100 nm, or a subrange thereof, e.g. 350-500 nm or 500-850 nm, or 350-850 nm.

The term “**phosphorophore**” as used herein refers to a compound which, when excited by exposure to a particular wavelength of light, emits light at a different wavelength and lower intensity over a prolonged period of time, e.g. up to several hours.

30 The term “**fluorophore**” as used herein refers to a compound which, when excited by exposure to a particular wavelength of light, emits light at a different (higher) wavelength. Fluorophores are usually described in terms of their emission profile or “color”. For example, green fluorophores such as Cy3 or FITC generally emit at wavelengths in the range of 515-540 nm,

while red fluorophores such as Cy5 or tetramethylrhodamine generally emit at wavelengths in the range of 590-690 nm. The term “fluorophore” is to be understood as encompassing, in particular, organic fluorescent dyes such as fluorescein, rhodamine, AMCA, Alexa Fluor dyes (e.g., Alexa Fluor 647), and biological fluorophores.

- 5 The term “**immune cell engaging effector**” as used herein refers to a compound which is capable of binding one or more cell surface molecules of effector cells of the immune system. When covalently linked to a compound that binds to cell surface molecules of cancer cells, these compounds act as immune cell engagers, i.e. they activate the effector cells of the immune system and directly and/or indirectly trigger immune cell mediated killing of the cancer cells.
- 10 In principle, all effector cells of the immune system can be exploited for this approach, including but not limited to T cells (both CD8 and CD4 cells), natural killer cells (NK cells), phagocytotic myeloid cells (monocytes, macrophages, dendritic cells and cytokine-activated neutrophils) and B cells. Preferably, immune effector cells regardless of their antigen specificity are targeted by immune cell engaging effectors, with T cells, NK cells, macrophages and
- 15 monocytes being the preferably engaged effector cells. Typical cell surface molecules that are targeted by immune cell engaging effectors include, but are not limited to, CD3, CD27, CD28, CD40, CD134, CD137, CD278, CD16, NKG2D, NKp30, and CD64. Typical immune cell engaging effectors are antibodies and binding fragments thereof, such as Fab, Fv or single domain fragments that target e.g. CD3, CD28, CD137, CD16, NKG2D, and CD64 (Fucà et al.
- 20 *ESMO Open* 2021, 6, 100046), but also scaffolds using designed ankyrin repeat proteins (= *DARPs*) and even small peptides have been employed for this purpose (e.g. targeting CD137, Claus et al. *Mabs* 2023, 15, 2167189).

- The term “**chelator**” (or “chelating agent”) as used herein refers to a molecule containing two or more electron donor atoms that can form coordinate bonds to a single central metal ion, e.g.
- 25 to a radionuclide. Typically, chelating agents coordinate metal ions through oxygen, nitrogen, or sulfur donor atoms, or combinations thereof. After the first coordinate bond is formed, each successive donor atom that binds creates a ring containing the metal ion. A chelating agent may be bidentate, tridentate, tetradentate, etc., depending on whether it contains 2, 3, 4, or more donor atoms capable of binding to the metal ion. However, the chelating mechanism is not fully
- 30 understood and depends on the chelating agent and/or radionuclide. For example, it is believed that DOTA can coordinate a radionuclide via carboxylate and amino groups (donor groups) thus forming complexes having high stability (Dai et al. *Nature Com.* 2018, 9, 857). The term “chelating agent” is to be understood as including the chelating agent as well as salts thereof. Chelating agents having carboxylic acid groups, e.g., DOTA, TRITA, HETA, HEXA, EDTA,

DTPA etc., may, for example, be derivatized to convert one or more carboxylic acid groups to amide groups for attachment to the compound, i.e. to the reactive moiety or the linker, alternatively, for example, said compounds may be derivatized to enable attachment to the compound via one of the CH₂ groups in the chelate ring.

- 5 The term "**radionuclide**" as used herein refers to an atom with an unstable nucleus, which is a nucleus characterized by excess energy that is released by different types of radioactive decay. Radionuclides occur naturally or can be artificially produced. In one embodiment, references to "**nuclide(s)**" made in the present specification and claims are preferably to be understood as references to "**radionuclide(s)**".
- 10 The expression "**moiety derived from a drug**" as used herein refers to a moiety corresponding to a native drug, which differs from the native drug only by the structural modification required for bonding to adjacent moieties, e.g. for bonding to the reactive moiety, linker or branching group comprised in the compound of the present invention. This may include covalent bonds formed by existing functional groups (available in the native drug) or covalent bonds and
- 15 adjacent functional groups newly introduced for this purpose. By consequence, the drug can be used in its non-modified form (except for the replacement of e.g. a hydrogen atom by a covalent bond), or it can be chemically modified in order to incorporate one functional group allowing covalent attachment to the reactive moiety, linker, or branching group comprised in the compound of the present invention. The expression or term "moiety derived from a drug" as
- 20 used herein is meant to encompass both meanings.

In an analogous manner, the term "**derivative**" is used to characterize moieties bonded to adjacent moieties, which moieties differ from the molecules from which they are derived only by the structural elements responsible for bonding to adjacent moieties. This may include covalent bonds formed by existing functional groups or covalent bonds and adjacent functional

25 groups newly introduced for this purpose.

The term "**linker**" as used herein refers to an element, moiety, or structure which connects two parts of a molecule.

A "**pharmaceutically acceptable salt**" of the compound of the present invention is preferably an acid salt or a base salt that is generally considered in the art to be suitable for use in contact

30 with the tissues of human beings or animals without excessive toxicity or carcinogenicity, and preferably without irritation, allergic response, or other problem or complication. Such salts include mineral and organic acid salts of basic residues such as amines, as well as alkali or

organic salts of acidic residues such as carboxylic acids. Compounds of the invention are capable of forming internal salts which are also pharmaceutically acceptable salts.

Suitable pharmaceutically acceptable salts include, but are not limited to, salts of acids such as hydrochloric, phosphoric, hydrobromic, malic, glycolic, fumaric, sulfuric, sulfamic, sulfanilic, formic, toluenesulfonic, methanesulfonic, benzene sulfonic, ethane disulfonic, 2-hydroxyethylsulfonic, nitric, benzoic, 2-acetoxybenzoic, citric, tartaric, lactic, stearic, salicylic, glutamic, ascorbic, pantoic, succinic, fumaric, maleic, propionic, hydroxymaleic, hydroiodic, phenylacetic, alkanolic such as acetic, $\text{HOOC}-(\text{CH}_2)_n-\text{COOH}$ where n is any integer from 0 to 4, *i.e.*, 0, 1, 2, 3, or 4, and the like. Similarly, pharmaceutically acceptable cations include, but are not limited to sodium, potassium, calcium, aluminum, lithium and ammonium. Those of ordinary skill in the art will recognize further pharmaceutically acceptable salts for the compounds provided herein. In general, a pharmaceutically acceptable acid or base salt can be synthesized from a parent compound that contains a basic or acidic moiety by any conventional chemical method. Briefly, such salts can be prepared by reacting the free acid or base forms of these compounds with a stoichiometric amount of the appropriate base or acid in water or in an organic solvent, or in a mixture of the two. Generally, the use of non-aqueous media, such as ether, ethyl acetate, ethanol, isopropanol or acetonitrile, is preferred.

A "**pharmaceutically acceptable solvate**" of the compound of the invention is preferably a solvate of the compound of the invention formed by association of one or more solvent molecules to one or more molecules of a compound of the invention. Preferably, the solvent is one which is generally considered in the art to be suitable for use in contact with the tissues of human beings or animals without excessive toxicity or carcinogenicity, and preferably without irritation, allergic response, or other problem or complication. Such solvent includes an organic solvent such as alcohols, ethers, esters and amines.

A "**hydrate**" of the compound of the invention is formed by association of one or more water molecules to one or more molecules of a compound of the invention. Such hydrate includes but is not limited to a hemihydrate, monohydrate, dihydrate, trihydrate and tetrahydrate. Independent of the hydrate composition all hydrates are generally considered as pharmaceutically acceptable.

Hereinafter, in the present description of the invention and the claims, the use of the terms "**containing**" and "**comprising**" is to be understood such that additional unmentioned elements may be present in addition to the mentioned elements. However, these terms should also be understood as disclosing, as a more restricted embodiment, the term "**consisting of**" as well,

such that no additional unmentioned elements may be present, as long as this is technically meaningful.

Unless specified otherwise or the context dictates otherwise, references to groups being “substituted” or “optionally substituted” are to be understood as references to the presence (or optional presence, as the case may be) of at least one substituent selected from F, Cl, Br, I, CN, NO₂, NH₂, NH-(C₁-C₆)alkyl, N[(C₁-C₆)alkyl]₂, -X-(C₁-C₆)alkyl, -X-(C₂-C₆)alkenyl, -X-(C₂-C₆)alkynyl, -X-(C₆-C₁₄)aryl, -X-(5-14-membered heteroalkyl with 1-3 heteroatoms selected from N, O, S), wherein X represents a single bond, -(CH₂)-, -O-, -S-, -S(O)-, -S(O)₂-, -NH-, -CO-, or any combination thereof including, for instance, -C(O)-NH-, -NH-C(O)-. The number of substituents is not particularly limited and may range from 1 to the maximum number of valences that can be saturated with substituents. It is typically 1, 2 or 3 and usually 1 or 2, most typically 1.

Unless specified otherwise, all valencies of the individual atoms of the compounds or moieties described herein are saturated. In particular, they are saturated by the indicated binding partners. If no binding partner or a too small number of binding partners is indicated, the remaining valencies of the respective atom are saturated by a corresponding number of hydrogen atoms.

Unless specified otherwise, chiral compounds and moieties may be present in the form of a pure stereoisomer or in the form of a mixture of stereoisomers, including the 50:50 racemate. In the context of the present invention, references to specific stereoisomers are to be understood as references to compounds or moieties, wherein the designated stereoisomer is present in at least 90% enantiomeric excess (ee), more preferably at least 95 %ee and most preferably 100 %ee, wherein %ee is defined as $(|R-S|)/(R+S)*100\%$ with R and S representing the amount of moles of the respective enantiomers.

Molecules in which free rotation around one or more bonds is restricted may exist as distinct stable conformational isomers called rotamers. Rotamers often form around amide bonds due to the double bond character of the N-C bond. Unless specified otherwise, compounds that can form rotamers, may be present as individual (stable) rotamers or as a mixture of rotamers.

The term “**specifically binds**” as used herein refers to the ability of the compound of the invention to bind to its target (i.e., P-cadherin) with greater affinity than it binds to a non-target. In certain embodiments, specific binding refers to binding for P-cadherin with an affinity that is at least 10, 50, 100, 250, 500, or 1000 times greater than the affinity for a non-target.

The term "**binding affinity**" refers to the strength of interaction between the compound of the invention and its target (i.e., P-cadherin) as a function of its association and dissociation constants. Higher affinities typically mean that the compound has a fast on rate (association) and a slow off rate (dissociation). Binding affinities can change under various physiological conditions due to changes that occur to the compound or target under those conditions. Binding affinities of the compound may also change when effectors and/or linkers are attached.

The term "**inhibit**" or "**inhibition of**" as used herein means to reduce by a measurable amount, or to prevent entirely.

The term "**therapeutically effective amount**" refers to an amount of compound effective to treat a disease or disorder in a mammal. In the case of cancer, the therapeutically effective amount of the compound may reduce the number of cancer cells; reduce the tumor size; inhibit (i.e., slow to some extent and preferably stop) cancer cell infiltration into peripheral organs; inhibit (i.e., slow to some extent and preferably stop) tumor metastasis; inhibit, to some extent, tumor growth; and/or relieve to some extent one or more of the symptoms associated with the cancer. When the compound comprises a drug, and to the extent the drug may inhibit growth and/or kill existing cancer cells, it may be cytostatic and/or cytotoxic. For cancer therapy, efficacy can, for example, be measured by assessing the time to disease progression (TTP) and/or determining the response rate (RR).

The term "**cytotoxic drug**" (or "cytotoxic agent") as used herein refers to a substance that has cytotoxic activity and causes destruction of cells. The term is intended to include radioactive isotopes, chemotherapeutic agents, and toxins such as small molecule toxins or enzymatically active toxins of bacterial, fungal, plant or animal origin, including synthetic analogs and derivatives thereof.

The term "**diagnostically active compound**" as used herein refers to a compound which is suitable for or useful in the diagnosis of a disease.

The term "**diagnostic agent**" or "**diagnostically active agent**" as used herein refers to a compound which is suitable for or useful in the diagnosis of a disease.

The term "**therapeutically active compound**" as used herein refers to a compound which is suitable for or useful in the treatment of a disease.

The term "**therapeutic agent**" or "**therapeutically active agent**" refers to a compound which is suitable for or useful in the treatment of a disease.

The term “**theragnostically active compound**” as used herein refers to a compound which is suitable for or useful in both the diagnosis and therapy of a disease.

The terms “**theragnostic agent**” or “**theragnostically active agent**” as used herein refers to a compound which is suitable for or useful in both the diagnosis and therapy of a disease.

- 5 The term “**thera(g)nostics**” as used herein refers to a method for the combined diagnosis and therapy of a disease; preferably, the combined diagnostically and therapeutically active compounds used in theragnostics are radiolabeled.

The expression “**treatment of a disease**” as used refers to treatment and/or prevention of a disease, e.g., cancer.

- 10 The expression “**disease involving P-cad**” as used herein refers to a disease where cells including, but not limited to, tumor cells expressing, preferably in an upregulated manner, P-cad and tissue either expressing P-cad, preferably in an upregulated manner respectively, are either a or the cause for the disease and/or the symptoms of the disease, or are part of the pathology underlying the disease. A preferred P-cad-expressing cell is a tumor cell. In an embodiment of the disease, preferably when used in connection with the treatment, treating and/or therapy of the disease, affecting the cells, the tissue and pathology, respectively, results in cure, treatment or amelioration of the disease and/or the symptoms of the disease. In an embodiment of the disease, preferably when used in connection with the diagnosis and/or diagnosing of the disease, labeling of the P-cad-expressing cells and/or of the P-cad-expressing tissue allows discriminating or distinguishing said cells and/or said tissue from healthy or P-cad-non-expressing cells and/or healthy or P-cad-non-expressing tissue. More preferably such discrimination or distinction forms the basis for said diagnosis and diagnosing, respectively. In an embodiment thereof, “labeling” means the interaction of a detectable label either directly or indirectly with the P-cad-expressing cells and/or with the P-cad-expressing tissue or tissue containing such P-cad-expressing cells; more preferably such interaction involves or is based on the interaction of the label or a compound bearing such label with P-cad.
- 15
20
25

- The term “**target cell**” as used herein refers to a cell which is expressing P-cad and is a or the cause for a disease and/or the symptoms of a disease, or is part of the pathology underlying a disease. P-cad expression can be determined by methods known in the art such as Western blotting.
- 30

The term “**non-target cell**” as used herein refers to a cell which is either not expressing P-cad and/or is not a or the cause for a disease and/or the symptoms of a disease, or is part of the pathology underlying a disease.

The term “**neoplasm**” as used herein refers an abnormal new growth of cells. Typically, the cells in a neoplasm grow more rapidly than normal cells and will continue to grow if not treated. A neoplasm may be benign or malignant.

The term “**tumor**” as used herein refers to a mass lesion that may be benign or malignant.

- 5 The terms “**cancer**” and “**cancerous**” as used herein refer to or describe the physiological condition or disorder in mammals that is typically characterized by unregulated cell growth. A “tumor” comprises one or more cancerous cells. A “cancer” may be a malignant neoplasm.

- 10 The term “**patient**” as used herein refers to a subject to which the compound of the invention is administered. Examples of a “patient” include, but are not limited to, a human, rat, mouse, guinea pig, non-human primate, pig, goat, cow, horse, dog, cat, bird and fowl. Typically, a patient is a rat, mouse, dog, non-human primate or human. In some aspects, the patient is a human in need of an effective amount of the compound.

- 15 The terms “**treat**” or “**treatment**” unless otherwise indicated by context, refer to therapeutic treatment and prophylactic measures to prevent relapse, wherein the object is to inhibit or slow down (lessen) an undesired physiological change or disorder, such as, for example, the development or spread of cancer. For purposes of this invention, beneficial or desired clinical results include, but are not limited to, alleviation of symptoms, diminishment of extent of disease, stabilized (i.e., not worsening) state of disease, delay or slowing of disease progression, amelioration or palliation of the disease state, and remission (whether partial or total), whether
20 detectable or undetectable. “Treatment” can also mean prolonging survival as compared to expected survival if not receiving treatment. Those in need of treatment include those already with the condition or disorder as well as those prone to have the condition or disorder.

- 25 In the context of cancer, the term “**treating**” includes any or all of: inhibiting growth of tumor cells, cancer cells, or of a tumor; inhibiting replication of tumor cells or cancer cells, lessening of overall tumor burden or decreasing the number of cancerous cells, and ameliorating one or more symptoms associated with the disease.

Unless the context dictates otherwise, and/or alternative meanings are explicitly provided herein, all terms are intended to have meanings generally accepted in the art, as reflected by IUPAC Gold Book (status of 1st Nov. 2023), or the Dictionary of Chemistry, Oxford, 8th Ed.

2. COMPOUND OF THE INVENTION

The present invention relates to a chemical compound having a structure represented by the general formula (I). In particular, the present inventors have surprisingly found that the compound of the invention shows a high binding affinity for P-cadherin while not binding E-cadherin, the closest protein relative which is commonly expressed in adult epithelial tissues. That is, the compound of the invention contains a peptide motif (also referred to as “targeting unit”) that leads to strong interactions with the P-cadherin protein – i.e., polar, hydrophobic interactions – resulting in high binding affinity and selectivity for P-cadherin. In addition, the present inventors have surprisingly found that the compound of the invention shows other properties that makes it particularly suitable for use in the diagnosis and/or therapy of diseases in which P-cadherin is involved. Such other properties include a high stability in plasma deriving from high stability against both soluble plasma proteases and membrane-bound peptidases on the surface of blood cells such as neutral endopeptidase (NEP). Moreover, hydrophobic and hydrophilic moieties are well balanced, providing a favorable solubility profile. Having a low molecular weight, the compound of the invention - without being bound by any theory - is believed to have a short plasma half life and to efficiently penetrate into (tumor) tissues, thus, having a favorable pharmacokinetic profile for a diagnostic and therapeutic application: while being able to efficiently transport a radioactive or cytotoxic payload into the tumor and to provide a long retention in the tumor tissue, excessive compound will be quickly eliminated via the renal pathway and not remain in the circulation and/or expose healthy tissues to the toxic payload. Surprisingly, the inventors found that the compound of the invention, when equipped with a chelator and a radionuclide, shows little to no accumulation of radioactivity in any healthy tissues. This is even true for the kidneys that are involved in the excretion pathway and particularly prone to accumulate peptidic compounds. This limits, prevents and/or suppresses renal toxicity and makes the compound of the invention particularly suitable for use in therapeutic applications.

Without being bound by any theory, it is considered that the peptide structure formed by the residues Xaa1 to Xaa7, as defined herein, results in a high affinity for P-cadherin. In particular, the present inventors consider that the following core structures or motifs lead to a compound having a high affinity for P-cadherin:

- 1) the α -amino (= the peptide N-terminus) or the α -hydroxy group of Xaa1 (defined as (a) a residue of an L- α -amino acid comprising a side chain or (b) a residue of an L- α -hydroxy acid comprising a side chain) promotes an important polar interaction with the protein (without

being bound by any theory, it is believed that this interaction mimics the salt bridge formed between the side chain of E89 (i.e. E196 in SEQ ID NO: 1) and the protein N-terminus as described by Vendome, *et al.*, *PNAS*, **2014**, *111*: E4175 in the context of the self-dimerization mechanism), particularly when forming a salt bridge between the negatively charged side chain of E89 and the positively charged α -amino group of Xaa1; and/or

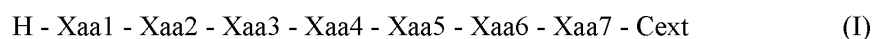
2) without being bound by any theory, the side chain of Xaa2 (defined as a residue of an L- α -amino acid comprising a side chain, which comprises an optionally substituted indole or benzothiophene group) is believed to occupy the Trp-binding pocket of P-cadherin (mimicking W2 in the natural sequence as described by Kudo, *et al.*, *Structure*, **2016**, *24*, 1523 in the context of the self-dimerization mechanism); and/or

3) the side chain of Xaa4 (defined as a residue of an L- α -amino acid comprising a hydrophobic side chain) is believed to promote a hydrophobic contact with the protein; and/or

4) the side chain of Xaa7 (defined as a residue of an L- α -amino acid comprising a side chain, which comprises an aryl or heteroaryl group) is believed to promote another hydrophobic contact with the protein.

The present inventors have also found that preferred compounds of the invention comprise certain core structures or motifs as will be described further below. When the compounds comprise these core structure or motifs, the technical effects in terms of binding affinity for P-cadherin are even more pronounced.

The present invention relates to a compound comprising a peptide, or to a peptide represented by the following formula (I):



or a pharmaceutically acceptable salt thereof,

wherein,

Xaa1 is (a) a residue of an α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid, preferably a residue of an L- α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid,

wherein Nmod is a group containing one or more selected from hydrogen, carbon, nitrogen oxygen and sulfur and optionally comprises a group Z^{1a} ,

preferably Nmod is selected from the group consisting of -H, -CH₂COOH, -CH₂CONH₂, -CH₂C(O) Z^{1a} , -(CH₂)_cNH(Z^{1a}), a (C₁-C₆) alkyl group and a group of formula -(CH₂)_cR^{1e},

wherein R^{1e} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{1e} optionally comprises a group Z^{1a} , preferably R^{1e} is selected from the group consisting of -H, -NH(Z^{1a}), a polar and a charged group, more preferably R^{1e} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z^{1a}) and -NH-C(NH)NH₂,

wherein c = 2, 3, 4 or 5, wherein optionally one or two hydrogens of said two, three, four or five -CH₂- groups of the -(CH₂)_cR^{1e} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_cR^{1e} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably c = 2 or 3,

more preferably Nmod is selected from the group consisting of -H, a (C₁-C₃)alkyl group and -CH₂COOH, still more preferably Nmod is selected from the group consisting of a methyl group and -CH₂COOH, and most preferably Nmod is a methyl group,

wherein the side chain of Xaa1 optionally comprises a group Z^{1b} , wherein the side chain of Xaa1 and the α -nitrogen atom of Xaa1 optionally form a heterocycle, with the proviso that if the side chain of Xaa1 and the α -nitrogen atom of Xaa1 form a heterocycle, the N-terminal modification group Nmod is absent, or

(b) a residue of an L- α -hydroxy acid comprising a side chain,

wherein the side chain optionally comprises a group Z^{1b} ,

H is a hydrogen atom which is covalently linked to (a) the α -nitrogen atom of Xaa1 if Xaa1 is a residue of an α -amino acid comprising a side chain and one N-terminal modification

group Nmod covalently attached to the α -nitrogen atom of the amino acid, or (b) the oxygen atom of the α -hydroxy group of Xaa1 if Xaa1 is a residue of an L- α -hydroxy acid comprising a side chain,

5 Xaa2 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid, wherein the side chain comprises an optionally substituted indole or benzothiophene group,

10 Xaa3 is a residue of an L- α -amino acid comprising a side chain, wherein the side chain optionally comprises a group Z^2 ,

Xaa4 is a residue of an L- α -amino acid comprising a hydrophobic side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,
15 wherein the side chain of Xaa4 and the α -nitrogen atom of Xaa4 optionally form a heterocycle,

Xaa5 is a residue of an α -amino acid comprising a side chain,
20 wherein the side chain optionally comprises a group Z^3 ,

Xaa6 is a residue of an α -amino acid comprising a side chain, preferably a residue of an L- α -amino acid comprising a side chain,
wherein the side chain optionally comprises a group Z^4 ,
25 wherein the side chain of Xaa6 and the α -nitrogen atom of Xaa6 optionally form a heterocycle,

Xaa7 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,
30 wherein the side chain comprises an aryl or heteroaryl group, preferably a bicyclic aryl or heteroaryl group,

Cext is a moiety covalently attached to the carbonyl group of Xaa7, which is represented by one of the formulae (Ia), (Ib), (Ic), (Id), and (Ie):

	Cterm	(Ia)
	Xaa8 - Cterm	(Ib)
	Xaa8 - Xaa9 - Cterm	(Ic)
	Xaa8 - Xaa9 - Xaa10 - Cterm	(Id)
5	Xaa8 - Xaa9 - Xaa10 - Xaa11	(Ie)

wherein,

Xaa8 is a residue of glycine or a residue of an L- α -amino acid comprising a side chain,

10 wherein the side chain optionally comprises a group Z^5 ,

Xaa9 is a residue of an α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid, preferably Xaa9 is a residue of an L- α -amino acid comprising a side chain and optionally
15 comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^6 ,

wherein the side chain of Xaa9 and the α -nitrogen atom of Xaa9 optionally form a heterocycle,

20 Xaa10 is a residue of an α -amino acid comprising a side chain, preferably a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^7 ,

wherein the side chain of Xaa10 and the α -nitrogen atom of Xaa10 optionally form a heterocycle,

25

Xaa11 is a residue of a compound comprising an amino group and optionally comprising a carbonyl group, wherein the amino group is covalently attached to the carbonyl group of Xaa10,

30 wherein if the carbonyl group is present, said carbonyl group is covalently attached to a C-terminal modification group Cterm,

preferably Xaa11 is

(a) a residue of an α -amino acid comprising a side chain, a C-terminal modification group Cterm and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^8 ,

wherein the side chain of Xaa11 and the α -nitrogen atom of Xaa11 optionally form a heterocycle, or

(b) a residue of an optionally substituted β -amino alcohol, or

5 (c) a residue of a (C₁-C₆)alkylamine such as cyclohexylamine, or of a (C₂-C₆)alkyldiamine such as ethylenediamine,

Cterm is a C-terminal modification group, which is selected from the group consisting of -NH₂, -OH, a group Z^9 , and -NHR^{Cterm}, wherein R^{Cterm} is selected from
10 group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group,

each group Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9 is independently an effector E, such as a chelator, which may optionally comprise a linker moiety L that covalently links the effector
15 E to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, the effector E being preferably selected from the group consisting of:

(α) a chromophore, wherein the chromophore is preferably selected from (α 1) a phosphorophore and (α 2) a fluorophore such as fluorescein or rhodamine; and

(β) a chelator optionally comprising a radionuclide; and

20 (γ) a drug, preferably a cytotoxic drug; and

(δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

In a preferred embodiment, the compound of the invention comprises at least one group Z, i.e.
25 at least one of Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and/or Z^9 , wherein each group Z independently comprise an optional linker moiety L.

In a more preferred embodiment, the compound of the invention comprises one or two groups Z, i.e. one or two selected from the group consisting of Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and
30 Z^9 which independently comprise an optional linker moiety L. In particular, the compound of the invention may comprise one or two groups Z selected from Z^3 , Z^4 and Z^5 , preferably from Z^3 and Z^5 .

More preferably, the compound of the invention comprises one group Z selected from the group consisting of Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9 , which optionally comprises a linker moiety L. In particular, the compound of the invention may comprise one group Z selected from Z^3 , Z^4 and Z^5 . Most preferably, the compound of the invention comprises a group Z^3 .

5

In a preferred embodiment, each group Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9 is independently a chelator which may optionally comprise a linker moiety L, wherein the chelator comprises a radionuclide (as described below), and wherein preferably the chelator is independently a residue of DOTA, DOTAGA, DOTAM, Crown, DOTP, NOTA, NODAGA, NODA-MPAA, HBED, TETA, CB-TE2A, DTPA, CHX-A''-DTPA, DFO, Macropa, HOPO ligand platform, TRAP, THP, AAZTA, DATA, NOPO, PCTA, PSC, sarcophagine, FSC, DEPA, DE4TA, NETA, NE3TA, H₄octapa, H₄CHXoctapa, H₄pypa, H₄py₄pa, HYNIC, N_xS_{4-x} (N₄, N₂S₂, N₃S), ^{99m}Tc(CO)₃-chelators.

More preferably, each group Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9 is independently a chelator which may optionally comprise a linker moiety L, wherein the chelator comprises a radionuclide (as described below), and wherein the chelator is independently a residue of is a residue of DOTA, DOTAGA, DOTAM, Crown, NOTA, NODAGA, NODA-MPAA, CB-TE2A, CHX-A''-DTPA, DFO, Macropa, THP, AAZTA, NOPO, PCTA, PSC, sarcophagine, NETA, H₄CHXoctapa, H₄pypa and N₄, preferably of DOTA, DOTAGA, DOTAM, NOTA, NODAGA, Macropa, Crown, NOPO, PCTA, PSC and N₄, more preferably of DOTA, DOTAM, Macropa, NOTA, PSC or NODAGA, and most preferably of DOTA.

In one embodiment, Cterm is attached to the carbonyl group of the residue Xaa7 in formula (Ia), Xaa8 in formula (Ib), Xaa9 in formula (Ic), Xaa10 in formula (Id) and Xaa11 in formula (Ie) via a linker L comprising one amino acid or a dipeptide, preferably the linker is absent or consists of one or two α -amino acids, most preferably the linker is absent or consists of one or two α -amino acids, wherein at least one of the amino acids comprises a polar or charged side chain.

In one embodiment, Cext is a moiety covalently attached to the carbonyl group of Xaa7, which is represented by any one of the formulae (Ia), (Ib), (Ic), (Id), (Ie), (If) and (Ig):

Cterm	(Ia)
Xaa8 - Cterm	(Ib)
Xaa8 - Xaa9 - Cterm	(Ic)

Xaa8 - Xaa9 - Xaa10 - Cterm	(Id)
Xaa8 - Xaa9 - Xaa10 - Xaa11	(Ie)
Xaa8 - Xaa9 - Xaa10 - Xaa11 - Xaa12 - Cterm	(If)
Xaa8 - Xaa9 - Xaa10 - Xaa11 - Xaa12 - Xaa13 - Cterm	(Ig)

5 wherein,

Cterm, Xaa8, Xaa9 and Xaa10 are as defined above with respect to formulae (Ia) to (Ie), and

- if Cext is represented by the formula (Ie):

10 Xaa11 is a residue of a compound comprising an amino group and optionally a carbonyl group, wherein the amino group is covalently attached to the carbonyl group of Xaa10,

wherein if the carbonyl group is present, said carbonyl group is covalently attached to a C-terminal modification group Cterm,

preferably Xaa11 is

15 (a) a residue of an α -amino acid comprising a side chain, a C-terminal modification group Cterm and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^8 ,

20 wherein the side chain of Xaa11 and the α -nitrogen atom of Xaa11 optionally form a heterocycle, or

(b) a residue of an optionally substituted β -amino alcohol, or

(c) a residue of a (C₁-C₆)alkylamine such as cyclohexylamine, or of a (C₂-C₆)alkyldiamine such as ethylenediamine,

25 • if Cext is represented by the formula (If):

Xaa11 is a residue of an α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^8 ,

30 wherein the side chain of Xaa11 and the α -nitrogen atom of Xaa11 optionally form a heterocycle, and

Xaa12 is a residue of an amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^{10} ,

wherein a C-terminal modification group Cterm is covalently attached to the carbonyl group of Xaa12, preferably Xaa12 is a residue of an α -amino acid comprising a polar or charged side chain, wherein the side chain optionally comprises a group Z^{10} ;

5

- if Cext is represented by the formula (Ig):

Xaa11 is a residue of an α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

10

wherein the side chain optionally comprises a group Z^8 ,

wherein the side chain of Xaa11 and the α -nitrogen atom of Xaa11 optionally form a heterocycle,

Xaa12 is a residue of an amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^{10} ,

15

preferably Xaa12 is a residue of an α -amino acid comprising a polar or charged side chain,

Xaa13 is a residue of an amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^{11} ,

wherein a C-terminal modification group Cterm is covalently

20

attached to the carbonyl group of Xaa13,

preferably Xaa13 is a residue of an α -amino acid comprising a polar or charged side chain, wherein the side chain optionally comprises a group Z^{11} ,

more preferably at least one of Xaa12 and Xaa13 is a residue of an α -amino acid comprising a polar or charged side chain,

25

each group Z^8 , Z^{10} and Z^{11} is independently an effector E, such as a chelator, which may optionally comprise a linker moiety L that covalently links the effector E to Xaa11, Xaa12 or Xaa13, the effector E being preferably selected from the group consisting of:

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(α) a chromophore, wherein the chromophore is preferably selected from (α 1) a phosphorophore and (α 2) a fluorophore such as fluorescein or rhodamine; and

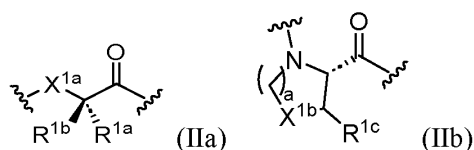
(β) a chelator optionally comprising a chelated radionuclide; and

(γ) a drug, preferably a cytotoxic drug; and

- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

In a preferred embodiment, the compound is represented by the formula (I), wherein at least one, e.g., one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve or thirteen of Xaa1, Xaa2, Xaa3, Xaa4, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is defined as follows:

- (1) Xaa1 is a residue of formula (IIa) or formula (IIb):



wherein,

in formula (IIa):

R^{1a} is selected from the group consisting of -H, a (C₁-C₆)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula $-(CH_2)_bR^{1d}$, preferably R^{1a} is selected from the group consisting of -H and a group of formula $-(CH_2)_bR^{1d}$,

wherein R^{1d} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{1d} optionally comprises a group Z^{1b} , preferably R^{1d} is selected from the group consisting of -H, a polar and a charged group, more preferably R^{1d} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -C(O)Z^{1b}, -NH₂, -NH(Z^{1b}), -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -SO₃H, -NH-CONH₂, -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

wherein $b = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_bR^{1d}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_bR^{1d}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $b = 1, 2$ or 3 ,

R^{1b} is selected from the group consisting of -H and a methyl group, with the proviso that if R^{1a} is -H, R^{1b} is -H, preferably R^{1b} is -H,

X^{1a} is selected from the group consisting of -O- and -N(Nmod)-, preferably X^{1a} is -N(Nmod)-,

wherein Nmod is selected from the group consisting of -H, -CH₂COOH, -CH₂CONH₂, -CH₂C(O)Z^{1a}, -(CH₂)_cNHZ^{1a}, a (C₁-C₆)alkyl group and a group of formula -(CH₂)_cR^{1c},

wherein R^{1c} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{1c} optionally comprises a group Z^{1a}, preferably R^{1c} is selected from the group consisting of -H, -NH(Z^{1a}), a polar and a charged group, more preferably R^{1c} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z^{1a}) and -NH-C(NH)NH₂,

wherein c = 2, 3, 4 or 5, wherein optionally one or two hydrogens of said two, three, four or five -CH₂- groups of the -(CH₂)_cR^{1c} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_cR^{1c} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably c = 2 or 3,

preferably Nmod is selected from the group consisting of -H, a (C₁-C₃)alkyl group and -CH₂COOH, more preferably Nmod is selected from the group consisting of a methyl group and -CH₂COOH, most preferably Nmod is a methyl group,

in formula (IIb):

a = 1, 2 or 3, preferably a = 1 or 2, more preferably a = 2,

R^{1c} selected from the group consisting of -H, -OH, -F, -NH₂ and a (C₁-C₃)alkyl group, preferably R^{1c} is -H,

X^{1b} is selected from the group consisting of -CH₂-, -CH(OH)-, -CH(F)-, -CH(NH₂)-, -CH(NHR^{1g})-, -NH-, -S-, -SO-, -SO₂- and -O-, wherein R^{1g} is a methyl, an acetyl (Ac) or a group Z^{1b}, preferably X^{1b} is -CH₂-,

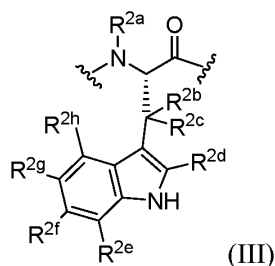
preferably Xaa1 is a residue of an *N*_α-methyl-L-α-amino acid, an *N*_α-(carboxymethyl)-L-α-amino acid, iminodiacetic acid (Ida) or (S)-piperidine-2-carboxylic acid (Pip),

more preferably Xaa1 is a residue of an amino acid selected from the group consisting of Pip, *N*-methyl-glycine (Nmg), *N*-methyl-L-alanine (Nma), *N*-methyl-L-serine (Nms), *N*-

methyl-L-aspartic acid (Nmd), *N*-methyl-L-glutamic acid (Nme), *N*_α-methyl-L-lysine (Nmk), *N*_α-methyl-*N*_ε-methyl-L-lysine (Nmk(Me)), *N*_α-methyl-*N*_ε,*N*_ε-dimethyl-L-lysine (KMe3a), *N*_α-methyl-*N*_ε,*N*_ε,*N*_ε-trimethyl-L-lysine (KMe4), *N*_α-methyl-L-ornithine (Nmo), *N*_α-methyl-*N*_δ-methyl-L-ornithine (Nmo(Me)), *N*_α-(carboxymethyl)-L-ornithine (Cmo), *N*_α-(carboxymethyl)-*N*_δ-methyl-L-ornithine (Cmo(Me)), (*S*)-4-amino-2-(methylamino)butanoic acid (Mdab), *N*-(carboxymethyl)-L-alanine (Mida), (*S*)-2,4-bis(methylamino)butanoic acid (Mdab(Me)), (*S*)-3-amino-2-(methylamino)propanoic acid (Mdap), (*S*)-2,3-bis(methylamino)propanoic acid (Mdap(Me)), (*S*)-azepane-2-carboxylic acid (Azp), (*S*)-morpholine-3-carboxylic acid (Mor) and Ida,

most preferably Xaa1 is a residue of an amino acid selected from the group consisting of Pip and Nma,

(2) Xaa2 is a residue of an amino acid of formula (III):



wherein,

in formula (III):

R^{2a} is selected from the group consisting of H and a (C₁-C₂)alkyl group, preferably R^{2a} is selected from the group consisting of -H and a methyl group, more preferably R^{2a} is -H,

R^{2b} and R^{2c} are each independently selected from the group consisting of -H and a methyl group,

R^{2d} and R^{2e} are each independently selected from the group consisting of -H, -OH, -F, -Cl and a methyl group,

R^{2f} , R^{2g} and R^{2h} are each independently selected from the group consisting of -H and -F,

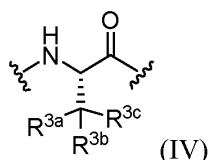
preferably each of R^{2b} , R^{2c} , R^{2d} , R^{2e} , R^{2f} , R^{2g} and R^{2h} is -H,

preferably Xaa2 is a residue of an amino acid selected from the group consisting of Trp,

7-chloro-L-tryptophan (7Clw), 7-methyl-L-tryptophan (7Mw), 7-fluoro-L-tryptophan (7Fw),

(2S,3S)- β -methyl-L-tryptophan (Bmw) and N-methyl-L-tryptophan (Nmw), more preferably Xaa2 is a residue of Trp,

(3) Xaa3 is a residue of an amino acid of formula (IV):



wherein,

in formula (IV):

R^{3a} and R^{3b} (a) are each independently selected from the group consisting of -H, -F and a (C₁-C₂)alkyl group, or

(b) form together a 3-, 4-, 5- or 6-membered carbocycle or heterocycle, preferably a 3-, 4- or 5-membered carbocycle,

preferably R^{3a} and R^{3b} are each independently selected from the group consisting of H and a methyl group,

R^{3c} is selected from the group consisting of a halogen atom, a polar group, a negatively charged group and an aliphatic group, wherein R^{3c} optionally comprises a group Z²,

preferably R^{3c} is selected from the group consisting of -OH, -COOH, -SO₃H, -CONH(R^{3d}), -NH-CONH(R^{3d}), -SO₂NH(R^{3d}), -F, -Cl,

a (C₁-C₄)alkyl group, a (C₃-C₄)carbocycle group and -NH(Z²), wherein R^{3c} is optionally linked to the β -carbon atom of Xaa3 by a linker

comprising one, two or three -CH₂- groups and one hydrogen atom of said one, two, or three -CH₂- groups that link R^{3c} to the β -carbon atom of

Xaa3 is optionally replaced by a substituent selected from the group consisting of -F, -OH, -COOH, a methyl group, and/or wherein one of

the said -CH₂- groups, which is different from the R^{3c} adjacent -CH₂- group, is optionally replaced by -O-, -S-, -SO- or -SO₂-, wherein R^{3d} is

selected from the group consisting of -H, a methyl group and a (C₂-C₄)alkyl group, wherein said (C₂-C₄)alkyl group is optionally substituted

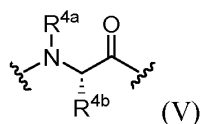
by one or two substituents independently selected from the group consisting of -OH, -COOH, -SO₃H and -CONH₂,

more preferably R^{3c} is selected from the group consisting of a methyl group, $-\text{COOH}$, $-\text{CONH}_2$ and $-\text{SO}_3\text{H}$ and R^{3c} is optionally linked to the β -carbon atom of Xaa3 by one $-\text{CH}_2-$ group, most preferably R^{3c} is selected from the group consisting of $-\text{COOH}$ and $-\text{SO}_3\text{H}$ and the optional linker is absent,

preferably Xaa3 is a residue of an amino acid selected from the group consisting of Asp, L-cysteic acid (Cya), β,β -dimethyl-L-aspartic acid (Dmd), β,β -dimethyl-L-cysteic acid (Penox), Glu, Val and Asn,

more preferably Xaa3 is a residue of an amino acid selected from the group consisting of Penox, Asp and Cya,

(4) Xaa4 is a residue of an amino acid of formula (V):



wherein,

in formula (V):

R^{4a} is selected from the group consisting of $-\text{H}$ and a $(\text{C}_1\text{-C}_3)$ alkyl group, preferably R^{4a} is selected from the group consisting of $-\text{H}$ and a methyl group,

R^{4b} is selected from the group consisting of a $(\text{C}_3\text{-C}_8)$ alkyl group, a $(\text{C}_3\text{-C}_7)$ carbocycle, an aryl group, a heteroaryl group and a group of formula $-(\text{CH}_2)_dR^{4c}$, wherein one or two hydrogen atoms of R^{4b} are optionally replaced by atoms or groups each and independently selected from the group consisting of $-\text{NH}_2$, $-\text{OH}$, a halogen atom and a $(\text{C}_1\text{-C}_3)$ alkyl group, preferably $-\text{F}$, $-\text{Cl}$ or a methyl group, preferably R^{4b} is selected from the group consisting of a $(\text{C}_3\text{-C}_5)$ alkyl group, a $(\text{C}_5\text{-C}_6)$ carbocycle, a phenyl group, a 2-thienyl group and a group of formula $-(\text{CH}_2)_dR^{4c}$,

wherein $d = 1, 2$ or 3 , preferably $d = 1$,

wherein R^{4c} is selected from the group consisting of a $(\text{C}_3\text{-C}_7)$ carbocycle, an aryl group and a heteroaryl group, wherein one or two hydrogen atoms

of R^{4c} are optionally replaced by atoms or groups each and independently selected from the group consisting of $-NH_2$, $-OH$, a halogen atom and a (C_1-C_3) alkyl group, preferably $-F$, $-Cl$ or a methyl group, preferably R^{4c} is selected from the group consisting of a (C_4-C_6) carbocycle, a phenyl group and a 2-thienyl group, and
 5 wherein one $-CH_2-$ group of R^{4b} is optionally replaced by an atom selected from the group consisting of $-O-$ and $-S-$,

or alternatively, R^{4a} and R^{4b} form together an optionally up to two-fold substituted 5-, 6-, or 7-membered heterocycle, wherein each substituent is each and independently selected from the group consisting of a (C_1-C_3) alkyl group, a halogen atom, $-NH_2$ and $-OH$, preferably R^{4a} and R^{4b} form together a 6-membered unsubstituted heterocycle,

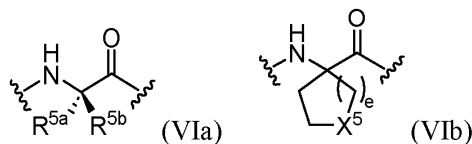
preferably Xaa4 is a residue of an amino acid selected from the group consisting of L-neopentyl-glycine (Npg), *N*-methyl-L-neopentyl-glycine (Mnpg), Leu, *N*-methyl-L-leucine (Nml), L-homoleucine (Hle), Phe, L- γ -ethyl-leucine (Gel), *N*-methyl-L- γ -ethyl-leucine (Mgel), L-norleucine (Nle), *N*-methyl-L-norleucine (NMB), L-cyclobutyl-alanine (Cba), L-cyclopentyl-alanine (Cpa), L-cyclohexyl-alanine (Cha), L-cyclopentyl-glycine (Cpg) and L-cyclohexyl-glycine (Chg),
 20

more preferably Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Leu, Mnpg, Nml, and Chg,

even more preferably Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnpg and Nml,

most preferably Xaa4 is a residue of Npg,

(5) Xaa5 is a residue of an amino acid of formula (VIa) or of (VIb):



wherein,

in formula (VIa):

R^{5a} is selected from the group consisting of -H, a (C₁-C₆)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula $-(CH_2)_fR^{5c}$, preferably R^{5a} selected from the group consisting of -H and a group of formula $-(CH_2)_fR^{5c}$,

5 wherein R^{5c} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{5c} optionally comprises a group Z^3 , preferably R^{5c} is selected from the group consisting of -H, -NH(Z^3), -C(O) Z^3 , a polar group and a charged group, more preferably R^{5c} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -C(O) Z^3 , -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺,
10 -NH(Z^3), -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

wherein $f = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_fR^{5c}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_fR^{5c}$ group which is different from the terminal -CH₂- groups of is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $f = 1, 2, 3$ or 4 ,

R^{5b} is selected from the group consisting of -H and a group of formula $-(CH_2)_gR^{5d}$,

20 wherein R^{5d} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{5d} optionally comprises a Z^3 group, preferably R^{5d} is selected from the group consisting of -H, a polar group and a charged group, more preferably R^{5d} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -SO₃H, -NH₂,
25 -NH(CH₃), -N(CH₃)₂ and -N(CH₃)₃⁺, most preferably R^{5d} is selected from the group consisting of -H and -OH,

wherein $g = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_gR^{5d}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_gR^{5d}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably R^{5b} is selected from the group consisting of -H and a methyl group, preferably $g = 1, 2, 3$ or 4 , more preferably $g = 1$ or 2 ,

30

in formula (VIb):

$e = 0, 1, 2$ or 3 , preferably $e = 2$,

X^5 is absent or selected from the group consisting of $-N(R^{5e})-$, $-O-$, $-S-$, $-SO-$, $-SO_2-$ and $-CH_2-$,

5 wherein R^{5e} is selected from the group consisting of $-H$, $-Ac$, (C_1-C_3) alkyl group and a group Z^3 , preferably R^{5e} is selected from the group consisting of $-H$, a methyl group and a group Z^3 , more preferably R^{5e} is a group Z^3 ,

10 wherein optionally one or two hydrogen atoms of any $-CH_2-$ groups that form the side chain are each and individually replaced by $-F$ or a methyl group,

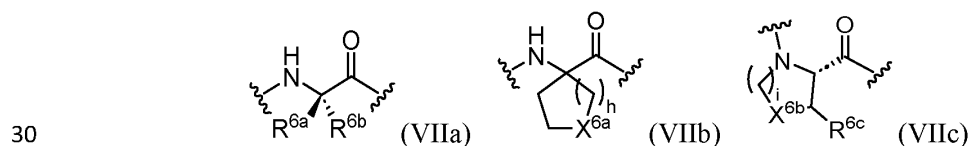
preferably X^5 is selected from the group consisting of $-N(R^{5e})-$, $-O-$ and $-CH_2-$, more preferably X^5 is $-N(R^{5e})-$,

15 preferably Xaa5 is a residue of an α,α -dialkylamino acid of formula (VIa), an L - α -amino acid of formula (VIa) comprising a polar or charged side chain, or an amino acid of formula (VIb),

more preferably Xaa5 is a residue of an amino acid selected from the group consisting of 2-aminoisobutyric acid (Aib), α -methyl-serine (Ams), α -methyl-lysine (Amk), (S) -2,3-diaminopropionic acid (Dap), (S) -2,4-diaminobutyric acid (Dab), L -ornithine (Orn), Lys, N_δ -methyl-L-ornithine (Orn(Me)), N_δ,N_δ -dimethyl-L-ornithine (OMe2), $N_\delta,N_\delta,N_\delta$ -trimethyl-L-ornithine (OMe3), N_ϵ -methyl-L-lysine (Lys(Me)), N_ϵ,N_ϵ -dimethyl-L-lysine (KMe2), $N_\epsilon,N_\epsilon,N_\epsilon$ -trimethyl-L-lysine (KMe3), Gly, Ala, Ser, 4-amino-tetrahydropyran-4-carboxylic acid (Thp), 4-amino-piperidine-4-carboxylic acid (Apc), 1-amino-1-cyclohexane carboxylic acid (Egz),
25 Apc(Z^3), Lys(Z^3), Orn(Z^3), Dab(Z^3) and Dap(Z^3),

most preferably Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z^3), Orn(Z^3) and Apc(Z^3),

(6) Xaa6 is a residue of an amino acid of formula (VIIa), (VIIb) or (VIIc):



wherein,

in formula (VIIa):

R^{6a} is selected from the group consisting of -H and a group of formula $-(CH_2)_kR^{6d}$,

5 wherein R^{6d} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{6d} optionally comprises a group Z^4 , preferably R^{6d} is selected from the group consisting of -H, a polar group and a charged group, more preferably R^{6d} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂ and -N(CH₃)₃⁺, most preferably R^{6d} is selected from the group consisting of -H, -OH, -CONH₂ and -COOH,

10 wherein $k = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_kR^{6d}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_kR^{6d}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $k = 1, 2$ or 3 , more preferably $k = 1$ or 2 ,

preferably R^{6a} is selected from the group consisting of -H and a methyl group, more preferably R^{6a} is -H,

20 R^{6b} is selected from the group consisting of -H, a (C₁-C₆)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula $-(CH_2)_mR^{6e}$, preferably R^{6b} is selected from the group consisting of -H and a group of formula $-(CH_2)_mR^{6e}$,

25 wherein R^{6e} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{6e} optionally comprises a group Z^4 , preferably R^{6e} is selected from the group consisting of -H, -NH(Z^4), -C(O) Z^4 , a polar group and a charged group, more preferably R^{6e} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -C(O) Z^4 , -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z^4) and -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

30 wherein $m = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_mR^{6e}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_mR^{6e}$ group which is different from the

terminal -CH₂- groups of is optionally replaced by -O-, -S-, -SO- or -SO₂-
 , preferably m = 1, 2, 3 or 4,

in formula (VIIb):

5 h = 0, 1, 2 or 3, preferably h = 2,

X^{6a} is absent or selected from the group consisting of -NR^{6f}-, -O-, -S-
 , -SO-, -SO₂- and -CH₂-,

wherein R^{6f} is selected from the group consisting of -H, -Ac, (C₁-
 C₃)alkyl group and a group Z⁴, preferably R^{6f} is selected from the group
 10 consisting of -H, a methyl group and a group Z⁴, more preferably R^{6f} is a
 group Z⁴,

wherein optionally one or two hydrogen atoms of any of
 the -CH₂- groups that form the side chain are each and individually
 substituted by -F or a methyl group,
 15 preferably X^{6a} is selected from the group consisting of -N(R^{6f})-, -O- and
 -CH₂-, more preferably X^{6a} is -N(R^{6f})-,

in formula (VIIc):

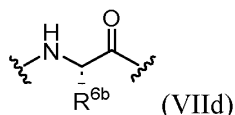
R^{6c} is selected from the group consisting of -H, -OH, -F, -NH₂, a (C₁-
 20 C₃)alkyl group, preferably R^{6c} is -H,

X^{6b} is selected from the group consisting of -CH(R^{6g})-, -S-, -O-, -NH-,
 preferably X^{6b} is -CH(R^{6g})-,

wherein R^{6g} is selected from the group consisting of -H, -OH, -F,
 -NH₂ and a (C₁-C₃)alkyl group, preferably R^{6g} is -H,

25 i = 1 or 2, preferably i = 1,

preferably Xaa6 is a residue of an L-amino acid amino acid of formula (VIIa), and more
 preferably Xaa6 is a residue of an L-amino acid of formula (VIId):



30

wherein,

in formula (VIId):

R^{6b} is selected from the group consisting of -H and a group of formula -
 $(CH_2)_mR^{6e}$,

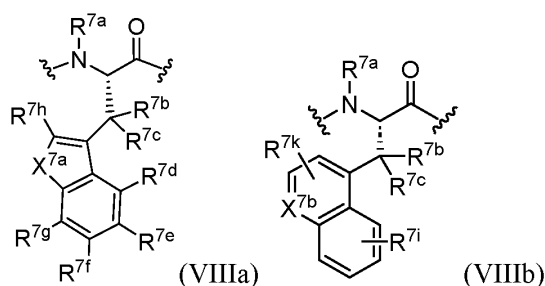
wherein R^{6e} is selected from the group consisting of -H, a polar
 group, a charged group and a hydrophobic group, wherein R^{6e} optionally
 comprises a group Z^4 , preferably R^{6e} is selected from the group consisting
 of -H, -NH(Z^4), -C(O) Z^4 , a polar and a charged group, more preferably
 R^{6e} is selected from the group consisting of -H, -OH, -CONH₂, -COOH,
 -C(O) Z^4 , -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺,
 -NH(Z^4) and -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

wherein $m = 1, 2, 3, 4$ or 5 , wherein optionally one or two
 hydrogen atoms of said one, two, three, four or five -CH₂- groups of the
 -(CH₂)_m R^{6e} group are replaced by a methyl group, and/or wherein
 one -CH₂- group of the -(CH₂)_m R^{6e} group which is different from the
 terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-,
 preferably $m = 1, 2, 3$ or 4 , more preferably $m = 1$ or 2 ,

preferably Xaa6 is a residue of an amino acid selected from the group consisting of Asn,
 Asp, Glu, Gln, Cya, Lys, Lys(Me), Orn, Orn(Me), Dab, Dab(Me), Gly, Ala, Thr, Ser, Leu, Tyr,
 Apc, Lys(Z^4) and Apc(Z^4),

more preferably Xaa6 is a residue of an amino acid selected from the group consisting of Ala,
 Asn, Asp, Cya, Lys, Lys(Z^4), Lys(Me), Thr and Ser, and most preferably a residue of Asn,

(7) Xaa7 is a residue of an amino acid of formula (VIIIa) or of formula (VIIIb):



wherein,

in formula (VIIIa):

R^{7a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group,
 preferably R^{7a} is -H or a methyl group, more preferably R^{7a} is -H,

5 R^{7b} and R^{7c} are each independently selected from the group consisting of
 -H and a methyl group, preferably R^{7b} and R^{7c} are -H,
 R^{7d} , R^{7e} , R^{7f} and R^{7h} are each independently selected from the group
 consisting of -H, -OH, a (C₁-C₂)alkyl group, -OCH₃ and a halogen atom,
 preferably R^{7d} , R^{7e} , R^{7f} and R^{7h} are each independently selected from the
 group consisting of -H, -F, -Cl, -Br and a methyl group, more preferably
 R^{7d} , R^{7e} and R^{7h} are each independently selected from the group
 consisting of -H, -F, -Cl and a methyl group, most preferably R^{7d} , R^{7e} and
 R^{7h} are -H, and R^{7f} is selected from the group consisting of -Br and -Cl,
 10 R^{7g} is selected from the group consisting of -H, -F and -Cl, more
 preferably R^{7g} is selected from the group consisting of -H and -F, most
 preferably R^{7g} is -H,
 X^{7a} selected from the group consisting of -NH- and -S-, preferably X^{7a} is
 -NH-,

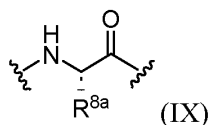
15

in formula (VIIIb):

R^{7a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group,
 preferably R^{7a} is -H or a methyl group, more preferably R^{7a} is -H,
 R^{7b} and R^{7c} are each independently selected from the group consisting of
 20 -H and a methyl group, preferably R^{7b} and R^{7c} are -H,
 R^{7i} and R^{7k} are each independently selected from the group consisting of
 -H, -OH, a methyl group, -OCH₃ and a halogen atom, preferably R^{7i} and
 R^{7k} are each independently selected from the group consisting of -H, -F,
 -Cl and a methyl group, more preferably R^{7i} and R^{7k} are -H,
 25 X^{7b} selected from the group consisting of -CH= and -N=, preferably X^{7b}
 is -CH=,

preferably Xaa7 is a residue of an amino acid selected from the group consisting of Trp,
 6-chloro-L-tryptophan (6Clw), L-6-methyl-tryptophan (6Mw), 5-chloro-L-tryptophan (5Clw),
 30 3-benzothienyl-L-alanine (Bta), 3-(1-naphthyl)-L-alanine (1Ni), 5-fluoro-L-tryptophan (5Fw),
 6-fluoro-L-tryptophan (6Fw), 7Fw and 6-bromo-L-tryptophan (Brw6),
 more preferably Xaa7 is a residue of an amino acid selected from the group consisting
 of 6Clw and Brw6,

(8) Xaa8 is a residue of an amino acid of formula (IX):



wherein,

5 in formula (IX):

R^{8a} is selected from the group consisting of -H and a group of formula -
(CH₂)_nR^{8b},

10 wherein R^{8b} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{8b} optionally comprises a group Z⁵, preferably R^{8b} is selected from the group consisting of -H, -NH(Z⁵), -C(O)Z⁵, a polar group and a charged group, more preferably R^{8b} comprises a positively charged group, and even more preferably R^{8b} is selected from the group consisting of -N(R^{8c})(R^{8d}), -N(CH₃)₂(R^{8e})⁺, -NH(Z⁵), -N(R^{8f})-C(N(R^{8g}))-N(R^{8h})(R⁸ⁱ) and a piperidinyl group, 15 wherein R^{8c}, R^{8d}, R^{8f}, R^{8g}, R^{8h} and R⁸ⁱ are each independently selected from the group consisting of -H and a (C₁-C₃)alkyl group, preferably R^{8c} and R^{8d} are each independently selected from the group consisting of -H and a methyl group, wherein R^{8e} is selected from the group consisting of a (C₁-C₃)alkyl group and -(CH₂)₃SO₃⁻, most preferably R^{8b} is selected from the group consisting of -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH-C(NH)NH₂, -NH-C(NH)-NH(CH₃), -NH-C(NH)-N(CH₃)₂ and -NH-C(N(CH₃))-NH(CH₃), 20

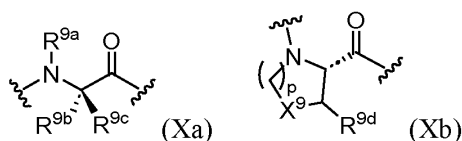
25 wherein n = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogens of said one, two, three, four or five -CH₂- groups of the -(CH₂)_nR^{8b} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_nR^{8b} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably n = 1, 2, 3 or 4, more preferably n = 3 or 4,

30 preferably Xaa8 is a residue of an amino acid selected from the group consisting of Lys, Lys(Me), KMe2, KMe3, (S)-3-((5-amino-5-carboxypentyl)dimethylammonio)propane-1-sulfonate (Kzw), Lys(Z⁵), 3-(4-piperidinyl)-L-alanine (Egg), Arg, N_ω-methyl-L-arginine

(Arg(Me)), *N*_ω,*N*_ω-dimethyl-L-arginine (RMe2), L-homoarginine (Har), Orn, Orn(Me), OMe2, OMe3, γ-(2-pyridyl)-L-ornithine (Opy), L-homolysine (Hly), L-citrulline (Cit), Gln, L-homocitrulline (Hci), *N*_ω,*N*_ω-dimethyl-L-arginine (Egd) and *N*_ε-iso-propyl-L-lysine (Kip),

more preferably Xaa8 is a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Lys(Z⁵), Arg(Me) and RMe2, and most preferably a residue of KMe3,

(9) Xaa9 is a residue of an amino acid of formula (Xa) or (Xb):



wherein,

in formula (Xa):

R^{9a} is selected from the group consisting of -H and (C₁-C₂)alkyl group, preferably R^{9a} is -H,

R^{9b} is selected from the group consisting of -H and a group of formula -(CH₂)_oR^{9e},

wherein R^{9e} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{9e} optionally comprises a group Z⁶, preferably R^{9e} is selected from the group consisting of -H, an aryl group, a heteroaryl group, a polar group and a charged group, more preferably R^{9e} is selected from the group consisting of -H, an aryl group, a heteroaryl group, -OH, -CONH₂, -COOH, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z⁴) and -NH-C(NH)NH₂, most preferably R^{9e} is selected from the group consisting of -H, a methyl group, an aryl group and a heteroaryl group, wherein said aryl group or heteroaryl group is optionally substituted by 1 or 2 substituents, preferably 1 substituent, wherein, preferably, each substituent is independently selected from the group consisting of a halogen atom, a (C₁-C₃)alkyl group, -CN, -COOH, -CONH₂, -NO₂, -NH₂, -NH-CN-NH₂, -SO₃H, -OH, an -O(C₁-C₃)alkyl group, wherein each substituent is optionally linked, preferably via a methylene group,

to the aryl group or heteroaryl group, and wherein said aryl group or heteroaryl group preferably comprises one aromatic ring,

wherein $o = 1, 2, 3$ or 4 , wherein optionally one or two hydrogen atoms of said one, two, three or four $-\text{CH}_2-$ groups of the $-(\text{CH}_2)_o\text{R}^{9e}$ group are replaced by a methyl group, and/or wherein one $-\text{CH}_2-$ group of the $-(\text{CH}_2)_o\text{R}^{9e}$ group which is different from the terminal $-\text{CH}_2-$ groups is optionally replaced by $-\text{O}-$, $-\text{S}-$, $-\text{SO}-$ or $-\text{SO}_2-$, preferably $o = 1$ or 2 , more preferably $o = 1$,

R^{9c} is selected from the group consisting of $-\text{H}$ and methyl group, with the proviso that if R^{9b} is $-\text{H}$, R^{9c} is $-\text{H}$, preferably R^{9c} is $-\text{H}$,

in formula (Xb):

R^{9d} is selected from the group consisting of $-\text{H}$, $-\text{OH}$, $-\text{F}$, $-\text{NH}_2$, a (C_1-C_3) alkyl group, preferably R^{9d} is $-\text{H}$,

X^9 is selected from the group consisting of $-\text{CH}(\text{R}^{9f})-$, $-\text{S}-$, $-\text{O}-$, $-\text{NH}-$, preferably X^9 is $-\text{CH}(\text{R}^{9f})-$,

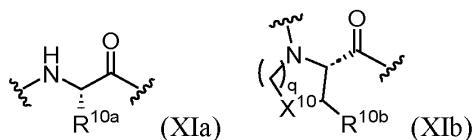
wherein R^{9f} is selected from the group consisting of $-\text{H}$, $-\text{OH}$, $-\text{F}$, $-\text{NH}_2$ and a methyl group, preferably R^{9f} is $-\text{H}$,

$p = 1$ or 2 , preferably $p = 1$,

preferably Xaa9 is a residue of an amino acid selected from the group consisting of Gly, Ala, Dab, Glu, Pro, 4-carbamoyl-L-phenylalanine (Pcnf), Lys(Z^6) and Tyr,

more preferably Xaa9 is a residue of an amino acid selected from the group consisting of Ala and Tyr,

(10) Xaa10 is a residue of formula (XIa) or (XIb):



wherein,

in formula (XIa):

R^{10a} is selected from the group consisting of $-\text{H}$ and a group of formula $-(\text{CH}_2)_r\text{R}^{10c}$,

wherein R^{10c} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{10c} optionally comprises a group Z^7 , preferably R^{10c} is selected from the group consisting of -NH(Z^7), a polar group and a charged group, more preferably R^{10c} is a negatively charged group, most preferably R^{10c} is selected from the group consisting of -COOH and -SO₃H,

wherein $r = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂) _{r} R^{10c} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂) _{r} R^{10c} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $r = 1, 2, 3$ or 4 , more preferably $r = 1$ or 2 ,

in formula (XIb):

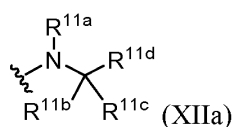
R^{10b} is selected from the group consisting of -H, -OH, -F, -NH₂, a (C₁-C₃)alkyl group, preferably R^{10b} is -H,

X^{10} is selected from the group consisting of -CH(R^{10d})-, -S-, -O-, -NH-, preferably X^9 is -CH(R^{10d})-,

wherein R^{10d} is selected from the group consisting of -H, -OH, -F, -NH₂ and a methyl group, preferably R^{10d} is -H, $q = 1$ or 2 , preferably $q = 1$,

preferably Xaa10 is a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Ser, Lys and Thr, more preferably Xaa10 is a residue of an amino acid selected from the group consisting of Asp and Cya,

(11) Xaa11 is a residue of formula (XIIa):



wherein,
in formula (XIIa):

R^{11a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, preferably R^{11a} is -H,

R^{11b} is selected from the group consisting of -H, a (C₁-C₈)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula -(CH₂)_sR^{11e},

wherein R^{11e} is selected from the group consisting of a polar group, a charged group and a hydrophobic group, wherein R^{11e} optionally comprises a group Z⁸, preferably R^{11e} is a hydrophobic group, more preferably R^{11e} is selected from the group consisting of an aryl group and a heteroaryl group,

wherein s = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂)_sR^{11e} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_sR^{11e} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably s = 1, 2 or 3, more preferably s = 1, or

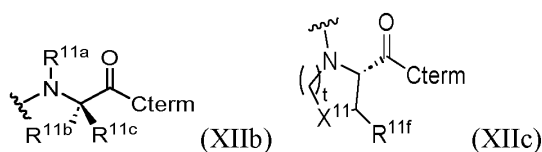
alternatively, R^{11a} and R^{11b} form together an optionally up to two-fold substituted 5-, 6-, or 7-membered heterocycle, wherein each substituent is each and independently selected from the group consisting of a (C₁-C₃)alkyl group, a halogen atom, -NH₂ and -OH, preferably R^{11a} and R^{11b} form together a 5- or 6-membered heterocycle,

R^{11c} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, preferably R^{11c} is -H, or

alternatively, R^{11b} and R^{11c} form together an optionally substituted 3-, 4-, 5-, 6- or 7-membered carbocycle or heterocycle, preferably a 6-membered carbocycle, wherein each substituent is independently selected from the group consisting of a (C₁-C₂)alkyl group, a halogen atom, -NH₂ and -OH,

R^{11d} is selected from the group consisting of -H, a (C₁-C₂)alkyl group, -CH₂(OH) and -C(O)-Cterm, preferably R^{11d} is -C(O)-Cterm,

preferably Xaa11 is a residue of formula (XIIf) or (XIIf):



wherein

in formula (XIIb):

5 R^{11a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, preferably R^{11a} is -H,

R^{11b} is selected from the group consisting of -H, a (C₁-C₈)alkyl group, a (C₃-C₇)carbocycle, a (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula $-(CH_2)_sR^{11e}$,

10 wherein R^{11e} is selected from the group consisting of a polar group, a charged group and a hydrophobic group, wherein R^{11e} optionally comprises a group Z^8 , preferably R^{11e} is a hydrophobic group, more preferably R^{11e} is selected from the group consisting of an aryl group and a heteroaryl group, wherein said aryl group or heteroaryl group is
15 optionally substituted by atoms or groups each and independently selected from the group consisting of -NH₂, -OH, -CN, -CONH₂, -OCH₃, a halogen atom and a (C₁-C₃)alkyl group,

wherein s = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_sR^{11e}$
20 group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_sR^{11e}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably s = 1, 2 or 3, more preferably s = 1,

R^{11c} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, with the proviso that if R^{11b} is -H, R^{11c} is -H, preferably R^{11c} is -H, or
25 alternatively, R^{11b} and R^{11c} form together an optionally substituted 3-, 4-, 5-, 6- or 7-membered carbocycle or heterocycle, preferably a 6-membered carbocycle, wherein each substituent is independently selected from the group consisting of a (C₁-C₂)alkyl group, a halogen atom, -NH₂ and -OH,
30

Cterm is selected from the group consisting of -NH₂, -OH, -NHR^{cterm} and a group Z^9 , wherein R^{cterm} is selected from group consisting of a (C₁-

C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group, preferably Cterm is NH₂,

in formula (XIIC):

5 R^{11f} is selected from the group consisting of -H, -OH, -F, -NH₂, a (C₁-C₃)alkyl group, preferably R^{11f} is -H,
 X¹¹ is selected from the group consisting of -CH(R^{11g})-, -S-, -O-, -NH-, preferably X¹⁰ is -CH(R^{11g})-,
 wherein R^{11g} is selected from the group consisting of -H, -OH, -F,
 10 -NH₂ and a methyl group, preferably R^{11g} is -H,
 t = 1, 2 or 3, preferably t = 1 or 2,
 Cterm is selected from the group consisting of -NH₂, -OH, -NHR^{cterm} and a group Z⁹, wherein R^{cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group, preferably Cterm is NH₂,

more preferably Xaa11 is a residue of an L-α-amino acid of formula (XIIB), wherein R^{11b} is a group of formula -CH₂R^{11e}, wherein R^{11e} is selected from the group consisting of an aryl group and a heteroaryl group, preferably a phenyl group or 2-thienyl group, wherein said
 20 aryl group or heteroaryl group is optionally substituted by one or more, e.g., one, two or three, atoms or groups each and independently selected from the group consisting of -NH₂, -OH, -CN, -CONH₂, -OCH₃, a halogen atom and a (C₁-C₃)alkyl group, preferably the aryl group or heteroaryl group is unsubstituted or has one substituent, and wherein preferably Cterm is NH₂,

even more preferably Xaa11 is a residue of an amino acid selected from the group
 25 consisting of Thi, Phe, Egz, ortho-chloro-phenylalanine (Ocf), 3-(1-naphthyl)alanine (1Ni), 3-fluoro-phenylalanine (Mff), 2-cyano-L-phenylalanine (Onf), 2-fluoro-L-phenylalanine (Off), Ala and Val, with Cterm being preferably -NH₂,

and even more preferably Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, with Cterm being preferably -NH₂,

30 most preferably Xaa11 is Thi, with Cterm being preferably -NH₂,

(12) Cext is a moiety of formula (Ie), and

(13) Cterm is selected from the group consisting of -NH₂, -OH, -NHR^{Cterm} and a group Z⁹, wherein R^{Cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group, preferably Cterm is NH₂,

5

wherein, in the above formulae, each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently an effector E, such as a chelator, which may optionally comprise a linker moiety L that covalently links the effector E to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, the effector E being preferably selected from the group consisting of:

- 10 (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells,
- 15 NK cells and/or phagocytotic cells.

In a preferred embodiment, the compound is represented by the formula (I), wherein at least one, e.g., one, two, three or four, of Xaa2, Xaa4, Xaa7 and Cext is defined as follows:

- (1) Xaa2 is a residue of an amino acid of formula (III) as described above, preferably
- 20 a residue of an amino acid selected from the group consisting of Trp, 7Clw, 7Mw, 7Fw, Bmw and Nmww, more preferably a residue of Trp,

- (2) Xaa4 is a residue of an amino acid of formula (V) as described above, preferably a residue of an amino acid selected from the group consisting of Npg, Mnp, Leu, Nml, Hle,
- 25 Phe, Gel, Mgel, Nle, NMB, Cba, Cpa, Cha, Cpg and Chg, more preferably a residue of an amino acid selected from the group consisting of Npg, Leu, Mnp, Nml, and Chg, even more preferably a residue of an amino acid selected from the group consisting of Npg, Mnp and Nml, and most preferably a residue of Npg,

- (3) Xaa7 is a residue of an amino acid of formula (VIIIa) or formula (VIIIb) as described above, preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and 6-bromo-L-tryptophan Brw6, more
- 30

preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6, and

(4) Cext is a moiety of formula (Ie) as described above.

5

In a more preferred embodiment, the compound is represented by the formula (I), wherein Xaa2, Xaa4, Xaa7 and Cext are defined as follows:

(1) Xaa2 is a residue of an amino acid of formula (III) as described above, preferably a residue of an amino acid selected from the group consisting of Trp, 7Clw, 7Mw, 7Fw, Bmw and Nmw, more preferably a residue of Trp,

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(2) Xaa4 is a residue of an amino acid of formula (V) as described above, preferably a residue of an amino acid selected from the group consisting of Npg, Mnp, Leu, Nml, Hle, Phe, Gel, Mgel, Nle, NMB, Cba, Cpa, Cha, Cpg and Chg, more preferably a residue of an amino acid selected from the group consisting of Npg, Leu, Mnp, Nml, and Chg, even more preferably a residue of an amino acid selected from the group consisting of Npg, Mnp and Nml, and most preferably a residue of Npg,

15

(3) Xaa7 is a residue of an amino acid of formula (VIIIa) or formula (VIIIb) as described above, preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6, and

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(4) Cext is a moiety of formula (Ie) as described above.

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In a more preferred embodiment, the compound is represented by the formula (I), wherein at least one, e.g., one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve or thirteen, of Xaa1, Xaa2, Xaa3, Xaa4, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:

(a) Xaa1 is a residue of an N_{α} -methyl-L- α -amino acid, an N_{α} -(carboxymethyl)-L- α -amino acid, Ida or Pip, preferably a residue of an amino acid selected from the group consisting of Pip, Nmg, Nma, Nms, Nmd, Nme, Nmk, Nmk(Me), KMe3a, KMe4, Nmo, Nmo(Me), Cmo, Cmo(Me), Mdab, Mdab(Me), Mida, Mdap, Mdap(Me), Azp, Mor and Ida, more

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preferably a residue of an amino acid selected from the group consisting of Pip and Nma, and still more preferably a residue of Pip,

- (b) Xaa2 is a residue of an amino acid selected from the group consisting of Trp, 7Clw, 7Mw, 7Fw, Bmw and Nmw, and preferably Xaa2 is a residue of Trp,
- 5 (c) Xaa3 is a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Dmd, Penox, Val and Asn, and preferably a residue of an amino acid selected from the group consisting of Penox, Asp and Cya,
- (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnp, Leu, Nml, Hle, Phe, Gel, Mgel, Nle, NMB, Cba, Cpa, Cha, Cpg and Chg, preferably a
10 residue of an amino acid selected from the group consisting of Npg, Leu, Mnp, Nml and Chg, and more preferably a residue of an amino acid selected from the group consisting of Npg, Mnp and Nml, and most preferably Xaa4 is a residue of Npg,
- (e) Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Amk, Dap, Dab, Orn, Orn(Me), OMe2, OMe3, Lys, Lys(Me), KMe2, KMe3, Gly, Ala, Ser, Thp, Apc, Egz, Apc(Z³), Lys(Z³), Orn(Z³), Dab(Z³) and Dap(Z³), and preferably a
15 residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC, DOTAMGAM, PSCGA and NOTA, more preferably Xaa5 is a residue of an amino acid
20 selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC), Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),
- (f) Xaa6 is a residue of an amino acid selected from the group consisting of Asn, Asp, Glu, Gln, Cya, Lys(Me), Orn, Orn(Me), Dab, Dab(Me), Gly, Ala, Thr, Ser, Leu, Tyr, Apc, Lys(Z⁴) and Apc(Z⁴), wherein Z⁴ is preferably selected from the group consisting of
25 DOTA, DOTAM and PSC, and Xaa6 is preferably a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Z⁴), Lys(Me), Thr and Ser, and more preferably Xaa6 is a residue of Asn,
- (g) Xaa7 is a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, and preferably a residue of an amino
30 acid selected from the group consisting of 6Clw and Brw6,

- (h) Xaa8 is a residue of an amino acid selected from the group consisting of Lys, Lys(Me), KMe2, KMe3, Kzw, Egg, Arg, Arg(Me), Lys(Z⁵), RMe2, Har, Orn, Orn(Me), OMe2, OMe3, Opy, Hly, Cit, Gln, Hci, Egd and Kip, wherein Z⁵ is preferably selected from the group consisting of DOTA, DOTAM and PSC, preferably Xaa8 is a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Arg(Me), Lys(Z⁵) and RMe2, and more preferably a residue of KMe3,
- (i) Xaa9 is a residue of an amino acid selected from the group consisting of Gly, Ala, Dab, Glu, Pro, Pcnf, Lys(Z⁶) and Tyr, wherein Z⁶ is preferably selected from the group consisting of DOTA, DOTAM and PSC, and preferably Xaa 9 is a residue of an amino acid selected from the group consisting of Ala and Tyr,
- (j) Xaa10 is a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Thr, Lys and Ser, and preferably a residue of an amino acid selected from the group consisting of Asp and Cya,
- (k) Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe, Ocf, INi, Mff, Onf, Off, Ala and Val, preferably a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, and more preferably a residue of Thi,
- (l) Cext is a moiety of formula (Ie), and
- (m) Cterm is NH₂.
- 20 In an even more preferred embodiment, the compound is represented by the formula (I), wherein at least one, e.g., one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve or thirteen, of Xaa1, Xaa2, Xaa3, Xaa4, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:
- (a) Xaa1 is a residue of an amino acid selected from the group consisting of Pip and Nma, and preferably a residue of Pip,
- (b) Xaa2 is a residue of Trp,
- (c) Xaa3 is a residue of an amino acid selected from the group consisting of Penox, Asp and Cya,
- (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Leu, Mnpg, Nml and Chg, and preferably a residue of an amino acid selected from the group consisting of Npg, Mnpg and Nml, and more preferably Xaa4 is a residue of Npg,

- (e) Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC, DOTAMGAM, PSCGA and NOTA, preferably Xaa5 is a residue of an amino acid selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC), Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),
- (f) Xaa6 is a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Z⁴), Lys(Me), Thr and Ser, wherein Z⁴ is preferably selected from the group consisting of DOTA, DOTAM and PSC, and preferably Xaa6 is a residue of Asn,
- (g) Xaa7 is a residue of an amino acid selected from the group consisting of 6Clw and Brw6,
- (h) Xaa8 is a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Arg(Me), Lys(Z⁵) and RMe2, wherein Z⁵ is preferably selected from the group consisting of DOTA, DOTAM and PSC, and preferably a residue of KMe3,
- (i) Xaa9 is a residue of an amino acid selected from the group consisting of Ala and Tyr,
- (j) Xaa10 is a residue of an amino acid selected from the group consisting of Asp and Cya,
- (k) Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, and preferably a residue of Thi,
- (l) Cext is a moiety of formula (Ie), and
- (m) Cterm is NH₂.

Still more preferably, the compound is represented by the formula (1), wherein at least one, e.g., one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve or thirteen, of Xaa1, Xaa2, Xaa3, Xaa4, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:

- (a) Xaa1 is a residue of Pip,
- (b) Xaa2 is a residue of Trp,
- (c) Xaa3 is a residue of an amino acid selected from the group consisting of Penox, Asp and Cya,

- (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnp and Nml, and preferably Xaa4 is a residue of Npg,
- (e) Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC, DOTAMGAM, PSCGA and NOTA, preferably Xaa5 is a residue of an amino acid selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC), Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),
- (f) Xaa6 is a residue of Asn,
- (g) Xaa7 is a residue of an amino acid selected from the group consisting of 6Clw and Brw6,
- (h) Xaa8 is a residue of KMe3,
- (i) Xaa9 is a residue of an amino acid selected from the group consisting of Ala and Tyr,
- (j) Xaa10 is a residue of an amino acid selected from the group consisting of Asp and Cya,
- (k) Xaa11 is a residue of Thi,
- (l) Cext is a moiety of formula (Ie), and
- (m) Cterm is NH₂.

In an even more preferred embodiment, the compound is represented by the formula (1), wherein Xaa2, Xaa4, Xaa7 and Cext are defined as follows:

- (b) Xaa2 is a residue of an amino acid selected from the group consisting of Trp, 7Clw, 7Mw, 7Fw, Bmw and Nmw, and preferably Xaa2 is a residue of Trp, and
- (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnp, Leu, Nml, Hle, Phe, Gel, Mgel, Nle, NMB, Cba, Cpa, Cha, Cpg and Chg, preferably a residue of an amino acid selected from the group consisting of Npg, Leu, Mnp, Nml and Chg, more preferably a residue of an amino acid selected from the group consisting of Npg, Mnp and Nml, and most preferably a residue of Npg, and
- (g) Xaa7 is a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, and preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6, and

- (l) Cext is a moiety of formula (Ie).

Still more preferably, the compound is represented by the formula (1), wherein Xaa2, Xaa4, Xaa7 and Cext are defined as follows:

- 5 (b) Xaa2 is a residue of Trp, and
- (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Leu, Mnp, Nml and Chg, preferably a residue of an amino acid selected from the group consisting of Npg, Mnp and Nml, and most preferably a residue of Npg, and
- (g) Xaa7 is a residue of an amino acid selected from the group consisting of 6Clw and Brw6,
10 and
- (l) Cext is a moiety of formula (Ie).

In a preferred embodiment, the compound is represented by the formula (I), wherein

- (a) Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Glu-Npg, Pip-Trp-Val-Npg, Pip-Trp-Asn-Npg,
15 Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Leu, Pip-Trp-Cya-Leu, Pip-Trp-Glu-Leu, Pip-Trp-Val-Leu, Pip-Trp-Asn-Leu, Pip-Trp-Dmd-Leu, Pip-Trp-Asp-Chg, Pip-Trp-Cya-Chg, Pip-Trp-Glu-Chg, Pip-Trp-Val-Chg, Pip-Trp-Asn-Chg, Pip-Trp-Dmd-Chg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Glu-Nml, Pip-Trp-Val-Nml, Pip-Trp-Asn-Nml,
20 Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnp, Pip-Trp-Cya-Mnp, Pip-Trp-Glu-Mnp, Pip-Trp-Val-Mnp, Pip-Trp-Asn-Mnp, Pip-Trp-Dmd-Mnp, Nma-Trp-Asp-Npg, Nma-Trp-Cya-Npg, Nma-Trp-Glu-Npg, Nma-Trp-Val-Npg, Nma-Trp-Asn-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Leu, Nma-Trp-Cya-Leu, Nma-Trp-Glu-Leu, Nma-Trp-Val-Leu, Nma-Trp-Asn-Leu, Nma-Trp-Dmd-Leu, Nma-Trp-Asp-Chg, Nma-Trp-Cya-Chg,
25 Nma-Trp-Glu-Chg, Nma-Trp-Val-Chg, Nma-Trp-Asn-Chg, Nma-Trp-Dmd-Chg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Glu-Nml, Nma-Trp-Val-Nml, Nma-Trp-Asn-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnp, Nma-Trp-Cya-Mnp, Nma-Trp-Glu-Mnp, Nma-Trp-Val-Mnp, Nma-Trp-Asn-Mnp, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnp, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnp, Nmo(Me)-Trp-Cya-Mnp, Nmg-Trp-Cya-Mnp, Nmo(Me)-Trp-Cya-Nml, Nmg-Trp-Cya-Nml, Nmo(Me)-Trp-Asp-Mnp, Nmg-Trp-Asp-Mnp,
30 Nmo(Me)-Trp-Asp-Nml, Nmg-Trp-Asp-Nml, Nmo(Me)-Trp-Asp-Npg, Nmg-Trp-Asp-

- Npg, Nmo(Me)-Trp-Penox-Npg, Nmg-Trp-Penox-Npg, Nmo(Me)-Trp-Penox-Nml, Nmg-Trp-Penox-Nml, Nmo(Me)-Trp-Penox-Mnpg, Nmg-Trp-Penox-Mnpg, Nmo(Me)-Trp-Cya-Npg, Nmg-Trp-Cya-Npg, Azp-Trp-Cya-Mnpg, Mor-Trp-Cya-Mnpg, Azp-Trp-Cya-Nml, Mor-Trp-Cya-Nml, Azp-Trp-Asp-Mnpg, Mor-Trp-Asp-Mnpg, Azp-Trp-Asp-Nml, Mor-Trp-Asp-Nml, Azp-Trp-Asp-Npg, Mor-Trp-Asp-Npg, Azp-Trp-Penox-Npg, Mor-Trp-Penox-Npg, Azp-Trp-Penox-Nml, Mor-Trp-Penox-Nml, Azp-Trp-Penox-Mnpg, Mor-Trp-Penox-Mnpg, Nma-Trp-Dmd-Mnpg, Azp-Trp-Cya-Npg, and Mor-Trp-Cya-Npg, and
- (b) Xaa7 is preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6.

In a more preferred embodiment, the compound is represented by the formula (I), wherein

- (a) Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnpg, Pip-Trp-Cya-Mnpg, Pip-Trp-Dmd-Mnpg, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnpg, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnpg, Nma-Trp-Asp-Npg, Nma-Trp-Cya-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnpg, Nma-Trp-Cya-Mnpg and Nma-Trp-Dmd-Mnpg, and
- (b) Xaa7 is preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6.

Still more preferably, the compound is represented by the formula (I), wherein

- (a) Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Glu-Npg, Pip-Trp-Val-Npg, Pip-Trp-Asn-Npg, Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Leu, Pip-Trp-Cya-Leu, Pip-Trp-Glu-Leu, Pip-Trp-Val-Leu, Pip-Trp-Asn-Leu, Pip-Trp-Dmd-Leu, Pip-Trp-Asp-Chg, Pip-Trp-Cya-Chg, Pip-Trp-Glu-Chg, Pip-Trp-Val-Chg, Pip-Trp-Asn-Chg, Pip-Trp-Dmd-Chg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Glu-Nml, Pip-Trp-Val-Nml, Pip-Trp-Asn-Nml, Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnpg, Pip-Trp-Cya-Mnpg, Pip-Trp-Glu-Mnpg, Pip-Trp-Val-Mnpg, Pip-Trp-Asn-Mnpg, Pip-Trp-Dmd-Mnpg, Nma-Trp-Asp-Npg, Nma-

- Trp-Cya-Npg, Nma-Trp-Glu-Npg, Nma-Trp-Val-Npg, Nma-Trp-Asn-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Leu, Nma-Trp-Cya-Leu, Nma-Trp-Glu-Leu, Nma-Trp-Val-Leu, Nma-Trp-Asn-Leu, Nma-Trp-Dmd-Leu, Nma-Trp-Asp-Chg, Nma-Trp-Cya-Chg, Nma-Trp-Glu-Chg, Nma-Trp-Val-Chg, Nma-Trp-Asn-Chg, Nma-Trp-Dmd-Chg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Glu-Nml, Nma-Trp-Val-Nml, Nma-Trp-Asn-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnpg, Nma-Trp-Cya-Mnpg, Nma-Trp-Glu-Mnpg, Nma-Trp-Val-Mnpg, Nma-Trp-Asn-Mnpg, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnpg, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnpg, Nmo(Me)-Trp-Cya-Mnpg, Nmg-Trp-Cya-Mnpg, Nmo(Me)-Trp-Cya-Nml, Nmg-Trp-Cya-Nml, Nmo(Me)-Trp-Asp-Mnpg, Nmg-Trp-Asp-Mnpg, Nmo(Me)-Trp-Asp-Nml, Nmg-Trp-Asp-Nml, Nmo(Me)-Trp-Asp-Npg, Nmg-Trp-Asp-Npg, Nmo(Me)-Trp-Penox-Npg, Nmg-Trp-Penox-Npg, Nmo(Me)-Trp-Penox-Nml, Nmg-Trp-Penox-Nml, Nmo(Me)-Trp-Penox-Mnpg, Nmg-Trp-Penox-Mnpg, Nmo(Me)-Trp-Cya-Npg, Nmg-Trp-Cya-Npg, Azp-Trp-Cya-Mnpg, Mor-Trp-Cya-Mnpg, Azp-Trp-Cya-Nml, Mor-Trp-Cya-Nml, Azp-Trp-Asp-Mnpg, Mor-Trp-Asp-Mnpg, Azp-Trp-Asp-Nml, Mor-Trp-Asp-Nml, Azp-Trp-Asp-Npg, Mor-Trp-Asp-Npg, Azp-Trp-Penox-Npg, Mor-Trp-Penox-Npg, Azp-Trp-Penox-Nml, Mor-Trp-Penox-Nml, Azp-Trp-Penox-Mnpg, Mor-Trp-Penox-Mnpg, Nma-Trp-Dmd-Mnpg, Azp-Trp-Cya-Npg, and Mor-Trp-Cya-Npg, and
- (b) Xaa7 is preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6, and
- at least one, e.g., one, two, three, four, five, six, seven or eight, of Xaa5, Xaa6, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:
- (e) Xaa5 is a residue of a residue of an amino acid of formula (VIa) or (VIb) as described above, preferably an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC, DOTAMGAM, PSCGA and NOTA, more preferably Xaa5 is a residue of an amino acid selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC), Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),

- (f) Xaa6 is a residue of an amino acid of formula (VIIa), (VIIb) or (VIIc) as described above, preferably a residue of an L-amino acid of formula (VIId) as described above, more preferably a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Me), Lys(Z⁴), Thr and Ser, most preferably Xaa6 is a residue of Asn,
- (h) Xaa8 is a residue of an amino acid of formula (IX) as described above, preferably a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Arg(Me), Lys(Z⁵) and RMe2, more preferably a residue of KMe3,
- (i) Xaa9 is a residue of an amino acid of formula (Xa) or (Xb) as described above, preferably a residue of an amino acid selected from the group consisting of Gly, Ala, Dab, Glu, Pro, Penf, Lys(Z⁶) and Tyr, more preferably a residue of an amino acid selected from the group consisting of Ala and Tyr,
- (j) Xaa10 is a residue of formula (XIa) or (XIb) as described above, preferably a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Lys, Thr and Ser, more preferably a residue of an amino acid selected from the group consisting of Asp and Cya,
- (k) Xaa11 is a residue of formula (XIIa) as described above, preferably a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, more preferably a residue of Thi,
- (l) Cext is a moiety of formula (Ie), and
- (m) Cterm is NH₂.

Most preferably, the compound is represented by the formula (I), wherein

- (a) Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnpg, Pip-Trp-Cya-Mnpg, Pip-Trp-Dmd-Mnpg, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnpg, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnpg, Nma-Trp-Asp-Npg, Nma-Trp-Cya-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnpg, Nma-Trp-Cya-Mnpg and Nma-Trp-Dmd-Mnpg, and

- (b) Xaa7 is preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6, and
at least one, e.g., one, two, three, four, five, six, seven or eight, of Xaa5, Xaa6, Xaa8,
5 Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:
- (e) Xaa5 is a residue of an amino acid of formula (VIa) or (VIb) as described above, preferably a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC,
10 DOTAMGAM, PSCGA and NOTA, more preferably Xaa5 is a residue of an amino acid selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC), Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),
- (f) Xaa6 is a residue of an amino acid of formula (VIIa), (VIIb) or (VIIc) as described
15 above, preferably a residue of an L-amino acid of formula (VIId) as described above, more preferably a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Me), Lys(Z⁴), Thr and Ser, most preferably Xaa6 is a residue of Asn,
- (h) Xaa8 is a residue of an amino acid of formula (IX) as described above, preferably a
20 residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Arg(Me), Lys(Z⁵) and RMe2, more preferably a residue of KMe3,
- (i) Xaa9 is a residue of an amino acid of formula (Xa) or (Xb) as described above, preferably a residue of an amino acid selected from the group consisting of Gly, Ala, Dab, Glu, Pro, Pcnf, Lys(Z⁶) and Tyr, more preferably a residue of an amino acid
25 selected from the group consisting of Ala and Tyr,
- (j) Xaa10 is a residue of formula (XIa) or (XIb) as described above, preferably a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Lys, Thr and Ser, more preferably a residue of an amino acid selected from the group consisting of Asp and Cya,
- 30 (k) Xaa11 is a residue of formula (XIIa) as described above, preferably a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, more preferably a residue of Thi,

(l) Cext is a moiety of formula (Ie), and

(m) Cterm is NH₂.

2.1. Group Z comprising an effector E and an optional linker L

5 In accordance with the present invention, the compound may comprise one or more of groups Z, wherein each group Z comprises an effector E (such as a chelator) and an optional linker L, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- 10 (β) a chelator optionally comprising a chelated radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

15 If the compound comprises more than one group Z, the groups Z may be identical or different, and each effector E may be independently selected from the group consisting of (α), (β), (γ) and (δ).

In one embodiment, the compound of the invention comprises one or more of groups Z, wherein
20 each group Z comprises an effector E (such as a chelator) and an optional linker L, each effector E being selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a chelated radionuclide; and
- 25 (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

If the compound comprises more than one group Z, the groups Z may be identical or different, and each effector E is independently selected from the group consisting of (α), (β), (γ) and (δ).

30

In a preferred embodiment, the compound of the invention comprises one or more groups Z, wherein each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 , Z^9) is independently a moiety represented by the following formula (XVa):



5 wherein,

* indicates covalent attachment to an attachment point (i.e., to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11),

L is a linker, and

E is selected from the group consisting of:

- 10 (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a chelated radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- 15 (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

In a more preferred embodiment, each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 , Z^9) comprises an effector E and an optional linker L, and each effector E represents (β) a chelator
20 optionally comprising a chelated radionuclide.

2.1.1 Linker L

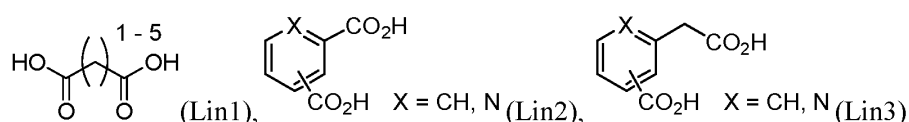
As used herein, a linker is an element, moiety, or structure, which connects two parts of a molecule. In the present invention, the linker forms a covalent bond with the effector and the
25 respective part of the compounds of the invention where the Z group is attached. A first functional group of the linker forming the bond with the effector (e.g., chelator) may in principle, be any chemical group, which is capable of forming a bond, preferably a covalent bond with the effector. In addition, the linker comprises a second functional group forming the bond, preferably a covalent bond with the part of the compound of the invention at the specified
30 positions, where the Z group is attached. Such second functional group may in principle, be any chemical group, which is capable of forming such bond with said part of the compound of the invention at the specific positions where the Z group is attached.

An important property or feature of a linker is that it spaces apart the effector (e.g., effector) from the peptide part of the compound of the invention. This is especially important in cases where the target binding ability of the peptide is compromised by the close proximity of the chelator. However, the overall linker length in its most extended conformer should not exceed
 5 200 Å, preferably not more than 150 Å and most preferably not more than 100 Å.

A further important feature or property of a linker is that it enables the attachment of the effector (e.g., chelator) to suitable positions of the peptide part of the compound of the invention.

In an embodiment, a residue of a dicarboxylic acid may represent a building block for a linker. Dicarboxylic acid-based linkers are typically used to enable the attachment of an effector to an
 10 amino group comprised in the side chain of an amino acid residue of the compound of the invention. Such amino side chain provides an amino group as functional group to which one of the at least two carboxyl groups provided by the dicarboxylic acid building block is covalently attached forming an amide linkage. The effector provides an amino group as functional group to which another of the at least two carboxyl groups provided by the dicarboxylic acid building
 15 block is covalently attached forming an amide linkage, too. The very kind of dicarboxylic acid used as building block for a linker is dependent on the nature of the effector and the attachment site on the compound of the invention, and more specifically any functional group available at or provided by the effector, respectively, which is reacted with one of the at least two carboxyl groups of the dicarboxylic acid building block.

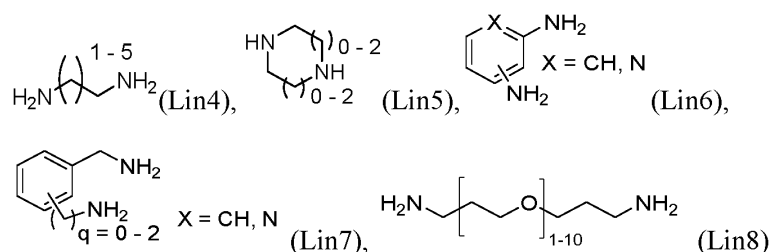
20 Preferred building blocks are dicarboxylic acids, which are selected from building blocks of the following formulae (Lin1), (Lin2) and (Lin3):



More preferred dicarboxylic acid building blocks of formula (Lin1) are malonic acid, succinic acid, glutaric acid, adipic acid, wherein the two carboxylic acid groups are attached to ends of the aliphatic chain; of formula (Lin2) are phthalic acid, terephthalic acid, isophthalic acid, and
 25 of formula (Lin3) is 2-, 3- or 4-carboxy-phenyl acetic acid. A most preferred dicarboxylic acid building block is glutaric acid (Glutar).

In an embodiment, a residue of a diamine represents a building block for a linker. Diamine based linkers are used to enable the attachment of an effector (e.g., a chelator) to the C-terminal
 30 carboxyl group of the compound of the invention or to a carboxyl group comprised in the side chain of an amino acid residue of the compound of the invention. Such carboxyl-containing

- C-terminal group or carboxyl-containing side chain provides a carboxyl group as functional group to which one of the at least two amino groups provided by the diamine is covalently attached forming an amide linkage. The effector provides a carboxyl group as functional group to which another of the at least two amino groups provided by the diamine building block is covalently attached forming an amide linkage, too. The very kind of diamine used as building block for a linker is dependent on the nature of the effector (e.g., chelator) and the attachment site on the compound of the invention, and more specifically any functional group available at or provided by the effector, respectively, which is reacted with one of the at least two amino groups of the diamine building block.
- Preferred building blocks are diamines, which are selected from building blocks of the following formulae (Lin4), (Lin5), (Lin6), (Lin7) and (Lin8):



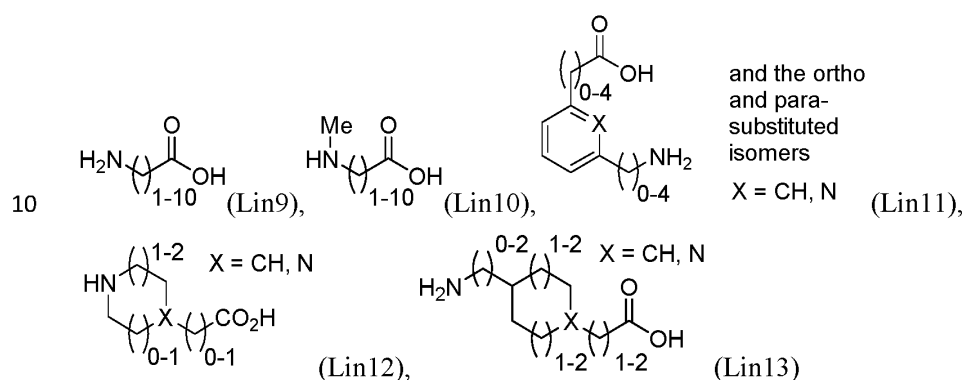
- More preferred diamine building blocks are ethylenediamine (en), 1,4-diaminobutane, 1,5-diaminopentane (Ape), 1,6-diaminohexane, 4,7,10-trioxa-1,13-tridecanediamine, 1,3-dazetine, piperazine (PP), 1,3-diazinane, o-, m- and p-phenylenediamine, 4-aminobenzylamine, and 1,4-bis(aminomethyl)benzene. Most preferred diamino building blocks are 1,5-diaminepentane (Ape), ethylenediamine (en), and piperazine (PP).

- In an embodiment, a residue of an amino acid represents the building block for a linker. Amino acid-based linkers are used to enable the attachment of an effector (e.g., chelator) to an amino group comprised in the side chain of an amino acid residue or to the C-terminal carboxylic acid moiety of the compound of the invention. Such amino-containing side chain of the compound of the invention provides an amino group to which the carboxyl group of the amino acid linker is attached covalently by formation of an amide bond. The effector provides a carboxyl group as functional group, to which the amino group of the amino acid linker is attached covalently by formation of an amide bond. Furthermore, to the amino group of the linker, the carboxyl group of another linker can be attached covalently by formation of an amide bond, which preferably is an α -amino acid linker. As an alternative such C-terminal carboxyl group of the compound of the invention provides a carboxyl group to which the amino group of the amino acid linker is attached covalently by formation of an amide bond. In this case, the effector (e.g.,

chelator) provides an amino group as functional group to which the carboxyl group of the linker is attached covalently by formation of an amide bond. Furthermore, to the carboxyl group of the linker, the amino group of another linker can be attached covalently by formation of an amide bond, which preferably is an α -amino acid linker. It is within the present invention that

5 two or more amino acid linkers can be covalently attached to each other, forming a peptidic linker with an amino group and a carboxyl group which equally well functions as an amino acid-based linker.

Preferred building blocks are amino acids, which are selected from amino acids of any of the following formulae (Lin9), (Lin10), (Lin11), (Lin12) and (Lin13):



It is within the present invention that such amino acid linker is not further substituted. It is, however, also within the present invention that such amino acid linker is further substituted; preferably such substitution is CO-NH₂ and/or Ac-NH-.

15 Representative amino acids of the formula Lin8 include glycine (Gly), β -alanine (Bal), γ -aminobutyric acid (Gab), 5-amino-pentanoic acid, 6-amino-hexanoic acid and homologs thereof with up to 10 CH₂ groups.

Representative amino acids of the formula Lin10 include N-methylglycine (Nmg), N-methyl- β -alanine, N-methyl- γ -aminobutyric acid, N-methyl-5-amino-pentanoic acid, N-methyl-6-amino-hexanoic acid, and homologs thereof with up to 10 CH₂ groups.

20

Representative amino acids of the formula Lin11 include 3-aminomethyl-benzoic acid, 4-aminomethyl-benzoic acid, anthranilic acid, 3-amino-benzoic acid, and 4-amino-benzoic acid.

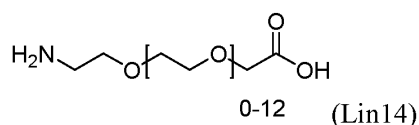
Representative amino acids of the formula Lin12 include 4-carboxymethyl-piperidine (Cmp), 3-piperidinecarboxylic acid (nipecotic acid, Rni), and 4-piperidinecarboxylic acid (isonipecotic acid, Inp).

25

Representative amino acids of the formula Lin13 include (4-aminopiperidin-1-yl)acetic acid (APAc), 2-(piperazin-1-yl)-acetic acid (PPAc), and 4-(aminomethyl)cyclohexanecarboxylic acid (tranexamic acid, 4Amc).

It will be appreciated by a person skilled in the art that in case of amino acids with stereogenic centers all stereoisomeric forms may be used as such a linker.

In a further embodiment, the amino acid is an amino acid which contains, preferably as a backbone, a polyether. Preferably such polyether is polyethylene glycol and consists of up to 30 monomer (ethylene oxide) units. Preferably, an amino acid comprising such polyether shows an increase in hydrophilicity compared to an amino acid not comprising such polyether. If incorporated as a linker the result is typically an increase in hydrophilicity which may, in turn, improve the solubility of the compound of the invention. A preferred embodiment of this kind of amino acid is depicted by the following formula Lin14, wherein it will be acknowledged that such amino acid may comprise 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12 ethylene oxide units:

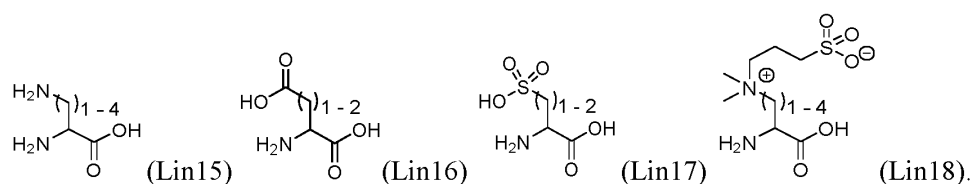


Preferred ethylene glycol containing amino acids are Ttds, O2Oc, PEG6, and PEG12.

In a further embodiment, a residue of an alpha amino acid represents a building block for a linker. Alpha amino acid-based linkers are used to enable the attachment of an effector to an amino group comprised in the side chain of an amino acid residue of the compound (peptide) of the invention and/or to the C-terminal carboxyl group of the compound (peptide) of the invention. Thereby, up to two effectors can be attached to one site of the compound of the invention. Such amino-containing side chain provides an amino group to which one of the one or more carboxyl groups provided by the alpha amino acid building block is covalently attached by formation of an amide linkage. Such C-terminal carboxyl group provides a carboxyl group as functional group to which one of the one or more amino groups provided by the alpha amino acid covalently attached by formation of an amide linkage. In such cases, wherein the alpha amino acid has more than one amino group, the effector (e.g., chelator) provides a carboxylic group as functional group, which is attached covalently to said amino group of the alpha amino acid by an amide linkage, while the other one of the amino groups is used as a linkage to the compound of the invention. In such cases, wherein the alpha amino acid has more than one carboxyl groups, the effector (e.g., chelator) provides an amino group as functional group, which is attached covalently to said carboxyl group of the alpha amino acid by an amide

linkage, while the other one of the carboxyl groups is used as a linkage to the compound of the invention. It is within the present invention that when an alpha amino acid building block contains multiple amino groups, that the carboxyl group and any of the amino groups can be used to mediate linkages to both the effector and the compound (peptide) of the invention while the other amino groups which are not engaged in amide linkages can fine-tune the physicochemical properties of the compound. In one embodiment, such amino groups (which are not engaged in amide linkages) can be modified by up to three methyl groups. It is also within the present invention that when an alpha amino acid building block contains multiple carboxyl groups, that the amino group and any of the carboxyl groups can be used to mediate linkages to both the effector and the compound (peptide) of the invention while the other carboxyl groups which are not engaged in amide linkages can fine tune the physicochemical properties of the compound. In one embodiment, such carboxyl groups (which are not engaged in amide linkages) can optionally be replaced by carboxamide groups or sulfonate groups.

Preferred building blocks are alpha amino acids, which are selected from building blocks of the following formula (Lin15), (Lin16), (Lin17) or (Lin18):



More preferred alpha amino acids building blocks are di-amino-propionic acid (Dap), di-amino-butyric acid (Dab), ornithine (Orn), lysine (Lys), aspartic acid, and glutamic acid. The most preferred alpha amino acid building blocks are lysine and glutamic acid. It will be appreciated by a person skilled in the art that, in case of alpha amino acids with stereogenic centers, all stereoisomeric forms may be used as such a linker. The use of a linker usually follows a purpose. In some circumstances, a linker can be used to space apart moieties in a compound, such as a larger moiety from a bioactive molecule, in order to retain high bioactivity. In other circumstances, the introduction of a linker allows for tuning physicochemical properties of the compound by introducing polarity and/or multiple charges. In certain circumstances, the site of attachment within the sequence of the compound of the invention and the chemical nature of the effector may necessitate the use of a linker. Further, in certain circumstances, it might be desirable to combine the effector and compound without the need of a linker.

Compounds of the present invention where the effector is directly attached to the side chain of an amino acid residue by forming an amide bond typically perform excellently without the use of any dedicated linker.

In a preferred embodiment, the compound of the invention comprises one or more groups Z, wherein each group Z (i.e., Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸, Z⁹) is independently a moiety represented by the following formula (XVb):



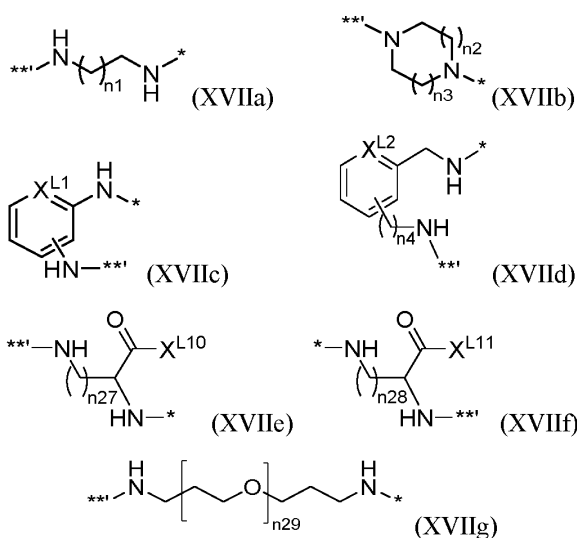
wherein,

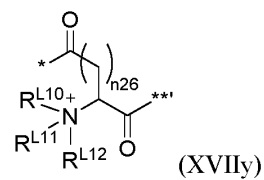
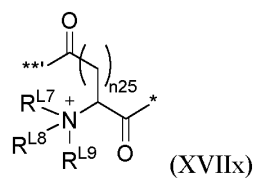
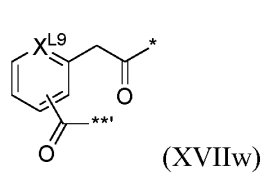
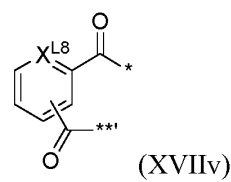
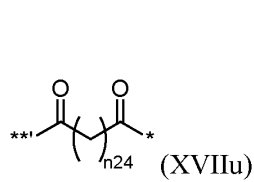
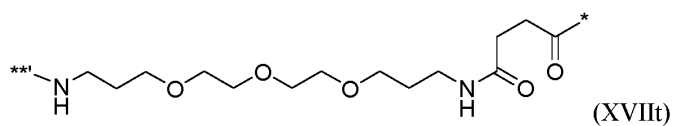
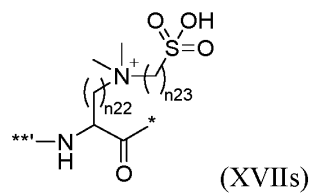
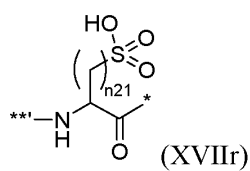
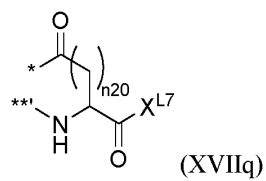
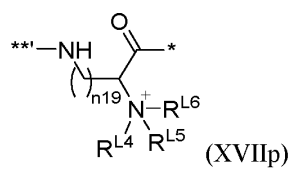
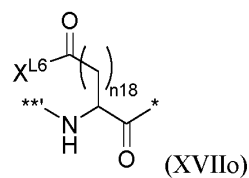
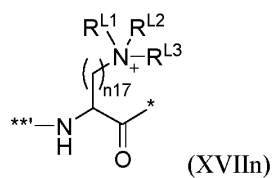
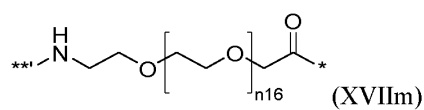
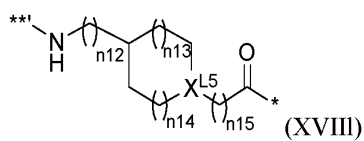
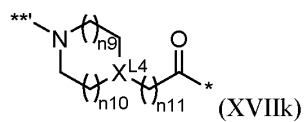
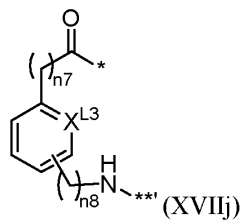
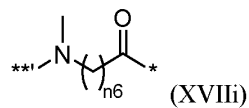
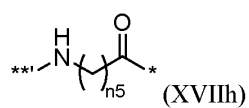
* indicates covalent attachment to an attachment point (i.e., to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11),

E is selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a chelated radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells; and

L is a linker moiety represented by any one of the formulae (XVIIa) to (XVIIg):





wherein,

- n1 and n24 are each independently 1 to 5,
 n2, n3, n4 and n12 are each independently 0 to 2,
 n5, n6 and n29 are each independently 1 to 10,
 n7 and n8 are each independently 0 to 4,
 5 n9, n13, n14, n15, n18 n20, n21, n25 and n26 are each independently 1 or 2,
 n 10 and n11 are each independently 0 or 1,
 n16 is 0 to 12,
 n17, n19, n22, n27 and n28 are each independently 1 to 4,
 n23 is 2 to 4,
 10 X^{L1} , X^{L2} , X^{L3} , X^{L4} , X^{L5} , X^{L8} and X^{L9} are each independently =CH- or =N-,
 X^{L6} , X^{L7} , X^{L10} and X^{L11} are each independently -OH or -NH₂,
 R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} , R^{L6} , R^{L7} , R^{L8} , R^{L9} , R^{L10} , R^{L12} and R^{L12} are each
 independently -H or a methyl group,
 * indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8,
 15 Xaa9, Xaa10 or Xaa11, and
 **' indicates covalent attachment to E.

2.1.2 Radionuclide

It will be recognized by a person skilled in the art that when a radioactive nuclide is present in
 20 the compound of the invention, the radioactive nuclide is selected taking into consideration the
 disease to be treated and/or the disease to be diagnosed, respectively, and/or the particularities
 of the patient and/or patient group, respectively, to be treated and/or to be diagnosed,
 respectively.

In the present invention, the “radioactive nuclide” may also be referred to as “radionuclide” and
 25 vice versa. Radioactive decay is the process by which an atomic nucleus of an unstable atom
 loses energy by emitting ionizing particles (ionizing radiation). There are different types of
 radioactive decay. A decay, or loss of energy, results when an atom with one type of nucleus,
 called the parent radionuclide, transforms to an atom with a nucleus in a different state, or to a
 different nucleus containing different numbers of protons and neutrons. Either of these products
 30 is named the daughter nuclide. In some decays the parent and daughter are different chemical
 elements, and thus the decay process results in nuclear transmutation (creation of an atom of a
 new element). For example, the radioactive decay can be alpha decay, beta decay, and gamma
 decay. Alpha decay occurs when the nucleus ejects an alpha particle (helium nucleus). This is
 the most common process of emitting nucleons, but in rarer types of decays, nuclei can eject

protons, or specific nuclei of other elements (in the process called cluster decay). Beta decay occurs when the nucleus emits an electron (β^- -decay) or positron (β^+ -decay) and a type of neutrino, in a process that changes a proton to a neutron or the other way around. By contrast, there exist radioactive decay processes that do not result in transmutation. The energy of an excited nucleus may be emitted as a gamma ray in gamma decay, or used to eject an orbital electron by interaction with the excited nucleus in a process called internal conversion, or used to absorb an inner atomic electron from the electron shell whereby the change of a nuclear proton to neutron causes the emission of an electron neutrino in a process called electron capture (EC), or may be emitted without changing its number of proton and neutrons in a process called isomeric transition (IT). Another form of radioactive decay, the spontaneous fission (SF), is found only in very heavy chemical elements resulting in a spontaneous breakdown into smaller nuclei and a few isolated nuclear particles.

In a preferred embodiment of the present invention, the radionuclide can be used for labeling of the compound of the invention.

In an embodiment of the present invention, the radionuclide is suitable for complexing with a chelator, leading to a radionuclide chelate complex.

In a further embodiment, one or more atoms of the compound of the invention are of non-natural isotopic composition, preferably these atoms are radionuclides; more preferably radionuclides of carbon, oxygen, nitrogen, sulfur, phosphorus and halogens. These radioactive atoms are typically part of amino acids, in some case halogen containing amino acids, and/or building blocks and in some cases halogenated building blocks each of the compound of the invention.

In a preferred embodiment of the present invention, the radionuclide has a half-life that allows for diagnostic and/or therapeutic medical use. Specifically, the half-life is between 1 min and 100 days.

In a preferred embodiment of the present invention, the radionuclide has a decay energy that allows for diagnostic and/or therapeutic medical use. Specifically, for γ -emitting isotopes, the decay energy is between 0.004 and 10 MeV, preferably between 0.05 and 4 MeV, for diagnostic use. For positron-emitting isotopes, the mean decay energy is between 0.6 and 13 MeV, preferably between 1 and 6 MeV, for diagnostic use. For β^- -emitting isotopes, the mean decay energy is between 0.02 and 3 MeV, preferably between 0.1 and 1 MeV, for therapeutic use. For α -emitting isotopes, the decay energy is between 3 and 10 MeV, preferably between 3.9 and 7 MeV, for therapeutic use.

In a preferred embodiment of the present invention, the radionuclide is industrially produced for medical use. Specifically, the radionuclide is available in GMP quality.

In a preferred embodiment of the present invention, the daughter nuclide(s) after radioactive decay of the radionuclide are compatible with the diagnostic and/or therapeutic medical use.

- Furthermore, the daughter nuclides are either stable or further decay in a way that does not interfere with or even support the diagnostic and/or therapeutic medical use. Representative radionuclides which may be used in connection with the present invention are well known to the person skilled in the art and include, but are not limited, to the following ones: ^{11}C , ^{13}N , ^{18}F , ^{24}Na , ^{28}Mg , ^{31}Si , ^{32}P , ^{33}P , ^{38}S , $^{34\text{m}}\text{Cl}$, ^{38}Cl , ^{39}Cl , ^{37}Ar , ^{41}Ar , ^{44}Ar , ^{42}K , ^{43}K , ^{44}K , ^{45}K , ^{47}Ca , ^{43}Sc , ^{44}Sc , $^{44\text{m}}\text{Sc}$, ^{47}Sc , ^{48}Sc , ^{49}Sc , ^{45}Ti , ^{47}V , ^{48}V , ^{48}Cr , ^{49}Cr , ^{51}Cr , ^{51}Mn , ^{52}Mn , $^{52\text{m}}\text{Mn}$, ^{56}Mn , ^{52}Fe , ^{59}Fe , ^{55}Co , ^{61}Co , $^{62\text{m}}\text{Co}$, ^{56}Ni , ^{57}Ni , ^{65}Ni , ^{66}Ni , ^{60}Cu , ^{61}Cu , ^{64}Cu , ^{67}Cu , ^{62}Zn , ^{63}Zn , ^{69}Zn , $^{69\text{m}}\text{Zn}$, $^{71\text{m}}\text{Zn}$, ^{72}Zn , ^{65}Ga , ^{66}Ga , ^{67}Ga , ^{68}Ga , ^{70}Ga , ^{72}Ga , ^{73}Ga , ^{66}Ge , ^{67}Ge , ^{69}Ge , ^{71}Ge , ^{75}Ge , ^{77}Ge , ^{78}Ge , ^{69}As , ^{70}As , ^{71}As , ^{72}As , ^{74}As , ^{76}As , ^{77}As , ^{78}As , ^{70}Se , ^{72}Se , ^{73}Se , $^{73\text{m}}\text{Se}$, ^{81}Se , $^{81\text{m}}\text{Se}$, ^{83}Se , ^{74}Br , $^{74\text{m}}\text{Br}$, ^{75}Br , ^{76}Br , ^{77}Br , ^{80}Br , $^{80\text{m}}\text{Br}$, ^{82}Br , ^{83}Br , ^{84}Br , ^{74}Kr , ^{76}Kr , ^{77}Kr , ^{79}Kr , ^{85}Kr , ^{87}Kr , ^{88}Kr , ^{78}Rb , ^{79}Rb , ^{81}Rb , ^{82}Rb , ^{84}Rb , $^{84\text{m}}\text{Rb}$, ^{86}Rb , ^{88}Rb , ^{89}Rb , ^{80}Sr , ^{81}Sr , ^{82}Sr , ^{83}Sr , $^{85\text{m}}\text{Sr}$, ^{87}Sr , ^{91}Sr , ^{92}Sr , ^{84}Y , ^{85}Y , $^{85\text{m}}\text{Y}$, ^{86}Y , $^{86\text{m}}\text{Y}$, ^{87}Y , $^{87\text{m}}\text{Y}$, ^{90}Y , $^{90\text{m}}\text{Y}$, $^{91\text{m}}\text{Y}$, ^{92}Y , ^{93}Y , ^{94}Y , ^{95}Y , ^{86}Zr , ^{87}Zr , ^{89}Zr , ^{97}Zr , ^{88}Nb , ^{89}Nb , $^{89\text{m}}\text{Nb}$, ^{90}Nb , ^{92}Nb , ^{95}Nb , $^{95\text{m}}\text{Nb}$, ^{96}Nb , ^{97}Nb , $^{98\text{m}}\text{Nb}$, ^{101}Mo , ^{102}Mo , ^{90}Mo , $^{91\text{m}}\text{Mo}$, $^{93\text{m}}\text{Mo}$, ^{99}Mo , ^{101}Tc , ^{104}Tc , ^{93}Tc , $^{93\text{m}}\text{Tc}$, ^{94}Tc , $^{94\text{m}}\text{Tc}$, ^{95}Tc , ^{96}Tc , $^{99\text{m}}\text{Tc}$, ^{103}Ru , ^{105}Ru , ^{94}Ru , ^{95}Ru , ^{97}Ru , ^{100}Rh , $^{101\text{m}}\text{Rh}$, ^{105}Rh , $^{106\text{m}}\text{Rh}$, ^{107}Rh , ^{97}Rh , $^{97\text{m}}\text{Rh}$, ^{99}Rh , $^{99\text{m}}\text{Rh}$, ^{100}Pd , ^{101}Pd , ^{103}Pd , ^{109}Pd , ^{111}Pd , $^{111\text{m}}\text{Pd}$, ^{112}Pd , ^{98}Pd , ^{99}Pd , ^{101}Ag , ^{103}Ag , ^{104}Ag , $^{104\text{m}}\text{Ag}$, ^{105}Ag , ^{106}Ag , $^{106\text{m}}\text{Ag}$, ^{111}Ag , ^{112}Ag , ^{113}Ag , ^{115}Ag , ^{104}Cd , ^{105}Cd , ^{107}Cd , ^{111}Cd , ^{115}Cd , $^{115\text{m}}\text{Cd}$, ^{117}Cd , $^{117\text{m}}\text{Cd}$, ^{118}Cd , ^{107}In , $^{108\text{m}}\text{In}$, ^{109}In , ^{110}In , $^{110\text{m}}\text{In}$, ^{111}In , ^{112}In , ^{113}In , $^{114\text{m}}\text{In}$, $^{115\text{m}}\text{In}$, $^{116\text{m}}\text{In}$, ^{117}In , $^{117\text{m}}\text{In}$, $^{119\text{m}}\text{In}$, ^{108}Sn , ^{109}Sn , ^{110}Sn , ^{111}Sn , ^{117}Sn , ^{121}Sn , $^{123\text{m}}\text{Sn}$, ^{125}Sn , ^{127}Sn , ^{128}Sn , ^{115}Sb , ^{116}Sb , $^{116\text{m}}\text{Sb}$, ^{117}Sb , $^{118\text{m}}\text{Sb}$, ^{119}Sb , ^{120}Sb , $^{120\text{m}}\text{Sb}$, ^{122}Sb , ^{126}Sb , $^{126\text{m}}\text{Sb}$, ^{127}Sb , ^{128}Sb , $^{128\text{m}}\text{Sb}$, ^{129}Sb , $^{129\text{m}}\text{Sb}$, ^{130}Sb , ^{131}Sb , ^{114}Te , ^{116}Te , ^{117}Te , ^{118}Te , ^{119}Te , $^{119\text{m}}\text{Te}$, ^{121}Te , ^{127}Te , ^{129}Te , $^{129\text{m}}\text{Te}$, ^{131}Te , $^{131\text{m}}\text{Te}$, ^{132}Te , ^{133}Te , $^{133\text{m}}\text{Te}$, ^{134}Te , ^{118}I , ^{119}I , ^{120}I , $^{120\text{m}}\text{I}$, ^{121}I , ^{123}I , ^{124}I , ^{125}I , ^{126}I , ^{128}I , ^{130}I , ^{131}I , ^{132}I , $^{132\text{m}}\text{I}$, ^{133}I , ^{134}I , ^{135}I , ^{120}Xe , ^{121}Xe , ^{122}Xe , ^{123}Xe , ^{125}Xe , ^{127}Xe , ^{133}Xe , $^{133\text{m}}\text{Xe}$, ^{135}Xe , $^{135\text{m}}\text{Xe}$, ^{138}Xe , ^{125}Cs , ^{127}Cs , ^{129}Cs , ^{130}Cs , ^{131}Cs , ^{132}Cs , ^{134}Cs , ^{135}Cs , ^{136}Cs , ^{138}Cs , ^{124}Ba , ^{126}Ba , ^{127}Ba , ^{128}Ba , ^{129}Ba , $^{129\text{m}}\text{Ba}$, ^{131}Ba , $^{131\text{m}}\text{Ba}$, ^{133}Ba , ^{135}Ba , ^{139}Ba , ^{140}Ba , ^{141}Ba , ^{142}Ba , ^{129}La , ^{131}La , ^{132}La , ^{133}La , ^{135}La , ^{140}La , ^{141}La , ^{142}La , ^{143}La , ^{130}Ce , ^{132}Ce , ^{133}Ce , $^{133\text{m}}\text{Ce}$, ^{134}Ce , ^{135}Ce , ^{137}Ce , $^{137\text{m}}\text{Ce}$, ^{141}Ce , ^{143}Ce , ^{146}Ce , ^{134}Pr , $^{134\text{m}}\text{Pr}$, ^{136}Pr , ^{137}Pr , $^{138\text{m}}\text{Pr}$, ^{139}Pr , ^{142}Pr , ^{143}Pr , ^{144}Pr , ^{145}Pr , ^{146}Pr , ^{147}Pr , ^{135}Nd , ^{136}Nd , ^{137}Nd , ^{138}Nd , ^{139}Nd , $^{139\text{m}}\text{Nd}$, ^{140}Nd , ^{141}Nd , ^{147}Nd , ^{149}Nd , ^{151}Nd , ^{152}Nd , ^{141}Pm , ^{148}Pm , $^{148\text{m}}\text{Pm}$, ^{149}Pm , ^{150}Pm , ^{151}Pm , ^{140}Sm , ^{141}Sm , $^{141\text{m}}\text{Sm}$, ^{142}Sm , ^{153}Sm , ^{155}Sm , ^{156}Sm , ^{145}Eu , ^{146}Eu , ^{147}Eu , ^{150}Eu , $^{152\text{m}}\text{Eu}$, ^{154}Eu , ^{156}Eu , ^{157}Eu , ^{158}Eu , ^{159}Eu , ^{145}Gd , ^{146}Gd , ^{147}Gd , ^{149}Gd , ^{159}Gd , ^{147}Tb , ^{148}Tb , ^{149}Tb , ^{150}Tb , ^{151}Tb , ^{152}Tb , ^{153}Tb , ^{154}Tb , $^{154\text{m}}\text{Tb}$,

¹⁵⁵Tb, ¹⁵⁶Tb, ^{156m}Tb, ¹⁶¹Tb, ¹⁶³Tb, ¹⁵¹Dy, ¹⁵²Dy, ¹⁵³Dy, ¹⁵⁵Dy, ¹⁵⁷Dy, ¹⁶⁵Dy, ¹⁶⁶Dy, ¹⁵⁴Ho, ¹⁵⁵Ho, ¹⁵⁶Ho, ¹⁵⁷Ho, ^{158m}Ho, ¹⁵⁹Ho, ¹⁶¹Ho, ¹⁶²Ho, ^{162m}Ho, ¹⁶⁴Ho, ^{164m}Ho, ¹⁶⁶Ho, ¹⁶⁷Ho, ¹⁵⁶Er, ¹⁵⁷Er, ¹⁵⁸Er, ¹⁵⁹Er, ¹⁶⁰Er, ¹⁶¹Er, ¹⁶³Er, ¹⁶⁵Er, ¹⁶⁹Er, ¹⁷¹Er, ¹⁷²Er, ¹⁶¹Tm, ¹⁶²Tm, ¹⁶³Tm, ¹⁶⁵Tm, ¹⁶⁶Tm, ¹⁶⁷Tm, ¹⁷²Tm, ¹⁷³Tm, ¹⁷⁵Tm, ¹⁶²Yb, ¹⁶³Yb, ¹⁶⁴Yb, ¹⁶⁶Yb, ¹⁶⁷Yb, ¹⁶⁹Yb, ¹⁷⁵Yb, ¹⁷⁷Yb, ¹⁷⁸Yb, ¹⁶⁷Lu, ¹⁶⁹Lu, ¹⁷⁰Lu, ¹⁷¹Lu, ¹⁷²Lu, ^{176m}Lu, ¹⁷⁷Lu, ¹⁷⁸Lu, ^{178m}Lu, ¹⁷⁹Lu, ¹⁶⁸Hf, ¹⁷⁰Hf, ¹⁷³Hf, ^{177m}Hf, ^{179m}Hf, ^{180m}Hf, ¹⁸¹Hf, ^{182m}Hf, ¹⁸³Hf, ¹⁸⁴Hf, ¹⁷²Ta, ¹⁷³Ta, ¹⁷⁴Ta, ¹⁷⁵Ta, ¹⁷⁶Ta, ¹⁷⁷Ta, ¹⁷⁸Ta, ¹⁸⁰Ta, ^{182m}Ta, ¹⁸³Ta, ¹⁸⁴Ta, ¹⁸⁵Ta, ¹⁸⁶Ta, ¹⁷⁴W, ¹⁷⁵W, ¹⁷⁷W, ¹⁷⁸W, ¹⁷⁹W, ¹⁸⁷W, ¹⁹⁰W, ¹⁷⁷Re, ¹⁷⁸Re, ¹⁷⁹Re, ¹⁸¹Re, ¹⁸²Re, ^{182m}Re, ¹⁸⁴Re, ¹⁸⁶Re, ¹⁸⁸Re, ^{188m}Re, ¹⁸⁹Re, ^{190m}Re, ¹⁸⁰Os, ¹⁸¹Os, ¹⁸²Os, ¹⁸³Os, ^{183m}Os, ¹⁹¹Os, ¹⁹³Os, ¹⁹⁶Os, ¹⁸²Ir, ¹⁸³Ir, ¹⁸⁴Ir, ¹⁸⁵Ir, ¹⁸⁶Ir, ^{186m}Ir, ¹⁸⁷Ir, ¹⁸⁸Ir, ¹⁸⁹Ir, ¹⁹⁰Ir, ¹⁹⁴Ir, ¹⁹⁵Ir, ^{195m}Ir, ^{196m}Ir, ¹⁸⁴Pt, ¹⁸⁶Pt, ¹⁸⁷Pt, ¹⁸⁸Pt, ¹⁸⁹Pt, ¹⁹¹Pt, ¹⁹⁵Pt, ¹⁹⁷Pt, ^{197m}Pt, ¹⁹⁹Pt, ²⁰⁰Pt, ²⁰²Pt, ¹⁸⁶Au, ¹⁹⁰Au, ¹⁹¹Au, ¹⁹²Au, ¹⁹³Au, ¹⁹⁴Au, ¹⁹⁶Au, ^{196m}Au, ¹⁹⁸Au, ^{198m}Au, ¹⁹⁹Au, ²⁰⁰Au, ^{200m}Au, ¹⁹⁰Hg, ¹⁹¹Hg, ¹⁹²Hg, ¹⁹³Hg, ¹⁹⁵Hg, ^{195m}Hg, ¹⁹⁷Hg, ^{197m}Hg, ¹⁹⁹Hg, ²⁰³Hg, ¹⁹⁴Tl, ^{194m}Tl, ¹⁹⁵Tl, ¹⁹⁶Tl, ^{196m}Tl, ¹⁹⁷Tl, ¹⁹⁸Tl, ^{198m}Tl, ¹⁹⁹Tl, ²⁰⁰Tl, ²⁰¹Tl, ²⁰²Tl, ¹⁹⁴Pb, ¹⁹⁵Pb, ¹⁹⁶Pb, ^{197m}Pb, ¹⁹⁸Pb, ¹⁹⁹Pb, ^{199m}Pb, ²⁰⁰Pb, ²⁰¹Pb, ^{202m}Pb, ²⁰³Pb, ²⁰⁴Pb, ²⁰⁹Pb, ²¹¹Pb, ²¹²Pb, ²¹⁴Pb, ²⁰⁰Bi, ^{200m}Bi, ²⁰¹Bi, ²⁰²Bi, ²⁰³Bi, ²⁰⁴Bi, ²⁰⁵Bi, ²⁰⁶Bi, ²¹⁰Bi, ²¹²Bi, ^{212m}Bi, ²¹³Bi, ²¹⁴Bi, ²⁰⁰Po, ²⁰¹Po, ²⁰²Po, ²⁰³Po, ²⁰⁴Po, ²⁰⁵Po, ²⁰⁶Po, ²⁰⁷Po, ²⁰⁵At, ²⁰⁶At, ²⁰⁷At, ²⁰⁸At, ²⁰⁹At, ²¹⁰At, ²¹¹At, ²⁰⁸Rn, ²⁰⁹Rn, ²¹⁰Rn, ²¹¹Rn, ²¹²Rn, ²²¹Rn, ²²²Rn, ²²³Rn, ²¹²Fr, ²²²Fr, ²²³Fr, ²²³Ra, ²²⁴Ra, ²²⁵Ra, ²²⁷Ra, ²³⁰Ra, ²²⁴Ac, ²²⁵Ac, ²²⁶Ac, ²²⁸Ac, ²²⁹Ac, ²²⁶Th, ²²⁷Th, ²³¹Th, ²³³Th, ²³⁴Th, ²³⁶Th, ²²⁷Pa, ²²⁸Pa, ²²⁹Pa, ²³⁰Pa, ²³²Pa, ²³³Pa, ²³⁴Pa, ²³⁵Pa, ²²⁹U, ²³⁰U, ²³¹U, ²³⁷U, ²³⁹U, ²⁴⁰U, ²⁴²U, ²³¹Np, ²³²Np, ²³³Np, ²³⁴Np, ^{236m}Np, ²³⁸Np, ²³⁹Np, ²⁴⁰Np, ²⁴¹Np, ²³²Pu, ²³⁵Pu, ²³⁷Pu, ²⁴³Pu, ²⁴⁵Pu, ²⁴⁶Pu, ²³⁵Am, ²³⁷Am, ²³⁸Am, ²³⁹Am, ²⁴⁰Am, ²⁴²Am, ²⁴⁴Am, ^{244m}Am, ²⁴⁵Am, ²⁴⁶Am, ^{246m}Am, ²⁴⁷Am, ²³⁹Cm, ²⁴⁰Cm, ²⁴¹Cm, ²⁵¹Cm, ²⁴⁵Bk, ²⁴⁶Bk, ²⁴⁸Bk, ²⁵⁰Bk, ²⁵¹Bk, ²⁴⁴Cf, ²⁴⁵Cf, ²⁴⁶Cf, ²⁴⁷Cf, ²⁵³Cf, ²⁵⁵Cf, ²⁴⁹Es, ²⁵⁰Es, ^{250m}Es, ²⁵¹Es, ²⁵³Es, ^{254m}Es, ²⁵⁵Es, ^{256m}Es, ²⁵⁰Fm, ²⁵¹Fm, ²⁵²Fm, ²⁵⁴Fm, ²⁵⁵Fm, ²⁵⁵Md, ²⁵⁶Md, ²⁵⁷Md, ²⁵⁹No. Their properties are described in more detail, for instance, in *Nuclear Data Sheets* (Elsevier, Amsterdam, NL).

In an embodiment of the present invention, the radionuclide is used for diagnosis (in this context, the radionuclide may also be referred to as “diagnostically active radionuclide”). Preferably, the radionuclide is selected from the group comprising ⁴³Sc, ⁴⁴Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ^{94m}Tc, ^{99m}Tc, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ¹⁸F for example as Al-¹⁸F, ⁷⁶Br, ⁷⁷Br, ¹²³I, ¹²⁴I, and ¹²⁵I. More preferably, the radionuclide is selected from the group comprising Al-¹⁸F, ⁴⁴Sc, ⁶⁴Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ^{99m}Tc, ¹¹¹In, ²⁰³Pb. Even more preferably, the radionuclide is ⁶⁴Cu, ⁶⁸Ga, ¹¹¹In and ²⁰³Pb. It will, however, also be acknowledged by a person skilled in the art that the use of said radionuclide is not limited to diagnostic purposes, but also encompasses their use in therapy and theragnostics when conjugated to the compound of the invention.

In an embodiment of the present invention, the radionuclide is used for therapy (in this context, the radionuclide may also be referred to as “therapeutically active radionuclide”). Preferably, the radionuclide is selected from the group comprising ^{47}Sc , ^{67}Cu , ^{89}Sr , ^{90}Y , ^{111}In , ^{153}Sm , ^{149}Tb , ^{161}Tb , ^{177}Lu , ^{186}Re , ^{188}Re , ^{212}Pb , ^{213}Bi , ^{223}Ra , ^{225}Ac , ^{226}Th , ^{227}Th , ^{125}I , ^{131}I , and ^{211}At . More preferably, the radioactive isotope is selected from the group comprising ^{67}Cu , ^{90}Y , ^{149}Tb , ^{161}Tb , ^{177}Lu , ^{212}Pb , ^{213}Bi , ^{225}Ac , ^{227}Th . Even more preferably, the radionuclide is selected from the group comprising ^{90}Y , ^{177}Lu , ^{212}Pb and ^{225}Ac . It will, however, also be acknowledged by a person skilled in the art that the use of said radionuclide is not limited to therapeutic purposes, but also encompasses their use in diagnostic and theragnostics when conjugated to the compound of the invention.

In a preferred embodiment, the radionuclide is selected from:

- (i) a diagnostically active radionuclide selected from the group consisting of $\text{Al-}^{18}\text{F}$, ^{43}Sc , ^{44}Sc , ^{51}Mn , ^{52}Mn , ^{64}Cu , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{89}Zr , $^{94\text{m}}\text{Tc}$, $^{99\text{m}}\text{Tc}$, ^{111}In , ^{149}Tb , ^{152}Tb , ^{155}Tb , ^{161}Tb , ^{177}Lu , ^{201}Tl , ^{203}Pb , ^{18}F , ^{76}Br , ^{77}Br , ^{123}I , ^{124}I , and ^{125}I , preferably from the group consisting of $\text{Al-}^{18}\text{F}$, ^{44}Sc , ^{64}Cu , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{89}Zr , $^{99\text{m}}\text{Tc}$, ^{111}In , ^{203}Pb , and more preferably from the group consisting of ^{64}Cu , ^{68}Ga , ^{111}In and ^{203}Pb ; and/or
- (ii) a therapeutically active radionuclide selected from the group consisting of ^{47}Sc , ^{67}Cu , ^{89}Sr , ^{90}Y , ^{111}In , ^{153}Sm , ^{149}Tb , ^{161}Tb , ^{177}Lu , ^{186}Re , ^{188}Re , ^{212}Pb , ^{213}Bi , ^{223}Ra , ^{225}Ac , ^{226}Th , ^{227}Th , ^{125}I , ^{131}I , and ^{211}At , preferably from the group consisting of ^{67}Cu , ^{90}Y , ^{149}Tb , ^{161}Tb , ^{177}Lu , ^{212}Pb , ^{213}Bi , ^{225}Ac , ^{227}Th , and more preferably from the group consisting of ^{90}Y , ^{177}Lu , ^{212}Pb and ^{225}Ac .

2.1.3 Effector E

2.1.3.1 Chelator

In an embodiment, the compound of the invention comprises, as the effector, a chelator. The chelator is part of the compound of the invention, whereby the chelator is either directly or indirectly, such as by a linker, attached to the rest of the compound of the invention. A preferred chelator is a chelator which forms metal chelates and preferably comprises at least one radionuclide. The at least one radionuclide is useful in or suitable for diagnostic and/or therapeutic and/or theranostic purposes, and is preferably useful in or suitable for imaging and/or radiotherapy.

Chelators in principle useful in and/or suitable for the present invention including diagnosis and/or therapy of a disease are known to the person skilled in the art. A variety of respective chelators is available and has been reviewed, e.g., by Banerjee et al. (Banerjee, *et al.*, *Dalton Trans*, **2005**, 24: 3886), and references therein (Price, *et al.*, *Chem Soc Rev*, **2014**, 43: 260; Wadas, *et al.*, *Chem Rev*, **2010**, 110: 2858). Such chelators include, but are not limited to linear, cyclic, macrocyclic, tetrapyrroline, N3S, N2S2 and N4 chelators as disclosed in US 5,367,080 A, US 5,364,613 A, US, 5,021,556 A, US 5,075,099 A and US 5,886,142 A.

Representative chelators and their derivatives including any bifunctional versions that can be attached to the compound of the invention include, but are not limited to, the examples listed in Table 6.

Table 6: Examples of chelators with their corresponding chemical names and exemplary reference of their disclosure.

Chelator	Chemical name	Ref.
AAZTA	1,4-bis(carboxymethyl)-6-[bis(carboxymethyl)]amino-6-methylperhydro-1,4-diazepine	a
ATMP	(nitrilotris(methylene))tris(phosphonic acid)	aa
ATSM	Diacetyl bis(N ⁴ -methylthiosemicarbazone)	b
Aza crown ether	1,10-dioxo-4,7,13,16-tetraazacyclooctadecane	dd
AZEP-DTPA	cis-(2,7-bis-(bis-carboxymethyl-amino)-methyl)-azepan-1-yl)-acetic	c
BATA	2,3,4,5,6,7,8,9,10,11,12,13,14,15-tetradecahydro-1,16,4,7,10,13-benzodioxatetraaza-cyclooctadecine-4,7,10,13-yl-tetraacetic acid	c
BATPA	1,2-bis(2-aminophenoxy)ethane-N,N,N',N'-tetraacetic acid	s
BPCA	2,2',2'',2'''-([2,2'-bipyridine]-6,6'-diylbis(methylene))bis(azanetriyl))tetraacetic acid	a
Bp44mT	2-benzoylpyridine 4,4-dimethyl-3-thiosemicarbazone	rr
C3B-DO2A	2,2'-(1,4,7,10-tetraazabicyclo[5.5.3]pentadecane-4,10-diyl)diacetic acid	j
CB-DO2A	4,10-bis(carboxymethyl)-1,4,7,10-tetraazabicyclo[5.5.2]tetradecane	a

CB-TE1A1P	2-(11-(phosphonomethyl)-1,4,8,11-tetraazabicyclo[6.6.2]hexadecan-4-yl)acetic acid	a
CB-TE2A	4,11-bis-(carboxymethyl)-1,4,8,11-tetraazabicyclo[6.6.2]-hexadecane	a
CB-TE2P	((1,4,8,11-tetraazabicyclo[6.6.2]hexadecane-4,11-diyl)bis(methylene))bis(phosphonic acid)	a
CB-TEAMA	2-(11-(2-amino-2-oxoethyl)-1,4,8,11-tetraazabicyclo[6.6.2]hexadecan-4-yl)acetic acid	gg
CB-TR2A	2,2'-(1,4,8,11-tetraazabicyclo[6.5.2]pentadecane-4,11-diyl)diacetic acid	j
CDTA	trans-1,2-diaminocyclohexane-N,N,N',N'-tetraacetic acid	b
C-DTPA	bis(2-(2,6-dioxomorpholino)ethyl)glycine	c
CHX-A''-DTPA	N-(2-aminoethyl)-trans-1,2-diaminocyclohexane-N,N',N''-pentaacetic acid	c
CHX-macropa	rac-6,6'-(((16aS,20aS)/(16aR,20aR)-Hexadecahydro-4H,13Hbenzo[b][1,4,10,13]tetraoxa[7,16]diazacyclooctadecine-4,13-diyl) bis(methylene))dipicolinic acid	c
CHX-octapa	6,6'-((cyclohexane-1,2-diylbis((carboxymethyl)azanediyl))bis(methylene))dipicolinic acid	h
Crown	2,2',2'',2'''-1,10-dioxo-4,7,13,16-tetraazacyclooctadecane-4,7,13,16-tetrayl-tetraacetic acid	h
Crown-N ₆ A	2,16-dioxo-3,6,9,12,15,21-hexaazabicyclo[15.3.1]henicosal(21),17,19-triene-N(6),N(9),N(12)-triacetic acid	c
Cyclam	1,4,8,11-tetraazacyclotetradecane	b
Cyclen	1,4,7,10-tetraazacyclododecane	b
DATA(M)	2,2'-(6-((carboxymethyl)(methyl)amino)-6-methyl-1,4-diazepane-1,4-diyl)diacetic acid	m
DATA(P)	(2S,2'S)-2,2'-(6-(((S)-1-carboxyethyl)amino)-6-methyl-1,4-diazepane-1,4-diyl)dipropionic acid	m

DATA(Ph)	d2,2'-(5-((carboxymethyl)amino)-5-phenyldihydropyrimidine-1,3(2H,4H)-diyl)diacetic acid	m
DATA(PPh)	(2S,2'S)-2,2'-(5-(((S)-1-carboxyethyl)amino)-5-phenyldihydropyrimidine-1,3(2H,4H)-diyl)dipropionic acid	m
DE4TA	2,2',2''-(10-(2-((carboxymethyl)amino)ethyl)-1,4,7,10-tetraazacyclododecane-1,4,7-triyl)triacetic acid	s
Deferiprone	3-hydroxy-1,2-dimethyl-4(1H)-pyridone	e
DEPA	7-[2-(bis-carboxymethylamino)-ethyl]-4,10-bis-carboxymethyl-1,4,7,10-tetraaza-cyclododec-1-yl-acetic acid	c
DFC	N-[3-[(2S,5S,8S)-5,8-bis[3-[acetyl(hydroxy)amino]propyl]-3,6,9,12,15,18-hexaoxo-1,4,7,10,13,16-hexazacyclooctadec-2-yl]propyl]-N-hydroxyacetamide	oo
DFO	N1-(5-aminopentyl)-N1-hydroxy-N4-(5-(N-hydroxy-4-((5-(N-hydroxyacetamido)pentyl)amino)-4-oxobutanamido)pentyl)succinamide	a
DFO-HOPO	N1-hydroxy-N1-(5-(4-(hydroxy(5-(1-hydroxy-6-oxo-1,6-dihydropyridine-2-carboxamido)pentyl)amino)-4-oxobutanamido)pentyl)-N4-(5-(N-hydroxyacetamido)pentyl)succinamide	dd
DiAmSar	1,8-diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]icosane	a
Diphosphine	2,3-bis(diphenylphosphaneyl)maleic acid	b
DM-TE2A	2,2'-(4,11-dimethyl-1,4,8,11-tetraazacyclotetradecane-1,8-diyl)diacetic acid	a
DO2A	1,4,7,10-tetraazacyclododecane-1,7-diacetic acid	n
DO2a2p	2,2'-(4,10-bis(phosphonomethyl)-1,4,7,10-tetraazacyclododecane-1,7-diyl)diacetic acid	n
DO2AP	2,2'-(4-(phosphonomethyl)-1,4,7,10-tetraazacyclododecane-1,7-diyl)diacetic acid	o
DO2P	((1,4,7,10-tetraazacyclododecane-1,7-diyl)bis(methylene))bis(phosphonic acid)	b
DO2PA	6,6' -((1,4,7,10-tetraazacyclododecane-1,7-diyl)bis(methylene))dipicolinic acid	g

DO2Py2Am	1,7-bis(2-pyridylmethyl)-4,10-bis((2-(2-hydroxyethoxy)ethyl)-2-aminoacetamido)-1,4,7,10-tetraazacyclododecane	c
DO3A	1,4,7,10-tetraazacyclododecane-1,4,7-triacetic acid	c
DO3A-Bu	10-(2,3-dihydroxy-(1-hydroxymethyl)propyl)-1,4,7,10-tetraazacyclododecane-1,4,7-triacetic acid	c
DO3P	((4-(phosphonomethyl)-1,4,7,10-tetraazacyclododecane-1,7-diyl)bis(methylene))bis(phosphonic acid)	b
DO3PA	2-(4,7,10-tris(phosphonomethyl)-1,4,7,10-tetraazacyclododecan-1-yl)acetic acid	n
DOTA	1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid	a
DOTA-2Py	2,2'-(7,10-bis(pyridin-2-ylmethyl)-1,4,7,10-tetraazacyclododecane-1,4-diyl)diacetic acid	h
DOTA-3Py	2-(4,7,10-tris(pyridin-2-ylmethyl)-1,4,7,10-tetraazacyclododecan-1-yl)acetic acid	h
DOTAGA	2-(4,7,10-tris(carboxymethyl)-1,4,7,10-tetraazacyclododecan-1-yl)pentanedioic acid	a
DOTG	2,2',2'',2'''-(1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrayl)tetraglutaric acid	s
DOTHA ₂	2-(4,7,10-tris(2-(hydroxy(methyl)amino)-2-oxoethyl)-1,4,7,10-tetraazacyclododecan-1-yl)acetic acid	l
DOTMA	(2R,2'R,2''R,2'''R)-2,2',2'',2'''-(1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrayl)tetrapropionic acid	p
DOTP	((1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrayl)tetrakis(methylene))tetrakis(phosphonic acid)	c
DOTPA	3,3',3'',3'''-(1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrayl)tetrapropionic acid	s
DOTPH	1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrakis(methylenephosphinic acid)	c
DOTPI	1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrakis(methylene(2-carboxyethylphosphinic acid))	c

DOTP-OEt	1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrakis(methylene(phosphonic acid monoethyl ester))	c
DOTPy/TPC	1,4,7,10-tetrakis(2-pyridylmethyl)-1,4,7,10-tetraazacyclododecane	c
DOTPyd	1,4,7,10-tetrakis(3-pyridazylmethyl)-1,4,7,10-tetraazacyclododecane	c
DOTPyr	1,4,7,10-tetrakis(4-pyrimidylmethyl)-1,4,7,10-tetraazacyclododecane	c
DOTPz	1,4,7,10-tetrakis(2-pyrazinylmethyl)-1,4,7,10-tetraazacyclododecane	c
Dp44mT	2-(di(pyridin-2-yl)methylene)-N,N-dimethylhydrazine-1-carbothioamide	ff
DpC	di-2-pyridylketone-4-cyclohexyl-4-methyl-3-thiosemicarbazone	mm
DTCBP	(3-hydroxy-3,3-diphosphonopropyl)(methyl)carbamodithioic acid	ll
DTPA	diethylenetriaminepentaacetic acid	a
DTPAm	2,2',2'',2'''-((((2-amino-2-oxoethyl)azanediyl)bis(ethane-2,1-diyl))bis(azanetriyl))tetraacetamide	i
ECC	ethylenecysteamine cysteine	s
EDTA	ethylenediaminetetraacetic acid	c
EDTMP	ethylenediamine-N,N,N',N''-tetramethylenephosphonic acid	g
EGTA	ethylene glycol bis(2-aminoethyl ether)-N,N,N',N'-tetraacetic acid	s
FSC	3,15,27-triamino-7,19,31-trihydroxy-10,22,34-trimethyl-1,13,25-trioxa-7,19,31-triaza-cyclohexatriaconta-9,21,33-triene-2,8,14,20,26,32-hexaone	s
H ₂ ampa	6,6'-(2,11-bis(2-amino-2-oxoethyl)-5,8-dioxa-2,11-diazadodecane-1,12-diyl)dipicolinic acid	ss
H ₂ azapa	6,6'-((ethane-1,2-diylbis(((1-benzyl-1H-1,2,3-triazol-4-yl)methyl)azanediyl))bis(methylene))dipicolinic acid	a

H ₂ BA2A1Py	2,2'-(7-(pyridin-2-ylmethyl)-2,3,6,7,8,9,11,12-octahydro-4H-benzo[b][1,4]dioxo[7,10,13]triazacyclopentadecine-4,10(5H)-diyl)diacetic acid	bb
H ₂ Bispa ²	6,6'-((9-hydroxy-1-methoxy-5-(methoxycarbonyl)-2,4-di(pyridin-2-yl)-3,7-diazabicyclo(3.3.1)nonane-3,7-diyl)bis(methylene)) dipicolinic acid	i
H ₂ CHX-DEDPA	6,6'-((((1R,2R)-cyclohexane-1,2-diyl)bis(azanediyl))bis(methylene))dipicolinic acid	q
H ₂ CHX-macropa	6,6'-(((16aR,20aR)-hexadecahydro-4H,13H-benzo[b][1,4,10,13]tetraoxa[7,16]diazacyclooctadecine-4,13-diyl)bis(methylene))dipicolinic acid	i
H ₂ dedpa	1,2-[[6-(carboxy)-pyridin-2-yl]-methylamino]ethane	a
H ₂ macrodiapa	6,6'-((1,4,7,13-tetraoxa-10,16-diazacyclooctadecane-10,16-diyl)bis(methylene))dipicolinic acid	i
H ₂ macropa	N,N'-bis[(6-carboxy-2-pyridyl)methyl]-4,13-diaza-18-crown-6	i
H ₂ ODO2A	1-oxa-4,7,10-triazacyclododecane-4,10-diacetic acid	qq
H ₃ BA3A	2,2',2''-(5,6,8,9,11,12-hexahydro-2H-benzo[b][1,4]dioxo[7,10,13]triazacyclopentadecine-4,7,10(3H)-triyl)triacetic acid	bb
H ₃ macrotripa	6,6',6''-((1,7,13-trioxa-4,10,16-triazacyclooctadecane-4,10,16-triyl)tris(methylene))tripicolinic acid	i
H ₃ THP	4-amino-N1,N7-bis((3-hydroxy-1,6-dimethyl-4-oxo-1,4-dihydropyridin-2-yl)methyl)-4-(3-(((3-hydroxy-1,6-dimethyl-4-oxo-1,4-dihydropyridin-2-yl)methyl)amino)-3-oxopropyl)heptanediamide	e
H ₄ (3,4,3-(LI-1,2-HOPO))	N,N'-(butane-1,4-diyl)bis(1-hydroxy-N-(3-(1-hydroxy-6-oxo-1,6-dihydropyridine-2-carboxamido)propyl)-6-oxo-1,6-dihydropyridine-2-carboxamide)	i
H ₄ (3,4,3-LI(Me-3,2-HOPO))	N,N'-(butane-1,4-diyl)bis(3-hydroxy-N-(3-(3-hydroxy-1-methyl-2-oxo-1,2-dihydropyridine-4-carboxamido)propyl)-1-methyl-2-oxo-1,2-dihydropyridine-4-carboxamide)	i

H ₄ (Me-3,2-HOPO-OH)	4-((4-(3-(bis(2-(3-hydroxy-1-methyl-2-oxo-1,2-dihydropyridine-4-carboxamido)ethyl)amino)-2-((bis(2-(3-hydroxy-1-methyl-2-oxo-1,2-dihydropyridine-4-carboxamido)ethyl)amino)methyl)propyl)phenyl)amino)-4-oxobutanoic acid	i
H ₄ neunpa	6,6'-(((azanediylbis(ethane-2,1-diyl))bis((carboxymethyl)azanediyl))bis(methylene))dipicolinic acid	i
H ₄ noneunpa	6,6'-(((oxybis-(ethane-2,1-diyl))bis((carboxymethyl)azanediyl))bis(methylene))-dipicolinic acid	i
H ₄ octapa	6,6'-((ethane-1,2-diylbis((carboxymethyl)azanediyl))bis(methylene))dipicolinic acid	a
H ₅ decapa	6,6'-((((carboxymethyl)azanediyl)bis(ethane-2,1-diyl))bis((carboxymethyl)azanediyl))bis(methylene))dipicolinic acid	a
H ₅ DO3AP	1,4,7,10-tetraazacyclododecane-1,4,7-triacetic-10-methylphosphonic acid	i
H ₆ phospha	<i>N,N'</i> -(methylenephosphonate)- <i>N,N'</i> -[6-(methoxycarbonyl)pyridin-2-yl]-methyl-1,2-diaminoethane	a
H ₆ Sbbpen	<i>N,N'</i> -bis(2-hydroxy-5-sulfonylbenzyl)- <i>N,N'</i> -bis(2-methylpyridyl) ethylenediamine	s
H ₈ (3,4,3-LI(CAM))	<i>N,N'</i> -(butane-1,4-diyl)bis(<i>N</i> -(3-(2,3-dihydroxybenzamido)propyl)-2,3-dihydroxybenzamide)	i
H ₈ (terephthalamide)	<i>N</i> ¹ , <i>N</i> ^{1'} -((1 ² ,1 ³ ,11 ² ,11 ³ -tetrahydroxy-2,10,12,20-tetraoxo-3,6,9,13,16,19-hexaaza-1,11(1,4)-dibenzenacycloicosaphane-6,16-diyl)bis(ethane-2,1-diyl))bis(2,3-dihydroxy- <i>N</i> ⁴ -(2-methoxyethyl)terephthalamide)	i
HBED	2,2'-(ethane-1,2-diylbis((2-hydroxybenzyl)azanediyl))diacetic acid	a

HBED-CC	3,3'-(((ethane-1,2-diylbis((carboxymethyl)azanediyl))bis(methylene))bis(4-hydroxy-3,1-phenylene))dipropionic acid	a
Hcb-te1pa	6-((1,4,8,11-tetraazabicyclo[6.6.2]hexadecan-4-yl)methyl)picolinic acid	kk
HEHA	2,2',2'',2''',2''''-(1,4,7,10,13,16-hexaazacyclooctadecane-1,4,7,10,13,16-hexayl)hexaacetic acid	a
HP-DO3A	10-(2-hydroxypropyl)-1,4,7-tetraazacyclododecane-1,4,7-triacetic acid	r
HYNIC	6-hydrazineynicotinic acid	w
macropaquin	6-((16-((8-hydroxyquinolin-2-yl)methyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecan-7-yl)methyl)picolinic acid	c
macrophosphi	((((1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7,16-diyl)bis(methylene))bis(pyridine-6,2-diyl))bis(methylphosphinic acid))	c
macrophospha	((((1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7,16-diyl)bis(methylene))bis(pyridine-6,2-diyl))bis(phosphonic acid))	c
macroquin-SO3	8-hydroxy-2-((16-((1-hydroxy-4-sulfoisoquinolin-3-yl)methyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecan-7-yl)methyl)quinoline-5-sulfonic acid	c
MAG3	(2-mercaptoacetyl)glycylglycylglycine	w
MAMA	N-(2-mercaptoethyl)-2-((2-mercaptoethyl)amino)acetamide	w
MA-NOTMP	((1,4,7-triazonane-1,4,7-triyl)tris(methylene))tris(methylphosphinic acid)	y
Me-DO2Pa	6,6'-((4,10-dimethyl-1,4,7,10-tetraazacyclododecane-1,7-diyl)bis(methylene))dipicolinic acid	c
Me-DO2Sc	(2E,2'E)-2,2'-((4,10-dimethyl-1,4,7,10-tetraazacyclododecane-1,7-diyl)bis(propan-1-yl-2-ylidene))bis(hydrazine-1-carboxamide)	c
MM-TE2A	2,2'-(4-methyl-1,4,8,11-tetraazacyclotetradecane-1,8-diyl)diacetic acid	a

MX-DTPA	2,2'-((1-((2-(bis(carboxymethyl)amino)ethyl)(carboxymethyl)amino)propan-2-yl)azanediyl)diacetic acid	g
N2S2	2,2'-(ethane-1,2-diylbis(azanediyl))bis(ethane-1-thiol)	w
N4	N,N'-bis-(2-amino-ethyl)-propane-1,3-diamine	w
N ₅ 3Pa	N,N''-bis(2-aminoethyl)-diethylenetriamino-N,N',N''-tripicolinic acid	c
NE3TA	2,2'-(7-(2-((carboxymethyl)amino)ethyl)-1,4,7-triazonane-1,4-diyl)diacetic acid	l
NETA	2,2'-((2-(4,7-bis(carboxymethyl)-1,4,7-triazonan-1-yl)ethyl)azanediyl)diacetic acid	a
NO2A	2,2'-(1,4,7-triazonane-1,4-diyl)diacetic acid	s
NO2AP	2,2'-(7-(((2-carboxyethyl)(hydroxy)phosphoryl)methyl)-1,4,7-triazonane-1,4-diyl)diacetic acid	s
NODAGA	2-(4,7-bis(carboxymethyl)-1,4,7-triazonan-1-yl)pentanedioic acid	a
NODA-MPAA	2,2'-(7-(4-(carboxymethyl)benzyl)-1,4,7-triazonane-1,4-diyl)diacetic acid	tt
NODASA	2-(4,7-bis(carboxymethyl)-1,4,7-triazonan-1-yl)succinic acid	s
NOPO	3-(((4,7-bis((hydroxy(hydroxymethyl)phosphoryl)methyl)-1,4,7-triazonan-1-yl)methyl)(hydroxy)phosphoryl)propanoic acid	a
NOTA	1,4,7-triazacyclononane- N,N',N''-triacetic acid	a
NOTAM	2,2',2''-(1,4,7-triazonane-1,4,7-triyl)triacetamide	z
NOTHA ₂	2-(4,7-bis(2-(hydroxy(methyl)amino)-2-oxoethyl)-1,4,7-triazonan-1-yl)acetic acid	l
NOTP	((1,4,7-triazonane-1,4,7-triyl)tris(methylene))tris(phosphonic acid)	s
NPTA	((4-carboxymethyl-7-(2-(carboxymethylamino)-ethyl)-perhydro-1,4,7-triazonin-1-yl)-acetic acid	c

NxS4-x	stands for a group of tetradentate chelators with N-atoms (basic amine or non-basic amide) and thiols as donors stabilizing Tc-complexes, especially Tc(V)-oxo complexes	w
Oxabiphore	((((oxybis(ethane-2,1-diyl))bis(azanetriyl))tetrakis(methylene))tetrakis(phosphonic acid)	g
oxo-DO3A	2,2',2''-(1-oxa-4,7,10-triazacyclododecane-4,7,10-triyl)triacetic acid	a
PCBA	2-((1,4,7,10,13-pentaazacyclopentadecan-1-yl)methyl)benzoic acid	ce
PCB-TE2A	2,2'-(1,4,8,11-tetraazabicyclo[6.6.3]heptadecane-4,11-diyl)diacetic acid	k
PCTA	2,2',2''-(3,6,9-triaza-1(2,6)-pyridinacyclodecaphane-3,6,9-triyl)triacetic acid	a
p-EDDHA	2,2'-(ethane-1,2-diylbis(azanediy))bis(2-(4-hydroxyphenyl)acetic acid)	w
PEPA	2,2',2'',2''',2''''-(1,4,7,10,13-pentaazacyclopentadecane-1,4,7,10,13-pentayl)pentaacetic acid	a
PIH	(E)-N'-((3-hydroxy-5-(hydroxymethyl)-2-methylpyridin-4-yl)methylene)isonicotinohydrazide	ff
PIP-DOTA	cis-((1R,11S)-6,9,15-tris-carboxymethyl-3,6,9,15-tetraazabicyclo[9.3.1]pentadec-3-yl)-acetic acid	c
PIP-DTPA	cis-2,6-bis(N,N-bis(carboxymethyl)aminomethyl)-1-piperidine acetic acid	c
PSC	2,2',2''-(10-(2-amino-2-oxoethyl)-1,4,7,10-tetraazacyclododecane-1,4,7-triyl)triacetic acid	t
PTSM	Pyruvaldehyde bis(N ⁴ -methylthiosemicarbazone)	b
Py4pa	6,6'-(((pyridine-2,6-diylbis(methylene))-bis((carboxymethyl)azanediy))bis(methylene))dipicolinic acid	h
Pycup2A	1,8-(2,6-Pyridinedimethylene)-1,4,8,11-tetraazacyclotetradecane-2,4-diacetic acid	l
QT	quinoline thiosemicarbazone	rr

Sarcophagine	3,6,10,13,16,19-hexazabicyclo[6.6.6]icosane	b
SHBED	2,2'-(ethane-1,2-diylbis((2-hydroxy-5-sulfobenzyl)azanediyl))diacetic acid	a
Tachpyr	N1,N3,N5-tris(pyridin-2-ylmethyl)cyclohexane-1,3,5-triamine	b
TACN	1,4,7-triazonane	v
TACN-TM	tris(2-mercaptoethyl)-1,4,7-triazacyclononane	a
TAM	2,3-dihydroxyterephthalamide	u
TAME	2-(aminomethyl)-2-methylpropane-1,3-diamine	v
TAME-Hex	(1,8-N,N'-bis(carboxymethyl)-1,4,8,11-tetraazacyclotetradecane	v
TCMC	2,2',2'',2'''-(1,4,7,10-tetraazacyclododecane-1,4,7,10-tetrayl)tetraacetamide	a
TE2A	2,2'-(1,4,8,11-tetraazacyclotetradecane-1,8-diyl)diacetic acid	a
TE2Py2Am	1,8-bis(2-pyridylmethyl)-4,11-bis((2-(2-hydroxyethoxy)ethyl)-2-aminoacetamido)-1,4,8,11-tetraaza- cyclotetradecane	a
TE3A	2,2',2''-(1,4,8,11-tetraazacyclotetradecane-1,4,8-triyl)triacetic acid	a
TETA	2,2',2'',2'''-(1,4,8,11-tetraazacyclotetradecane-1,4,8,11-tetrayl)tetraacetic acid	a
tet-a	(7S,14R)-5,5,7,12,12,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane	jj
TETAM	2,2',2'',2'''-(1,4,8,11-tetraazacyclotetradecane-1,4,8,11-tetrayl)tetraacetamide	pp
TETPA	3,3'-(4,11-bis(carboxymethyl)-1,4,8,11-tetraazacyclotetradecane-1,8-diyl)dipropionic acid	s
THPN	1,3-propanediamine-N,N,N',N'-tetrakis[(2-(aminomethyl)-3-hydroxy-1,6-dimethyl-4(1H)-pyridinone)acetamide]	oo
TMT-amine	2,2',2'',2'''-(((4'-(3-amino-4-methoxyphenyl)-[2,2':6',2''-terpyridine]-6,6''-diyl)bis(methylene))bis(azanetriyl))tetraacetic acid	hh
TRAP	3,3',3'''-(((1,4,7-triazonane-1,4,7-triyl)tris(methylene))tris(hydroxyphosphoryl))tripropanoic acid	a

TREN(Me-3,2-HOPO)	N,N'-(((2-(3-hydroxy-2-oxo-1,2-dihydropyridine-4-carboxamido)ethyl)azanediyl)bis(ethane-2,1-diyl))bis(3-hydroxy-1-methyl-2-oxo-1,2-dihydropyridine-4-carboxamide)	ii
Triapine	(E)-2-((3-aminopyridin-2-yl)methylene)hydrazine-1-carbothioamide	ff
TRITA	2,2',2'',2'''-(1,4,7,10-tetraazacyclotridecane-1,4,7,10-tetrayl)tetraacetic acid	s
TRITAM	2,2',2'',2'''-(1,4,7,10-tetraazacyclotridecane-1,4,7,10-tetrayl)tetraacetamide	pp
TTHA	triethylenetetramine-N,N,N',N'',N''',N''''-hexaacetic acid	s
[16]aneS ₄	1,5,9,13-tetrathiacyclohexadecane	cc
[2,2,2]-cryptand	4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo(8.8.8) hexacosane	x
6SS	N,N'-bis(2,2-dimethyl-2-mercaptoethyl)ethylenediamine-N,N'-diacetic acid	s
^{99m} Tc(CO) ₃ -Chelators	Ligand platform that accommodates the ^{99m} Tc(CO) ₃ -core	w

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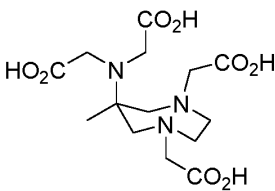
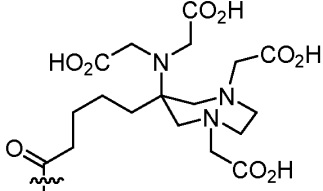
- s) Kostelnik *et al.*, *Chem. Rev.* **2019**, *119*(2), 902
t) Li *et al.*, *Pharmaceutics* **2023**, *15*, 414
u) McAuley, *et al.*, *Can. J. Chem.* **1989**, *67*, 1657
v) Maecke *et al.* in: *PET Chemistry* (Springer Berlin Heidelberg) **2007**, *64*, 215
5 w) Mazzi *et al.* in: *Technetium-99m pharmaceuticals* (Berlin: Springer) **2007**, 7-58
x) McDonagh *et al.*, *Inorg. Chem.* **2021**, *60*, 10030
y) Poty *et al.*, *ChemMedChem* **2015**, *10*(9), 1475
z) AlHokbany *et al.*, *EJNMMI Radiopharm Chem.* **2022**, *7*(19)
aa) Urbanovský *et al.*, *RSC Adv.* **2020**, *10*, 21329
10 bb) Egorova *et al.*, *Molecules* **2022**, *27*, 3115
cc) Straathof *et al.*, *Molecules* **2021**, *26*, 4603
dd) Yu *et al.*, *J. Inorg. Biochem.* **2016**, *154*, 89
ee) Lozza *et al.*, *Front. Oncol.* **2013**, *3*, 247
ff) Heath *et al.*, *Nutrients* **2013**, *5*(8), 2836
15 gg) Wadas *et al.*, *Chem. Rev.* **2010**, *110*(5), 2858
hh) Stimmel *et al.*, *Bioconjugate Chem.* **1995**, *6*(2), 219
ii) Yokel *et al.*, *J. Pharm. Sci.* **2000**, *89*(4), 545
jj) Woodin *et al.*, *Eur. J. Inorg. Chem.* **2005**, 4829
kk) Lima *et al.*, *Inorg. Chem.* **2014**, *53*(10), 5269
20 ll) Cai *et al.*, *J. Label Compd. Radiopharm* **2014**, *57*, 224
mm) Guo *et al.*, *J Hematol Oncol.* **2016**, *9*, 98
nn) Kanchi *et al.*, *Arab. J. Chem.* **2014**, *7*(1), 11
oo) Feiner *et al.*, *Cancers* **2021**, *13*, 4466
pp) Lyczko *et al.*, *Polyhedron* **2020**, *192*, 114822
25 qq) Chang *et al.*, *Dalton Trans.*, **2013**, *42*, 6397
rr) Serda *et al.*, *PLOS ONE* **2014**, *9*(10), e110291
ss) Ingham *et al.*, *Inorg. Chem.* **2022**, *61*(24), 9119
tt) McBride *et al.*, *EJNMMI Research* **2013**, *3*(36)
- 30 The diagnostic and/or therapeutic use of some of the above chelators is described in the prior art. For example, 2-hydrazino nicotinamide (HYNIC) has been widely used in the presence of a coligand for incorporation of ^{99m}Tc and ^{186,188}Re (Schwartz, *et al.*, *Bioconjug Chem*, **1991**, *2*: 333; Babich, *et al.*, *J Nucl Med*, **1993**, *34*: 1964; Babich, *et al.*, *Nucl Med Biol*, **1995**, *22*: 25); DTPA is used in Octreoscan® for complexing ¹¹¹In and several modifications are described in

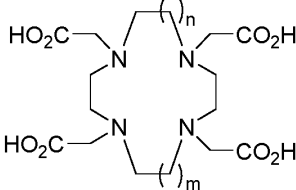
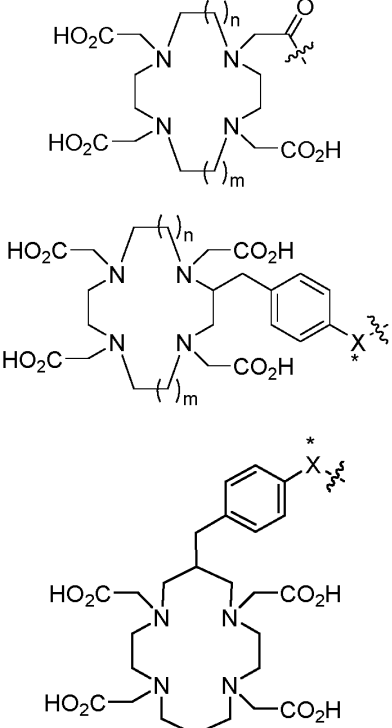
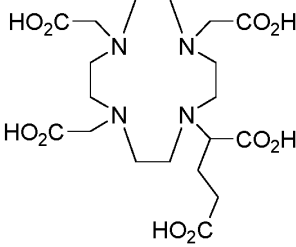
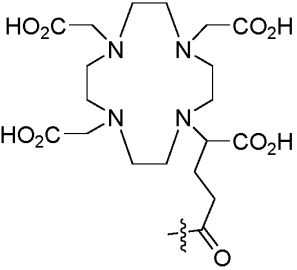
the literature (Li, *et al.*, *Nucl Med Biol*, **2001**, 28: 145; Brechbiel, *et al.*, *Bioconjug Chem*, **1991**, 2: 187); DOTA-type chelators for radiotherapy applications are described by Tweedle *et al.* (US Pat 4,885,363); other polyaza macrocycles for chelating trivalent isotopes metals are described by Eisenwiener *et al.* (Eisenwiener, *et al.*, *Bioconjug Chem*, **2002**, 13: 530); and N4-
 5 chelators such as a ^{99m}Tc -N4-chelator have been used for peptide labeling in the case of minigastarin for targeting CCK-2 receptors (Nock, *et al.*, *J Nucl Med*, **2005**, 46: 1727).

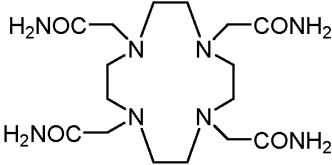
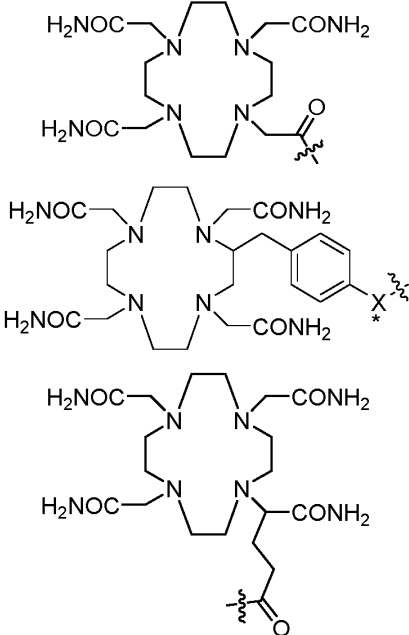
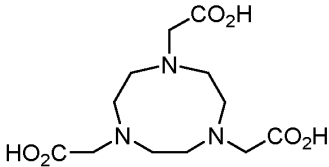
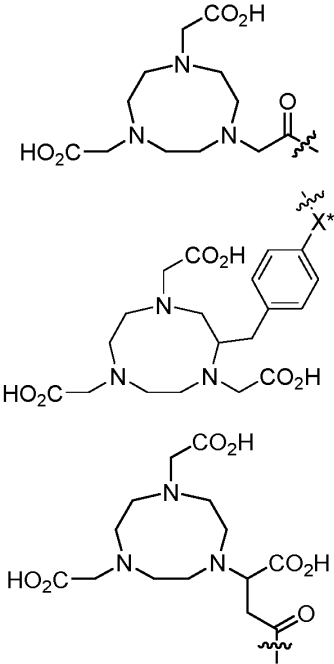
In preferred embodiments, the chelator used in the compound of the invention is selected from the group, but not limited to, comprising DOTA, DOTAGA, DOTAM, Crown, DOTP, NOTA, NODAGA, NODA-MPAA, HBED, TETA, CB-TE2A, DTPA, CHX-A'-DTPA, DFO,
 10 Macropa, HOPO ligand platform, TRAP, THP, AAZTA, DATA, NOPO, PCTA, PSC, sarcophagine, FSC, DEPA, DE4TA, NETA, NE3TA, H₄octapa, H₄CHXoctapa, H₄pypa, H₄py₄pa, HYNIC, N_xS_{4-x} (N₄, N₂S₂, N₃S), $^{99m}\text{Tc}(\text{CO})_3$ -chelators and their analogs. Preferably, the chelator additionally comprises one or more functional groups or functionalities allowing for attachment to the compound of the invention.

15 The chemical structures of these chelators and the residues resulting from preferred functionalization and/or conjugation (exemplifying possible attachment points) are shown in Table 7 below.

Table 7: Chemical structures of chelators and preferred residues.

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
AAZTA		

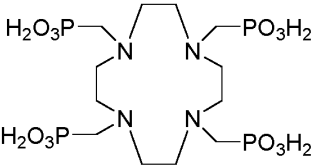
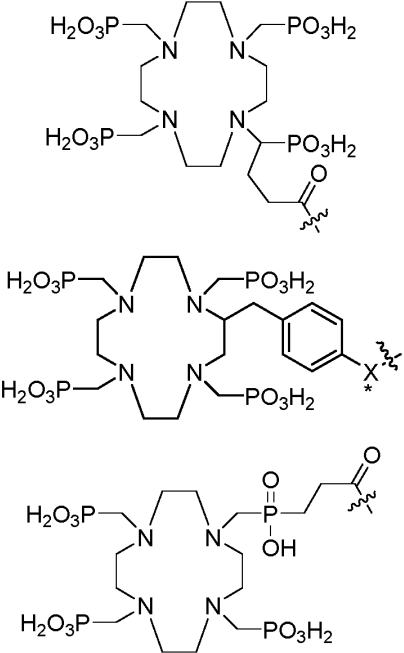
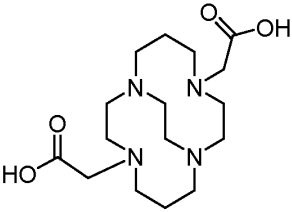
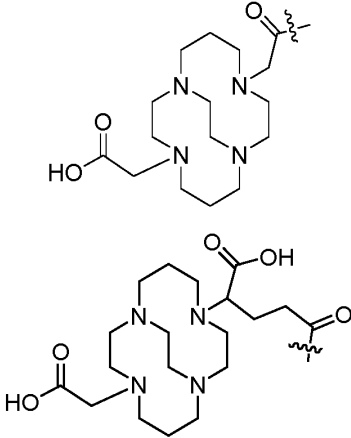
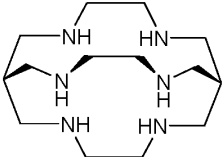
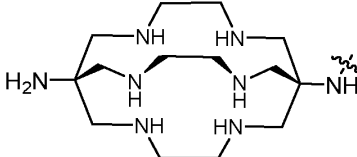
Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
DOTA (m=n=1) TETA (m=n=2)		
DOTAGA		

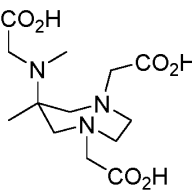
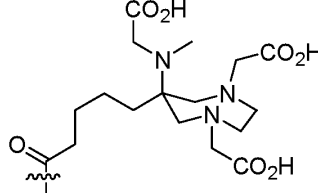
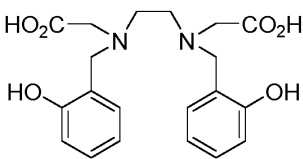
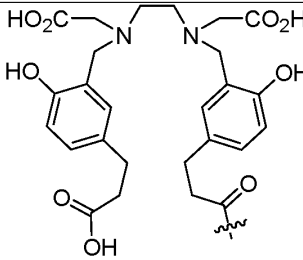
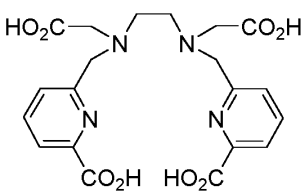
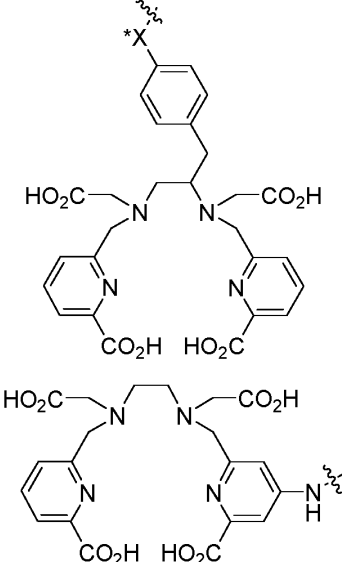
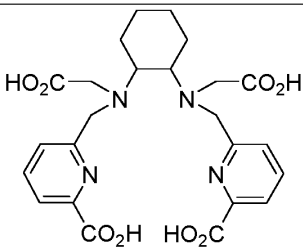
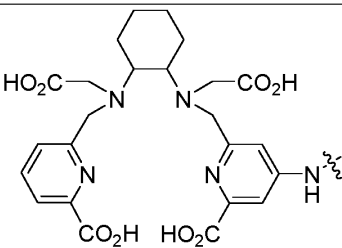
Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
DOTAM		
NOTA		

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
NODAGA		
NODA-MPAA		
DTPA		
CHX-A''-DTPA		

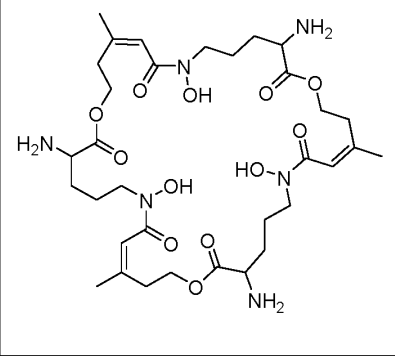
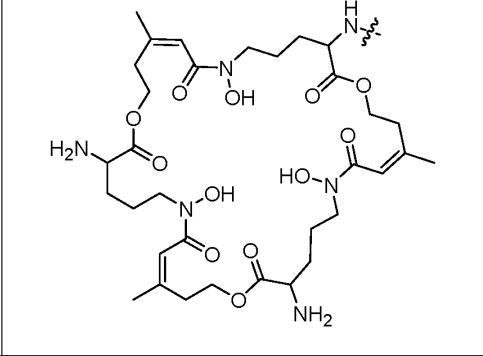
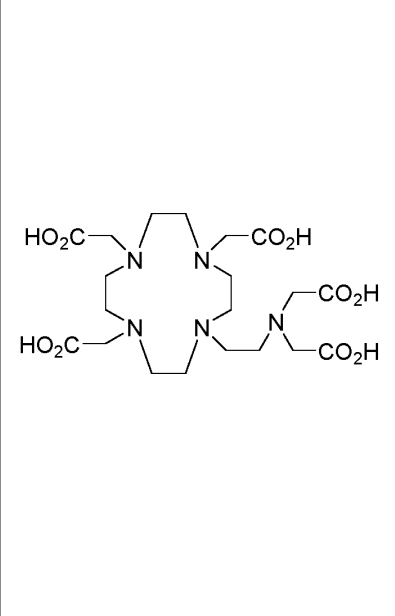
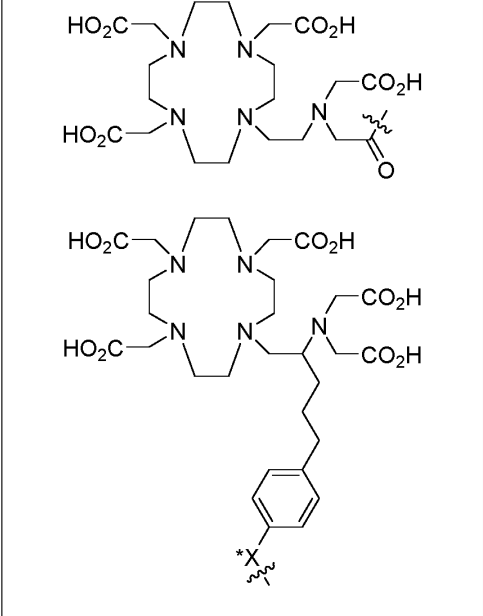
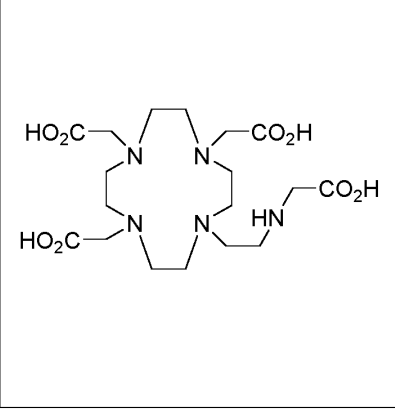
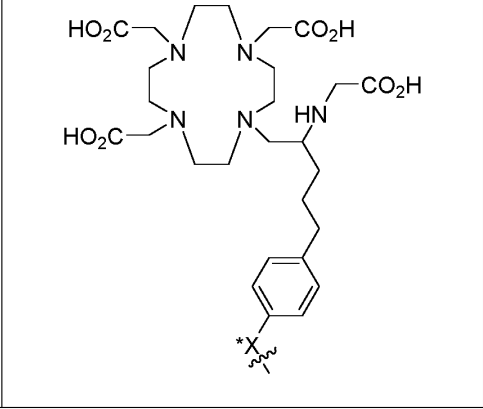
Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
N4		
N2S2 [†] Exemplary structure: EC		
N3S [†] Exemplary structure: MAG3		
^{99m} Tc(CO) ₃ ⁻ chelators [†] Exemplary structure: triamine chelator		
NETA		

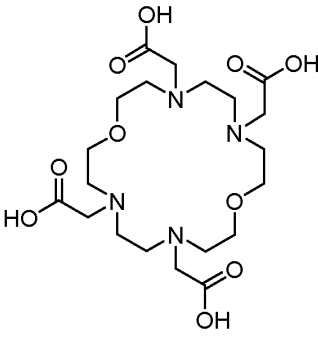
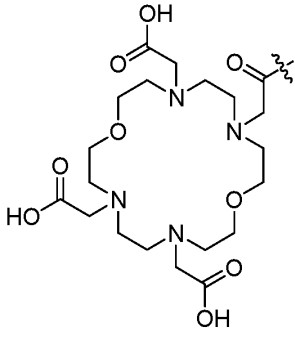
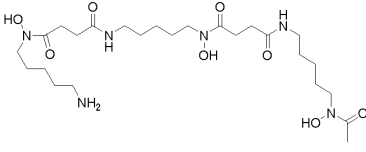
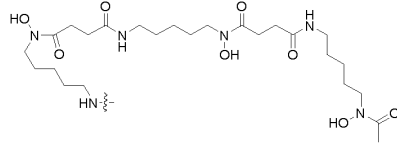
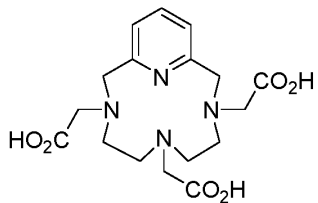
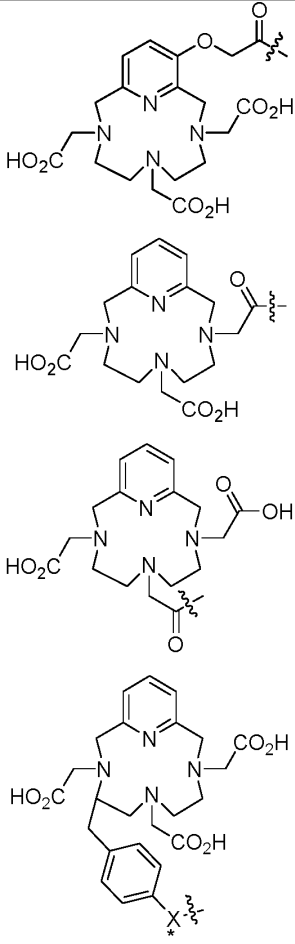
Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
NE3TA		
HYNIC		
TRAP		
NOPO		

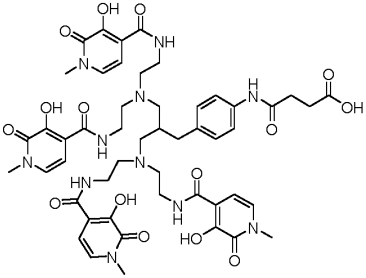
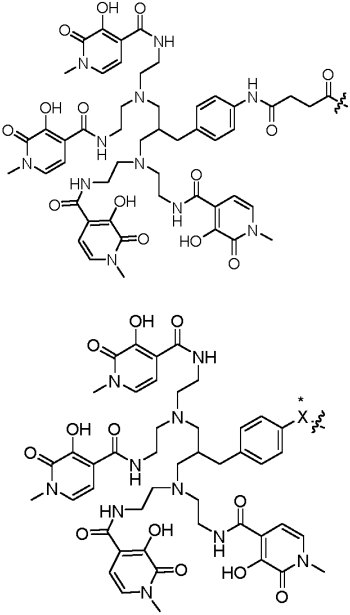
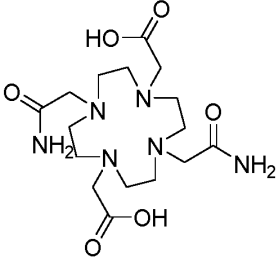
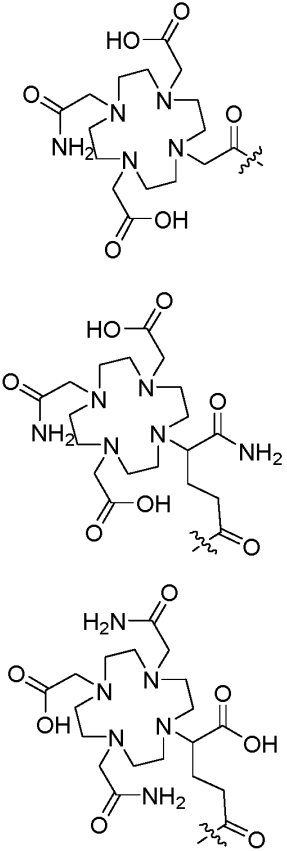
Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
DOTP		
CB-TE2A		
Sarcophagine		

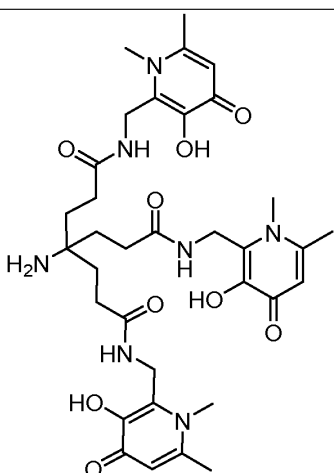
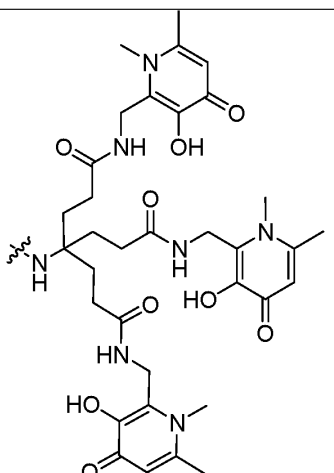
Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
DATA		
HBED		
H4octapa		
H4CHXoctapa		

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
H ₄ pypa		
H ₄ py4pa		
Macropa		

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
FSC		
DEPA		
DE4TA		

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
Crown		
DFO		
PCTA		

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
HOPO ligand platform[†] Exemplary structure: H₄(Me-3,2-HOPO-OH)		
PSC		

Abbreviation	Chelator structure	Residue after preferred attachment to linker or peptide
THP		

[†] as disclosed in: Mazzi *et al.* in: *Technetium-99m pharmaceuticals* (Berlin: Springer) **2007**, 7-58

^{*} as disclosed in: Santos *et al.*, *Molecules* **2021**, 26(22), 6997

wherein X* is selected from the group consisting of (a) -NH- and (b) -NH-C(S)-, wherein in (a) the N atom is the attachment point of both the chelator and the rest of the compound of the invention and in (b) the N atom is the attachment point of the chelator and the C atom of the thiocarbonyl group is the attachment point of the rest of the compound of the invention.

In a more preferred embodiment, the chelator is selected from the group consisting of DOTA, DOTAGA, DOTAM, Crown, NOTA, NODAGA, NODA-MPAA, CB-TE2A, CHX-A"-DTPA, DFO, Macropa, THP, AAZTA, NOPO, PCTA, PSC, sarcophagine, NETA, H₄CHXoctapa, H₄pypa and N₄, preferably from the group consisting of DOTA, DOTAGA, DOTAM, NOTA, NODAGA, Macropa, Crown, NOPO, PCTA, PSC and N₄, more preferably from the group consisting of DOTA, DOTAM, Macropa, NOTA, PSC and NODAGA.

Most preferably, the chelator is DOTA.

Preferably, the chelator additionally comprises one or more functional groups or functionalities allowing attachment to the compounds of the invention.

It will be acknowledged by the persons skilled in the art that the chelator, in principle, may be used regardless of whether the compound of the invention is used in or suitable for diagnosis or therapy (as described, for example, in international patent application WO 2009/109332 A1).

It will be further acknowledged by the persons skilled in the art that the presence of a chelator in the compound of the invention includes, if not stated otherwise, the possibility that the

chelator is complexed to any metal complex partner, i.e., any metal which, in principle, can be complexed by the chelator. An explicitly mentioned chelator of a compound of the invention or the general term chelator in connection with the compound of the invention refers either to the uncomplexed chelator as such or to the chelator to which any metal complex partner is bound, wherein the metal complex partner is any radioactive or non-radioactive metal complex partner. Preferably the chelator-metal complex, i.e., the chelator to which the metal complex partner is bound, is a stable chelator-metal complex.

Non-radioactive chelator-metal complexes have several applications, e.g., for assessing properties like stability or activity, which are otherwise difficult to determine. One aspect is that cold variants of the radioactive versions of the metal complex partner (e.g., non-radioactive indium complexes as described in the examples) can act as surrogates of the radioactive compounds. Furthermore, they are valuable tools for identifying metabolites *in vitro* or *in vivo*, as well as for assessing toxicity properties of the compounds of the invention. Additionally, chelator-metal complexes can be used in binding assays utilizing the fluorescence properties of some metal complexes with distinct ligands (e.g., Europium salts).

Chelators can be synthesized or are commercially available with a wide variety of (possibly already activated) groups for the conjugation to peptides or amino acids.

Due to the ready availability of carboxyl groups, DTPA, DOTA, DOTAGA, NOTA, NODAGA, NODA-MPAA, HBED, TETA, CB-TE2A, DATA, AAZTA, NETA, DEPA, Crown, NOPO, TRAP, HYNIC, PCTA, PSC and N2S2- as well as N3S-based chelators are particularly suitable for direct attachment to an amino nitrogen of the compound or to an amino group of a linker attached to the compound. The resulting linkage in this respect is an amide linkage.

Isothiocyanate-functionalized chelator derivatives of for example DOTA, NOTA, DOTAM, DTPA, CHX-A''-DTPA, H₄octapa, PCTA, DOTP, DEPA, DE4TA, NETA, NE3TA and HOPO ligand platform chelators are particularly suitable for direct attachment to an amino nitrogen of the compound or to an amino group of a linker attached to the compound. The resulting linkage in this respect is a thiourea linkage.

Functional groups in a chelator which are preferred groups for the direct attachment of a chelator to an amino-nitrogen are known to the person skilled in the art and include, but are not limited to, carboxylic acid, activated carboxylic acid, e.g., active ester like for instance NHS-ester, pentafluorophenol-ester, HOBt-ester, HOAt-ester, and isothiocyanate.

Functional groups in a chelator which are preferred reactive groups for the direct attachment of a chelator to a carboxyl group are known to the person skilled in the art and include, but are not limited to, alkylamino and arylamino groups. Respective chelator reagents are commercially available, e.g., alkylamino or arylamino-functionalized DOTA.

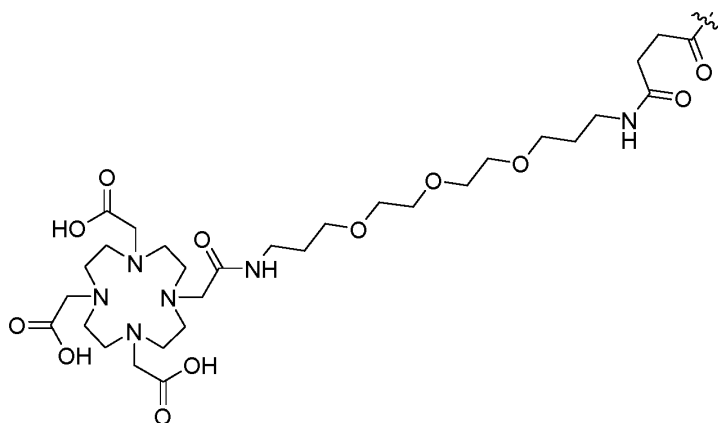
- 5 Functional groups in a chelator which are preferred groups for the direct attachment of a chelator to a thiol group are known to the person skilled in the art and include, but are not limited to maleimide nitrogens. Respective chelator reagents are commercially available, e.g., maleimide-functionalized DOTA.

- 10 Functional groups in a chelator which are preferred groups for the direct attachment of a chelator to an azido group are known to the person skilled in the art and include, but are not limited to, acyclic and cyclic alkynes. Respective chelator reagents are commercially available, e.g., propargyl or butynyl-functionalized DOTA.

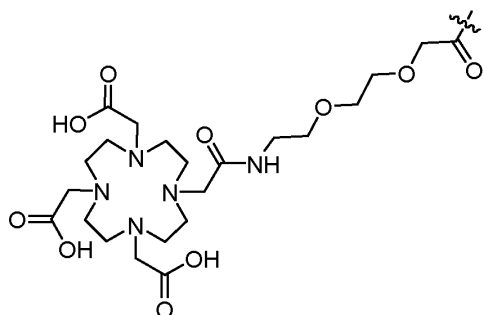
- 15 Functional groups in a chelator which are preferred groups for the direct attachment of a chelator to an alkyne group are known to the person skilled in the art and include, but are not limited to, alkyl and aryl azines. Respective chelator reagents are commercially available, e.g., azidopropyl-functionalized DOTA.

- In an embodiment, each Z group of the compound of the invention independently comprises a chelator and a linker. It will be acknowledged by the persons skilled in the art that, in principle, a chelator as defined herein can be combined with an appropriate linker as defined herein so as to form a linkage to both the chelator and to a functional group in the compound of the invention (i.e., a functional group that provides a suitable attachment point for the linker). A non-limiting list of preferred Z groups comprising a chelator and a linker (exemplified for DOTA as the chelator) is as follows:

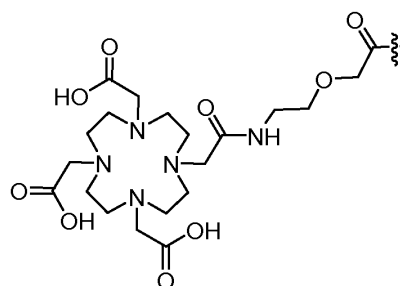
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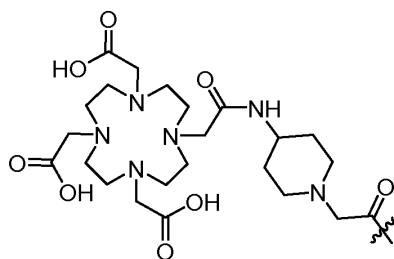
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DOTA-O1Pen:

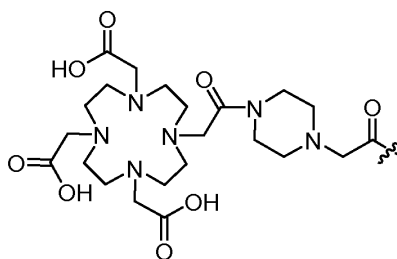


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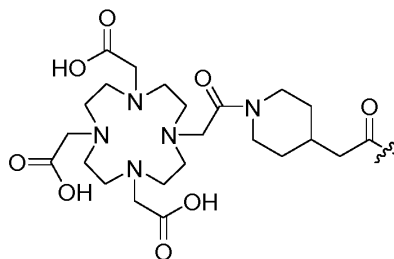


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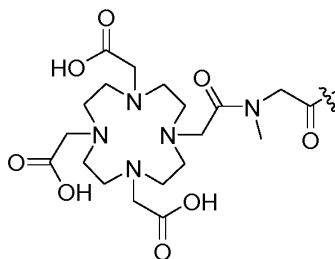
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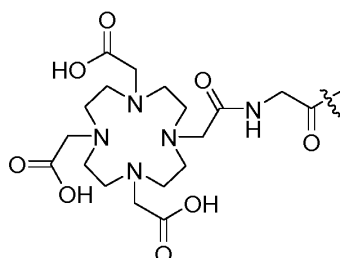
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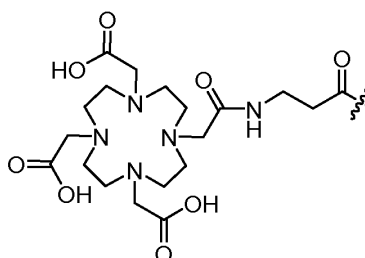
DOTA-Nmg:



DOTA-Gly:

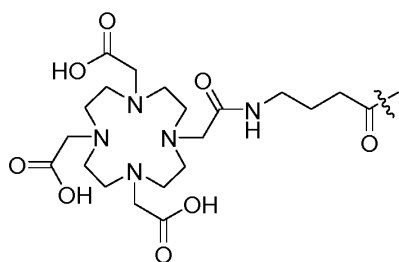


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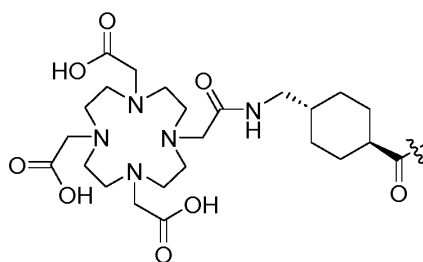


10 DOTA-Gab:

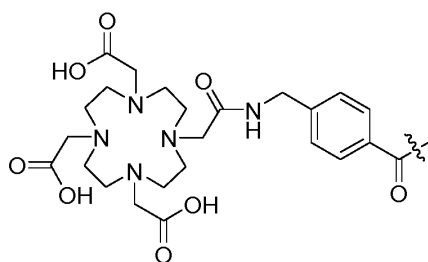
DOTA-4Amc:



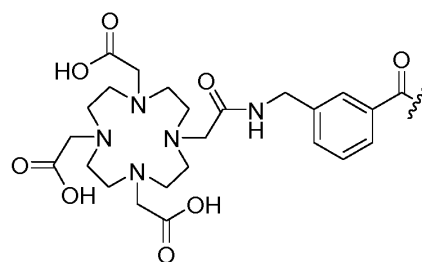
DOTA-Pamb:



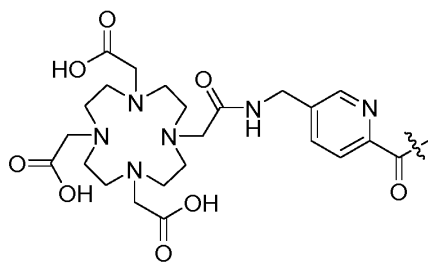
DOTA-Mamb:



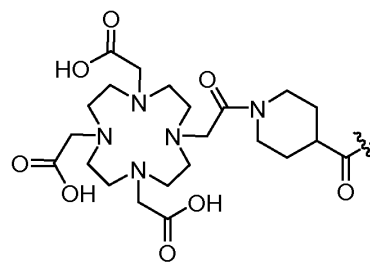
DOTA-Pamp:



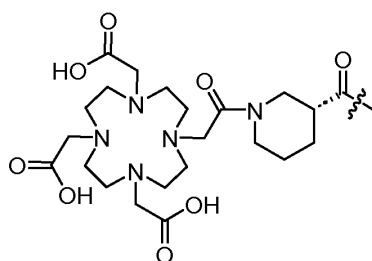
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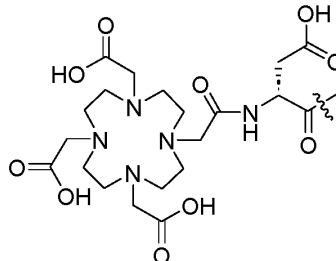
DOTA-Rni:



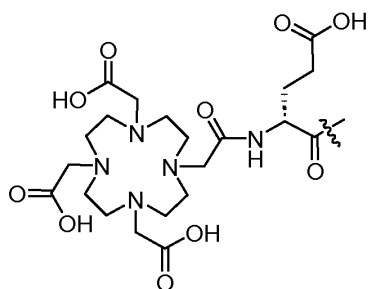
DOTA-asp:



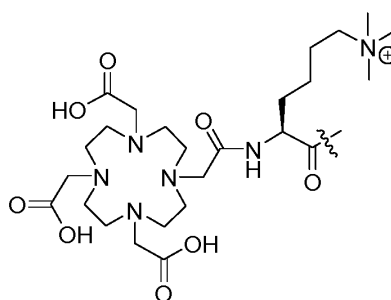
DOTA-glu:



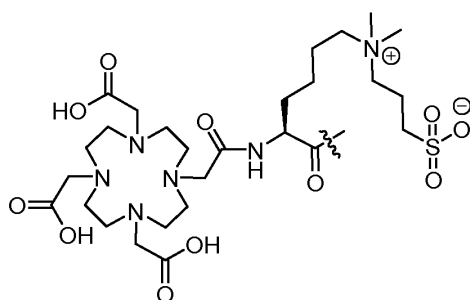
DOTA-KMe3:



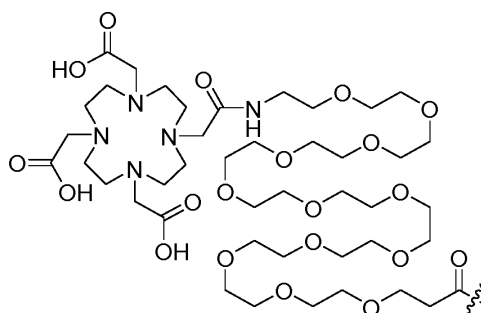
DOTA-Kzw:



DOTA-PEG12:



DOTA-PEG6:



5

In preferred embodiments, the chelator (which may be comprised as an effector in each group Z) is a residue of DOTA, DOTAGA, DOTAM, Crown, DOTP, NOTA, NODAGA, NODAMPA, HBED, TETA, CB-TE2A, DTPA, CHX-A''-DTPA, DFO, Macropa, HOPO ligand platform, TRAP, THP, AAZTA, DATA, NOPO, PCTA, PSC, sarcophagine, FSC, DEPA, DE4TA, NETA, NE3TA, H₄octapa, H₄CHXoctapa, H₄py₄, H₄py₄pa, HYNIC, N_xS_{4-x} (N₄, N₂S₂, N₃S), ^{99m}Tc(CO)₃-chelators.

In more preferred embodiments, the chelator (which may be comprised as an effector in each group Z) is a residue of DOTA, DOTAGA, DOTAM, Crown, NOTA, NODAGA, NODAMPA, CB-TE2A, CHX-A''-DTPA, DFO, Macropa, THP, AAZTA, NOPO, PCTA, PSC, sarcophagine, NETA, H₄CHXoctapa, H₄py₄ and N₄, preferably of DOTA, DOTAGA,

15

DOTAM, NOTA, NODAGA, Macropa, Crown, NOPO, PCTA, PSC and N4, more preferably of DOTA, DOTAM, Macropa, NOTA, PSC or NODAGA, and most preferably of DOTA.

In a more preferred embodiment, in formula (I), each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9) is independently a moiety represented by the following formula (XIII):

5

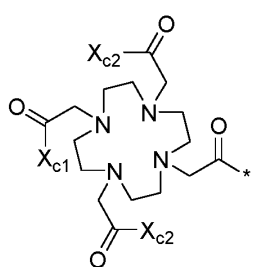
E-* (XIII)

wherein,

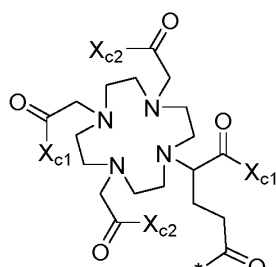
* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

E is a residue represented by any one of the following formulae (XIVa) to (XIVn):

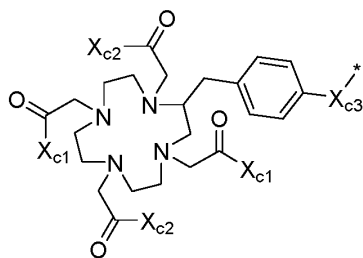
10



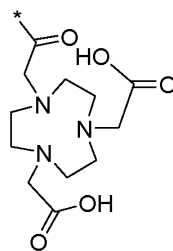
(XIVa)



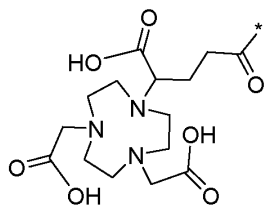
(XIVb)



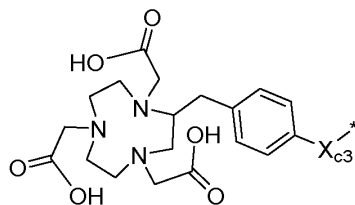
(XIVc)



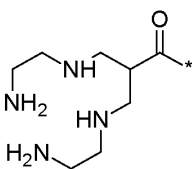
(XIVd)



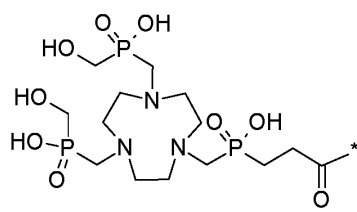
(XIVe)



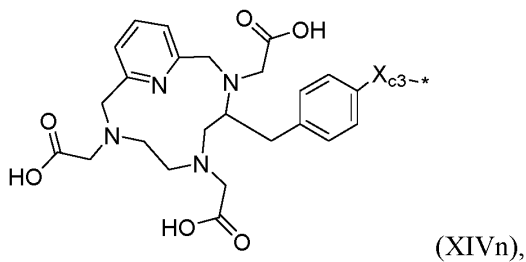
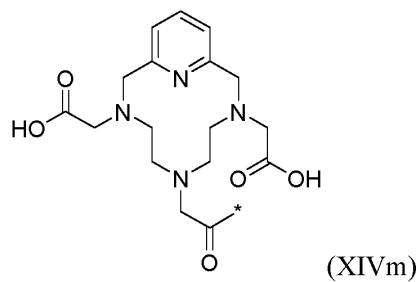
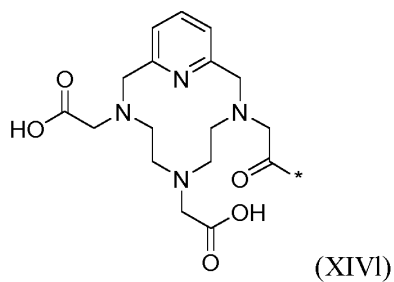
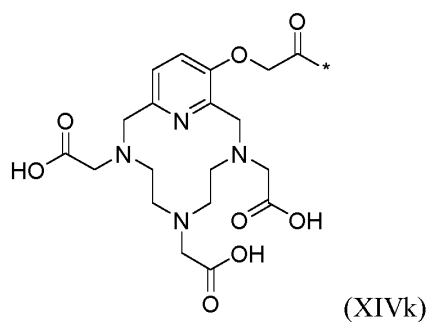
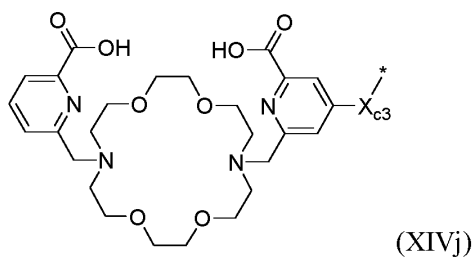
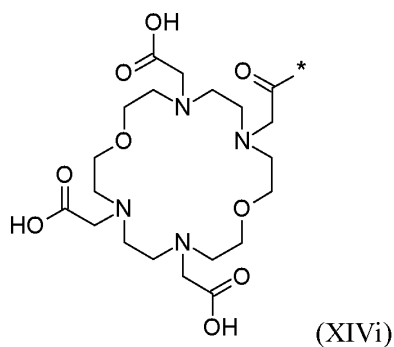
(XIVf)



(XIVg)



(XIVh)



5 wherein,

X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂,
and

X_{c3} is independently selected from the group consisting of -NH-* and -N-C(S)-*,
* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10
or Xaa11, and

10 the residue E optionally comprises a radionuclide.

Preferably, if Z (or E) is covalently attached to an N atom of an amino group of (or comprised in) the side chain of any one of Xaa1, Xaa3, Xaa5, Xaa6, Xaa8, Xaa9, Xaa10 and Xaa11, E is a residue represented by any one of the formulae (XIVa) to (XIVn), wherein X_{c3} is $-N-C(S)-*$; and if Z (or E) is covalently attached to a C atom of a carbonyl group of (or comprised in) the side chain of any of Xaa1, Xaa3, Xaa5, Xaa6, Xaa8, Xaa9, Xaa10 and Xaa11 or of (or comprised in) the main chain of any of Xaa7, Xaa8, Xaa9, Xaa10 and Xaa11, E is a residue represented by any one of the formulae (XIVc), (XIVf), (XIVj) and (XIVn), wherein X_{c3} is $-NH^*-$.

10 In a more preferred embodiment, in formula (I), each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9) is independently a moiety represented by the following formula (XV):

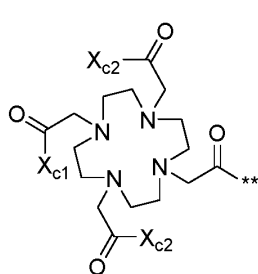


wherein,

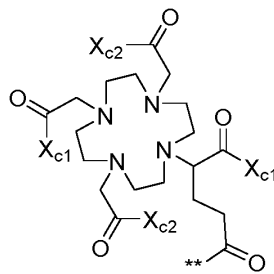
* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

15

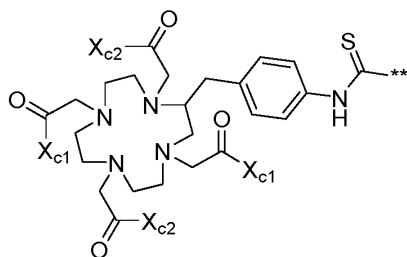
(a) E is a residue represented by any one of the following formulae (XVIa) to (XVIi):



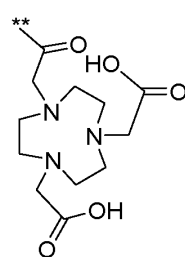
(XVIa)



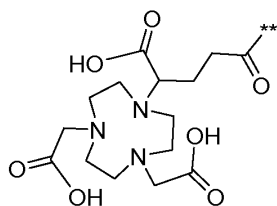
(XVIb)



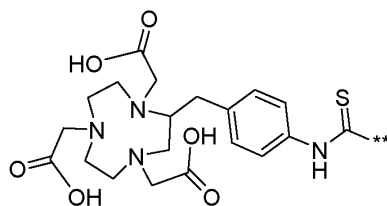
(XVIc)



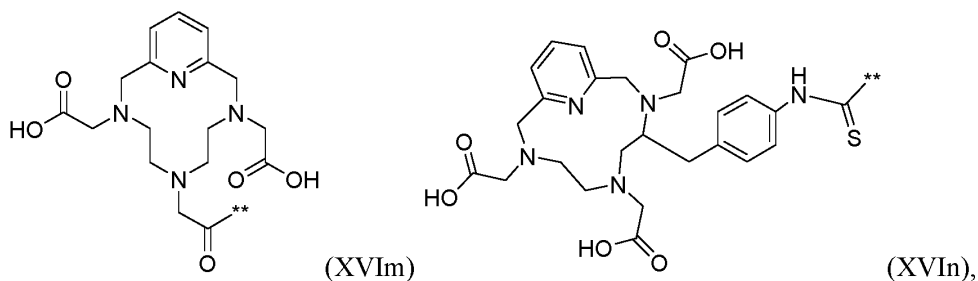
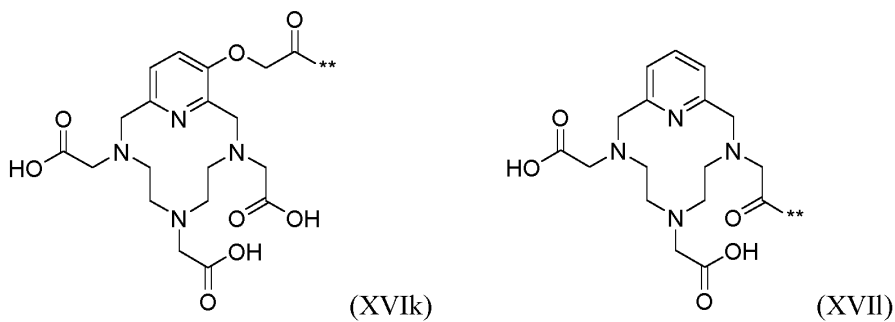
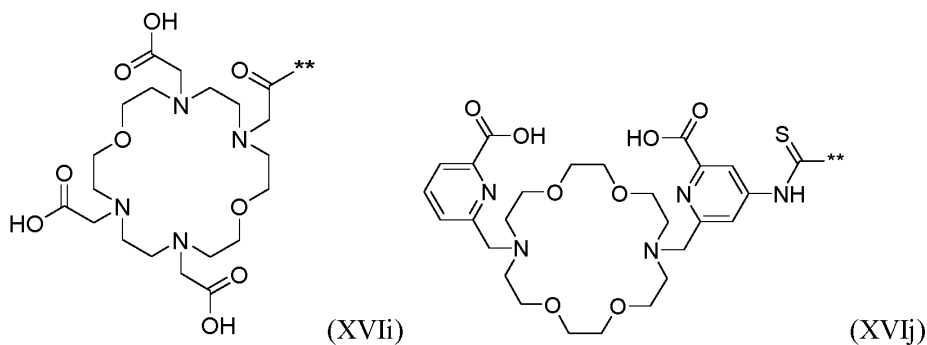
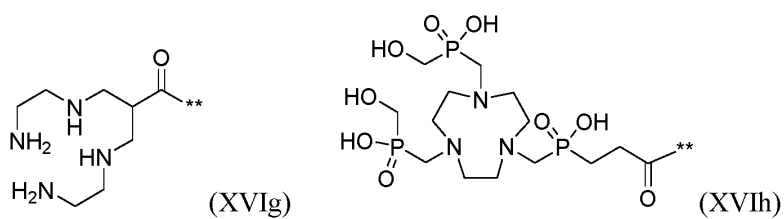
(XVIId)



(XVIe)



(XVIIf)



5

wherein,

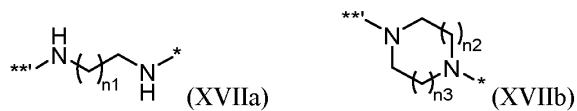
X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂, and

** indicates covalent attachment to L,

the residue E optionally comprises a chelated radionuclide, and

10

L is a linker moiety represented by any one of the formulae (XVIIa) to (XVIIt):



*Nc1cc[nH]c1X (XVIIc)*NCc1ccc(cc1)N(*) (XVIIId)
$$\begin{array}{c} \text{O} \\ || \\ \text{**I}-\text{NH}-\text{CH}_2-\text{C}-\text{X}^{\text{L10}} \\ | \\ \text{HN}-* \end{array}$$
$$\begin{array}{c} \text{O} \\ \parallel \\ \text{*}-\text{NH}-\text{C}-\text{X}^{\text{L11}} \\ | \\ \text{HN}-\text{**} \end{array} \quad (\text{XVII f})$$
$$\text{**I-NH-CH}_2\text{-(CH}_2\text{CH}_2\text{O)}_{n29}\text{CH}_2\text{CH}_2\text{CH}_2\text{NH-**} \quad (\text{XVIIg})$$
$$^{**1}-\text{NH}-(\text{CH}_2)_{n5}-\text{C}(=\text{O})-^* \quad (\text{XVIIh})$$
$$\text{**I}-\text{N}(\text{I})\text{---}(\text{CH}_2)_{n6}\text{---}\text{C}(=\text{O})\text{---}^* \quad (\text{XVIIi})$$
$$\text{Chemical structure (XVIIj): A benzene ring substituted with a polyacrylate chain (n7) and a polyamine chain (n8). The polyacrylate chain is attached to the ring via a carbonyl group (C=O) and a methylene group (CH2). The polyamine chain is attached to the ring via a methylene group (CH2) and an amine group (NH). The amine group is further substituted with a hydrogen atom (H) and a substituent (L3). The repeating units are indicated by parentheses and subscripts n7 and n8. The structure is labeled (XVIIj).$$
$$\begin{array}{c}
 \text{**I} \\
 | \\
 \text{N} - (\text{CH}_2)_{n9} - \text{X}^{\text{L4}} - (\text{CH}_2)_{n10} - (\text{CH}_2)_{n11} - \text{C}(=\text{O}) - * \\
 \text{(XVIIIk)}
 \end{array}$$
[illegible]
$$\text{***NHCH}_2\text{CH}_2\text{O}\left[\text{CH}_2\text{CH}_2\text{O}\right]_{n16}\text{CH}_2\text{C}(=\text{O})\text{CH}_2\text{***} \quad (\text{XVIIIm})$$

5

$$\begin{array}{c} \text{R}^{\text{L1}}\quad\text{R}^{\text{L2}} \\ | \qquad / \\ (\text{---})_{n17}\text{N}^{+}-\text{R}^{\text{L3}} \\ | \\ **!-\text{NH}-\text{CH}_2-\overset{*}{\underset{\parallel}{\text{O}}} \end{array}$$

(XVIIIn)

CC(=O)C(N)C(=O)C(*) (XVIIo)
$$\begin{array}{c}
 \text{O} \\
 \parallel \\
 \text{**I}-\text{NH}-\text{CH}-\text{C}-* \\
 | \\
 \text{N}^+-\text{R}^{\text{L6}} \\
 | \quad | \\
 \text{R}^{\text{L4}} \quad \text{R}^{\text{L5}}
 \end{array}
 \quad (\text{XVIIp})$$
$$\begin{array}{c} \text{O} \\ || \\ * \text{---} (\text{CH}_2)_{n20} \text{---} \text{C(=O)NH}^{**1} \text{---} \text{C(=O)X}^{\text{L7}} \end{array}$$

(XVIIq)

$$\begin{array}{c} \text{HO} \\ | \\ (\text{---})\text{S}(=\text{O})_2 \\ | \\ \text{---}\text{CH}(\text{NH}^{**+})\text{C}(=\text{O})^* \end{array} \quad (\text{XVIIr})$$
[illegible]*C(=O)CCCNC(=O)OCCOCCOCCOCCN*

(XVIIIt)

10

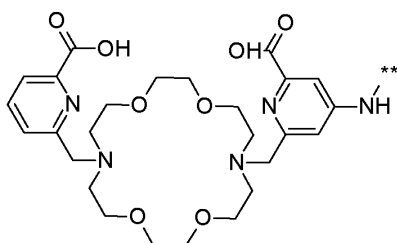
wherein,

n1 is 1 to 5,

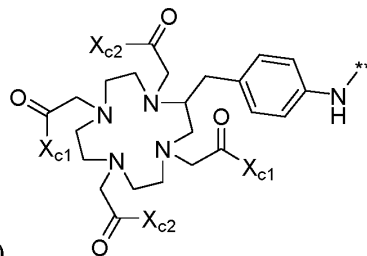
n2, n3, n4 and n12 are each independently 0 to 2,
 n5, n6 and n29 are each independently 1 to 10,
 n7 and n8 are each independently 0 to 4,
 n9, n13, n14, n15, n18, n20 and n21 are each independently 1 or 2,
 n 10 and n11 are each independently 0 or 1,
 n16 is 0 to 12,
 n17, n19, n22, n27 and n28 are each independently 1 to 4,
 n23 is 2 to 4,
 X^{L1} , X^{L2} , X^{L3} , X^{L4} and X^{L5} are each independently =CH- or =N-,
 X^{L6} , X^{L7} , X^{L10} and X^{L11} are each independently -OH or -NH₂,
 R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} and R^{L6} are each independently -H or a methyl group,
 * indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8,
 Xaa9, Xaa10 or Xaa11, and
 ** indicates covalent attachment to E;

or,

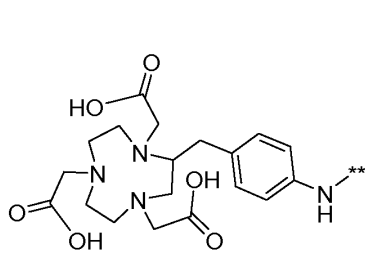
(b) E is a residue represented by the following formula (XVIo) or (XVIr):



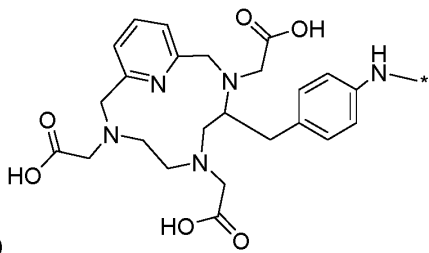
(XVIo)



(XVIp)



(XIVq)



(XIVr),

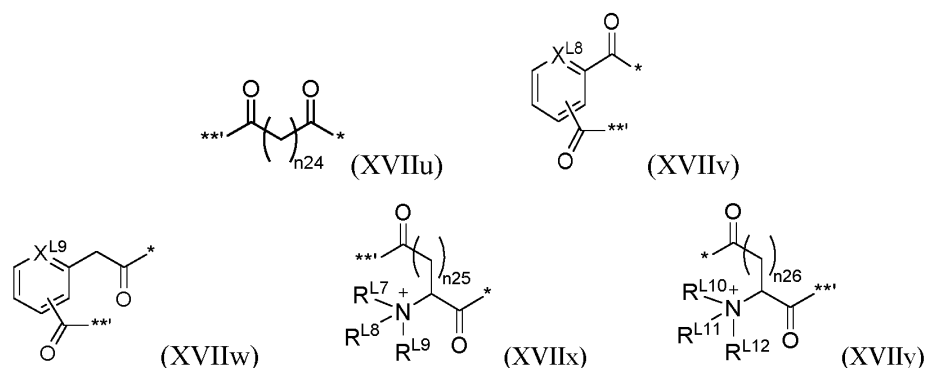
wherein,

X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂, and

** indicates covalent attachment to L, and

the residue E optionally comprises a radionuclide,

L is a linker moiety represented by any one of the formulae (XVIIu) to (XVIIy):



- 5 wherein,
 n24 is 1 to 5,
 n25 and n26 are each independently 1 or 2,
 X^{L8} and X^{L9} are each independently =CH- or =N-,
 R^{L7} , R^{L8} , R^{L9} , R^{L10} , R^{L11} and R^{L12} are each independently -H or a methyl
 10 group, and
 * indicates covalent attachment to an N atom of an amino group of Xaa1,
 Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and
 **' indicates covalent attachment to E.

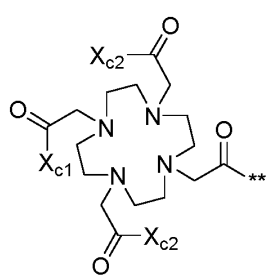
- 15 Preferably, in the above formula (XV), if Z (or L) is covalently attached to a C atom of a
 carbonyl group of (or comprised in) the side chain of any of Xaa1, Xaa3, Xaa5, Xaa6, Xaa8,
 Xaa9, Xaa10 and Xaa11 or of (or comprised in) the main chain of any of Xaa7, Xaa8, Xaa9,
 Xaa10 and Xaa11, L is selected from any one of the formulae (XVIIa) to (XVIIg); and if Z (or
 L) is covalently attached to an N atom of an amino group of (or comprised in) the main chain
 20 (backbone) of Xaa1 or the side chain of any one of Xaa1, Xaa3, Xaa5, Xaa6, Xaa8, Xaa9,
 Xaa10 and Xaa11, L is selected from any one of the formulae (XVIIh) to (XVIIy).

In a more preferred embodiment, in formula (I), each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 ,
 Z^7 , Z^8 and Z^9) is independently a moiety represented by the following formula (XV'):

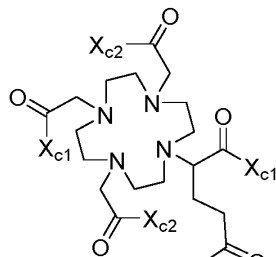


- wherein,
 * indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7,
 Xaa8, Xaa9, Xaa10 or Xaa11, and

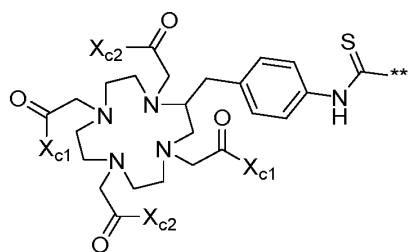
E is a residue represented by any one of the following formulae (XVIa) to (XVIj):



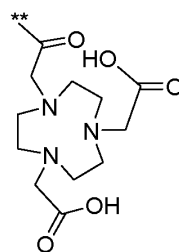
(XVIa)



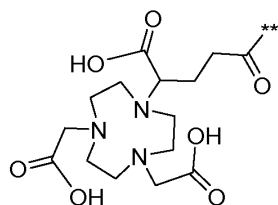
(XVIb)



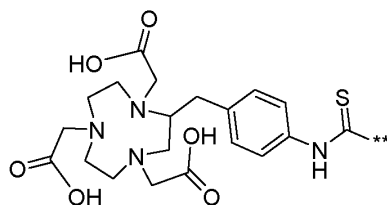
(XVIc)



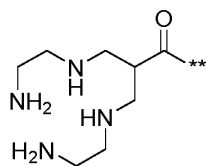
(XVIId)



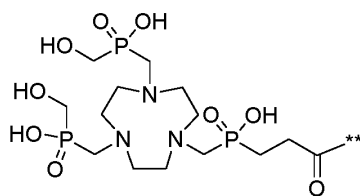
(XVIe)



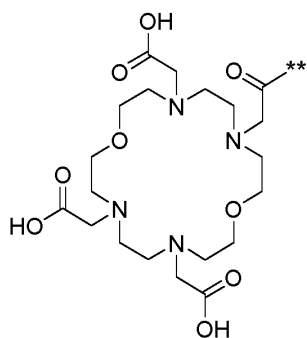
(XVIIf)



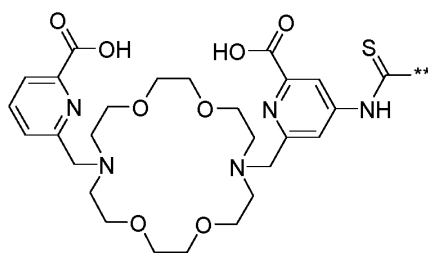
(XVIg)



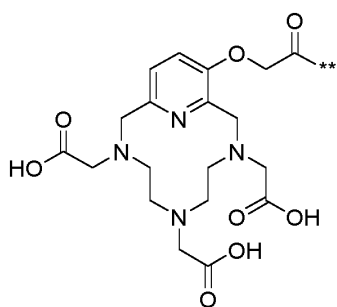
(XVIh)



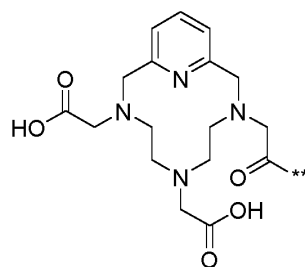
(XVIi)



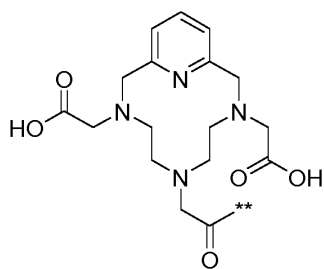
(XVIj)



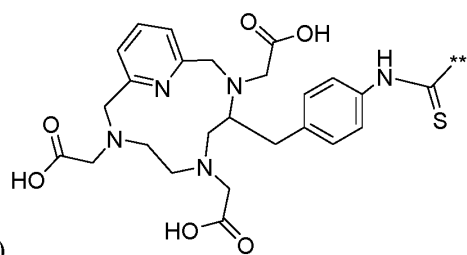
(XVIk)



(XVII)



(XVIIm)



(XVIIn)

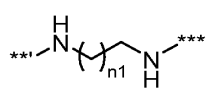
wherein,

X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂, and

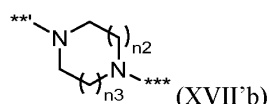
** indicates covalent attachment to L₁,

the residue E optionally comprises a radionuclide, and

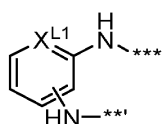
L₁ is a linker moiety represented by any one of the formulae (XVII'a) to (XVII'g):



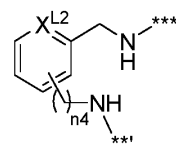
(XVII'a)



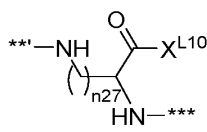
(XVII'b)



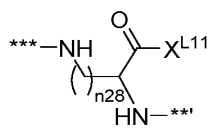
(XVII'c)



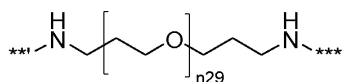
(XVII'd)



(XVII'e)



(XVII'f)



(XVII'g)

wherein,

n₁ is 1 to 5,

n₂, n₃ and n₄ are each independently 0 to 2,

n₂₉ is 1 to 10,

n27 and n28 are each independently 1 to 4,

n23 is 2 to 4,

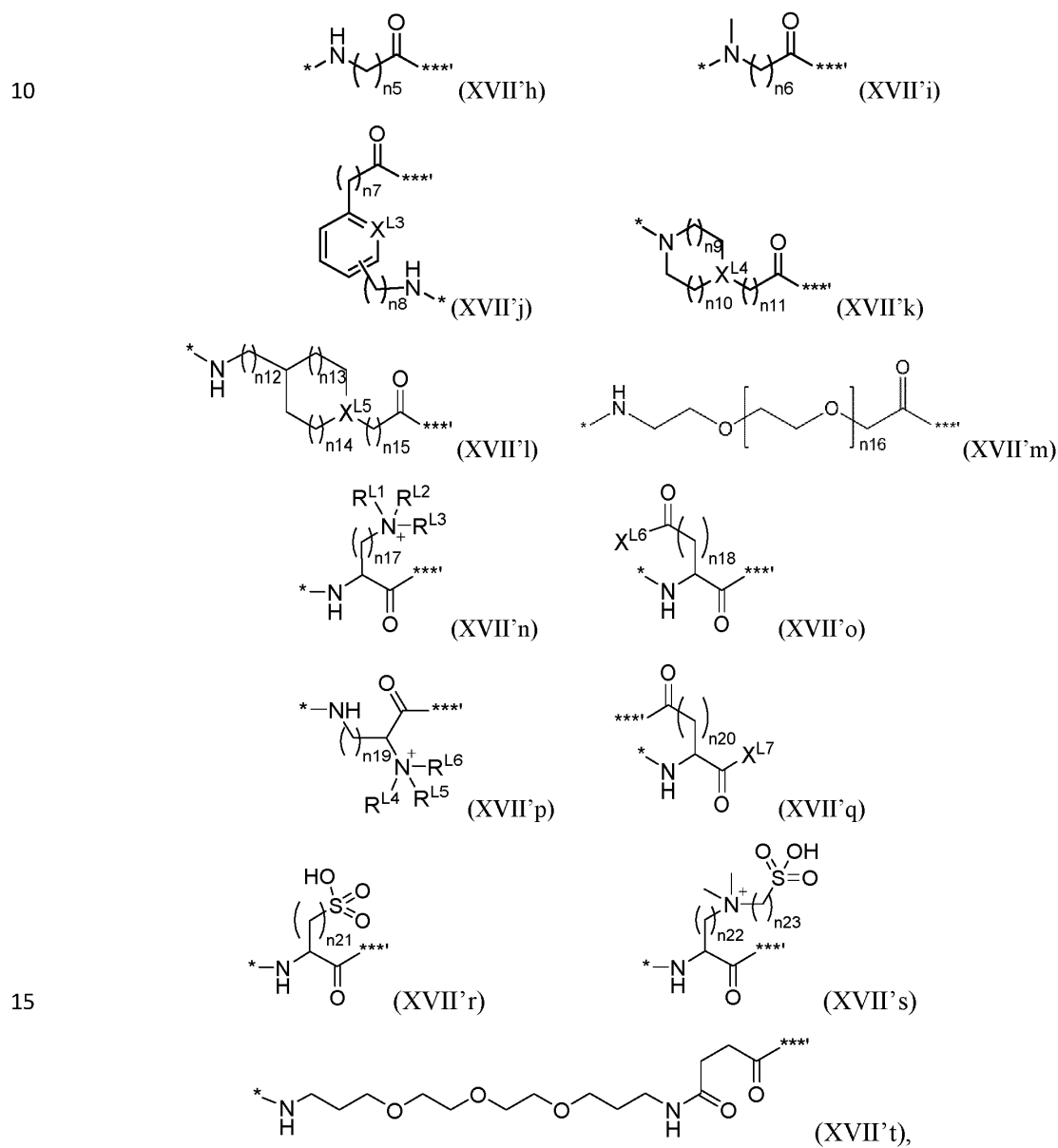
X^{L1} and X^{L2} are each independently =CH- or =N-,

X^{L10} and X^{L11} are each independently -OH or -NH₂,

*** indicates covalent attachment to L₂, and

**' indicates covalent attachment to E; and

L₂ is a linker moiety represented by any one of the formulae (XVII'h) to (XVII't):



wherein,

n12 is 0 to 2,

n5 and n6 are each independently 1 to 10,

n7 and n8 are each independently 0 to 4,

5 n9, n13, n14, n15, n18, n20 and n21 are each independently 1 or 2,

n10 and n11 are each independently 0 or 1,

n16 is 0 to 12,

n17, n19 and n22 are each independently 1 to 4,

n23 is 2 to 4,

10 X^{L3} , X^{L4} and X^{L5} are each independently =CH- or =N-,

X^{L6} and X^{L7} are each independently -OH or -NH₂,

R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} and R^{L6} are each independently -H or a methyl group,

* indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

15 *** indicates covalent attachment to L₁.

Preferably, in the above formula (XV'), L₂ is covalently attached to a C atom of a carbonyl group of (or comprised in) the side chain of any of Xaa1, Xaa3, Xaa5, Xaa6, Xaa8, Xaa9, Xaa10 and Xaa11 or of (or comprised in) the main chain of any of Xaa7, Xaa8, Xaa9, Xaa10 and Xaa11.

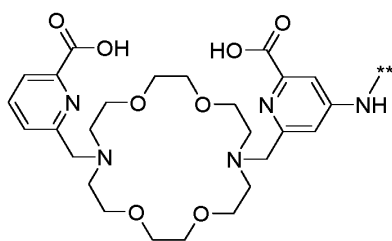
In a more preferred embodiment, in formula (I), each group Z (i.e., Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹) is independently a moiety represented by the following formula (XV''):



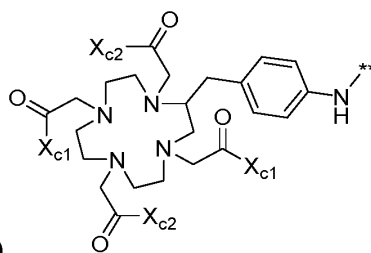
25 wherein,

* indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

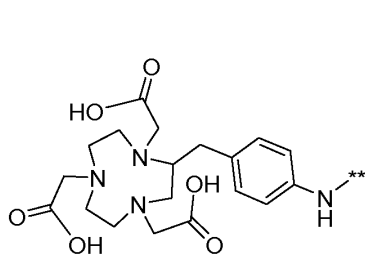
E is a residue represented by the following formula (XVIo) or (XVIp):



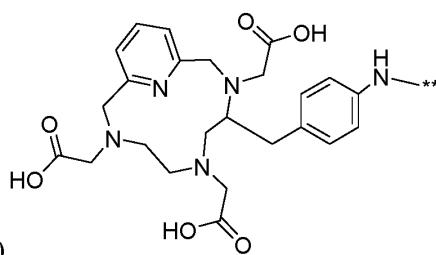
(XVIo)



(XVIp)



(XIVq)



(XIVr),

wherein,

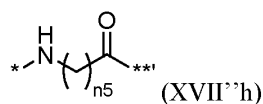
X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂, and

5

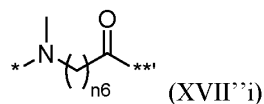
** indicates covalent attachment to L, and

the residue E optionally comprises a radionuclide,

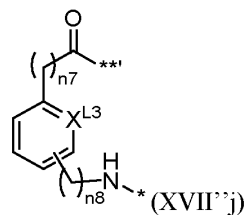
L is a linker moiety represented by any one of the formulae (XVII''h) to (XVII''t):



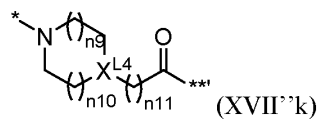
(XVII''h)



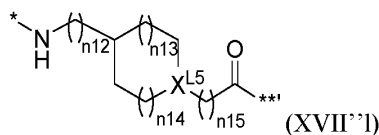
(XVII''i)



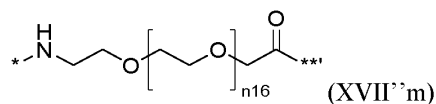
(XVII''j)



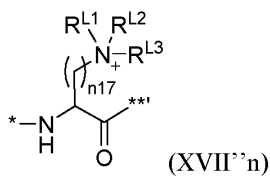
(XVII''k)



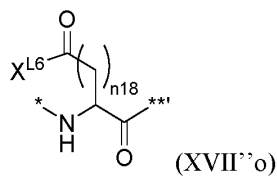
(XVII''l)



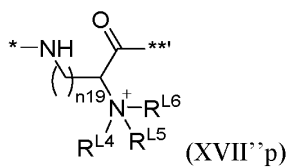
(XVII''m)



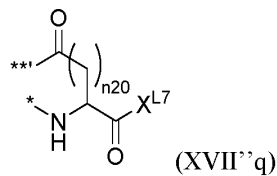
(XVII''n)



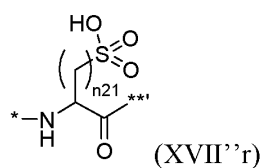
(XVII''o)



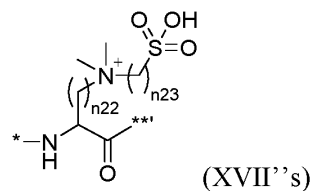
(XVII''p)



(XVII''q)

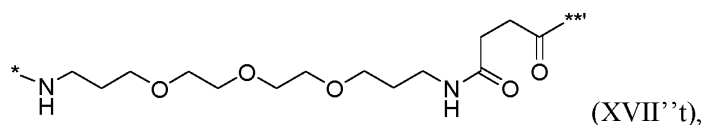


(XVII''r)



(XVII''s)

10



wherein,

n_{12} is 0 to 2,

n_5 and n_6 are each independently 1 to 10,

5 n_7 and n_8 are each independently 0 to 4,

n_9 , n_{13} , n_{14} , n_{15} , n_{18} , n_{20} and n_{21} are each independently 1 or 2,

n_{10} and n_{11} are each independently 0 or 1,

n_{16} is 0 to 12,

n_{17} , n_{19} and n_{22} are each independently 1 to 4,

10 n_{23} is 2 to 4,

X^{L3} , X^{L4} and X^{L5} are each independently $=CH-$ or $=N-$,

X^{L6} and X^{L7} are each independently $-OH$ or $-NH_2$,

R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} and R^{L6} are each independently $-H$ or a methyl group,

* indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5,

15 Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

** indicates covalent attachment to L.

Preferably, in the above formula (XV'), L is covalently attached to a C atom of a carbonyl group of (or comprised in) the side chain of any of Xaa1, Xaa3, Xaa5, Xaa6, Xaa8, Xaa9, Xaa10 and Xaa11 or of (or comprised in) the main chain of any of Xaa7, Xaa8, Xaa9, Xaa10 and Xaa11.

Moreover, if the compound of formula (I) contains more than one group Z, each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9) may be independently selected from the moieties of formulae (XIII), (XV), (XV') and (XV'') described above.

In the above formulae (XIII), (XV), (XV') and (XV''), the radionuclide, if present, is preferably as described in above section 2.1.2, and more preferably a diagnostically active radionuclide or a therapeutically active radionuclide (as described above).

In an embodiment of the present invention, it is preferred that the chelator E and the radionuclide comprised therein are as defined in the table below. The left column indicates the chelator and the right columns indicate, for each chelator, the corresponding radionuclides by order of preference.

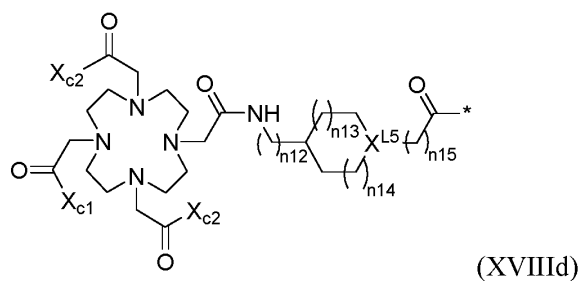
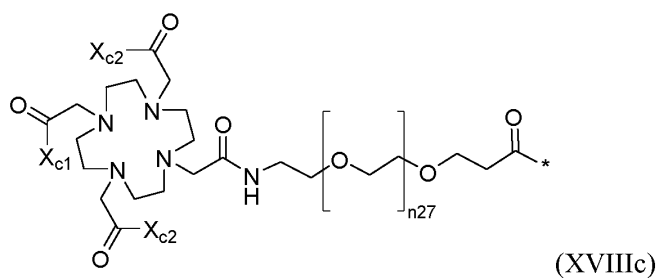
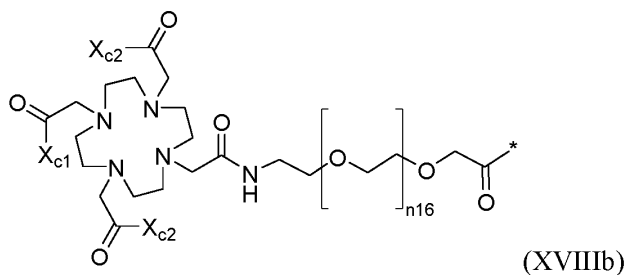
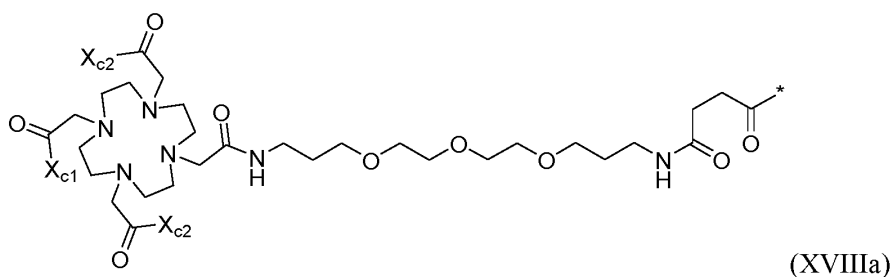
Table 8: Overview of preferred chelator-nuclide combinations in the context of the present invention.

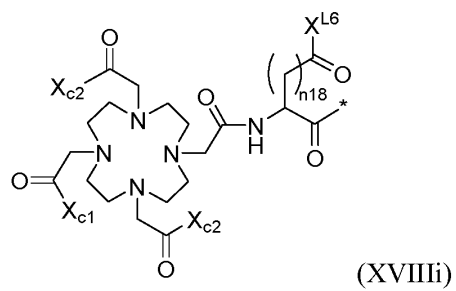
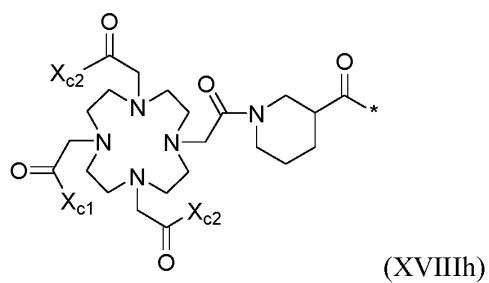
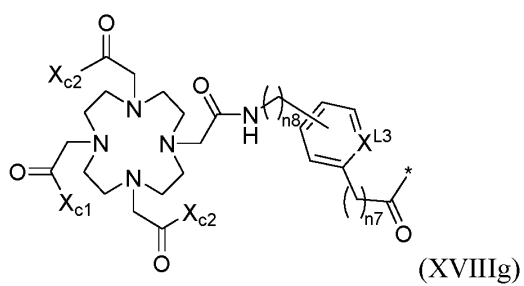
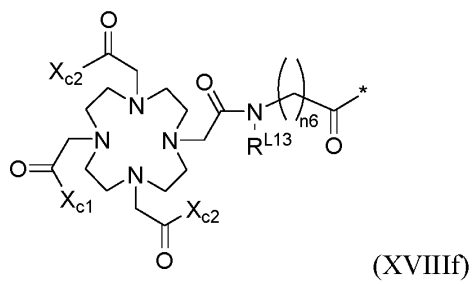
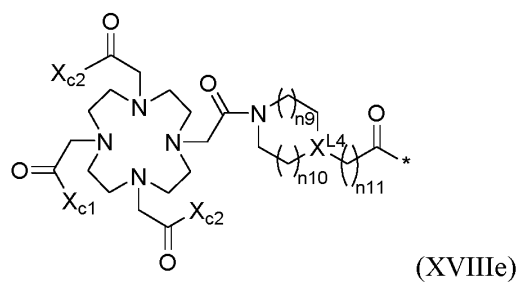
Chelator	Preferred nuclide combinations	More preferred nuclide combinations	Most preferred nuclide combinations
DOTA	^{44}Sc , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{90}Y , ^{111}In , ^{149}Tb , ^{161}Tb , ^{177}Lu , ^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac	^{44}Sc , ^{68}Ga , ^{86}Y , ^{90}Y , ^{111}In , ^{149}Tb , ^{161}Tb , ^{177}Lu , ^{203}Pb , ^{212}Pb , ^{225}Ac	^{68}Ga , ^{111}In , ^{177}Lu , ^{225}Ac
DOTAGA	^{89}Zr , ^{225}Ac	-	-
DOTAM	^{203}Pb , ^{212}Pb	-	-
Crown	^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac	^{213}Bi , ^{225}Ac	^{225}Ac
NOTA	$\text{Al-}^{18}\text{F}$, ^{64}Cu , ^{67}Cu , ^{67}Ga , ^{68}Ga	$\text{Al-}^{18}\text{F}$, ^{64}Cu , ^{67}Cu , ^{68}Ga	$\text{Al-}^{18}\text{F}$
NODAGA	^{64}Cu , ^{67}Cu , ^{67}Ga , ^{68}Ga	^{64}Cu , ^{67}Cu , ^{68}Ga	^{68}Ga
NODA-MPAA	$\text{Al-}^{18}\text{F}$	-	-
CB-TE2A	^{64}Cu , ^{67}Cu	-	-
CHX-A''-DTPA	^{86}Y , ^{90}Y , ^{111}In , ^{149}Tb , ^{161}Tb , ^{177}Lu	-	-
DFO	^{89}Zr		
Macropa	^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac	^{213}Bi , ^{225}Ac	^{225}Ac
HOPO ligand platform [†]	^{68}Ga , ^{89}Zr , ^{227}Th	^{89}Zr , ^{227}Th	^{227}Th
THP	^{67}Ga , ^{68}Ga	^{68}Ga	-
AAZTA	^{44}Sc , ^{86}Y , ^{90}Y , ^{149}Tb , ^{161}Tb , ^{177}Lu	^{177}Lu	-
NOPO	$\text{Al-}^{18}\text{F}$, ^{67}Ga , ^{68}Ga	^{68}Ga	-
PCTA	^{67}Ga , ^{68}Ga , ^{177}Lu	^{68}Ga , ^{177}Lu	-
PSC	^{111}In , ^{203}Pb , ^{212}Pb , ^{213}Bi	^{203}Pb , ^{212}Pb	-
Sarcophagine	^{64}Cu , ^{67}Cu	-	-
NETA	^{213}Bi	-	-

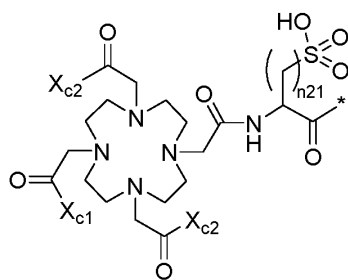
H ₄ CHXoctapa	¹¹¹ In, ¹⁷⁷ Lu, ²²⁵ Ac	¹¹¹ In, ¹⁷⁷ Lu	-
H ₄ pypa	⁴⁴ Sc, ⁸⁹ Zr, ¹¹¹ In, ¹⁷⁷ Lu	⁴⁴ Sc, ¹¹¹ In, ¹⁷⁷ Lu	-
N4	^{94m} Tc, ^{99m} Tc, ¹⁸⁶ Re, ¹⁸⁸ Re	^{99m} Tc	-

[†] as disclosed in: Santos *et al.*, *Molecules* **2021**, 26(22), 6997

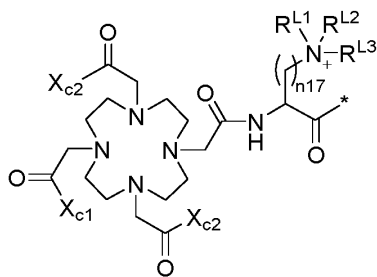
In an even more preferred embodiment, in formula (I), each group Z (i.e., Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹) is independently a moiety represented by any one of the following
5 formulae (XVIIIa) to (XVIIIn):



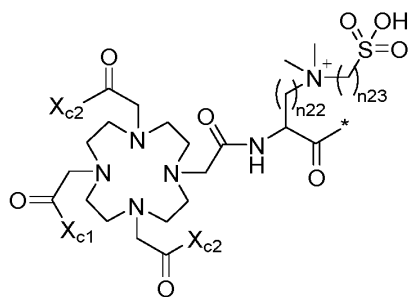




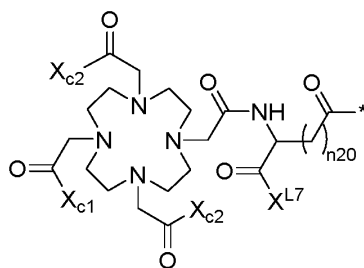
(XVIIIj)



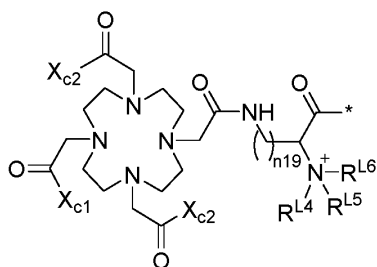
(XVIIIk)



(XVIIIl)



(XVIIIIm)



(XVIIIIn)

5

wherein,

X_{c1} , X_{c2} , X^{L6} and X^{L7} are each independently selected from the group consisting of -OH and -NH₂, and

n6 is 1 to 10, and

n7 and n8 are each independently 0 to 4,

n9, n13, n14, n15, n18, n20 and n21 are each independently 1 or 2, and

n10 and n11 are each independently 0 or 1, and

5 n12 is 0 to 2,

n16 and n27 are each independently 0 to 12, and

n17, n19 and n22 are each independently 1 to 4, and

n23 is 2 to 4, and

X^{L3} , X^{L4} and X^{L5} are each independently =N- or =CH-, and

10 R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} , R^{L6} and R^{L13} are each independently -H or a methyl group, and

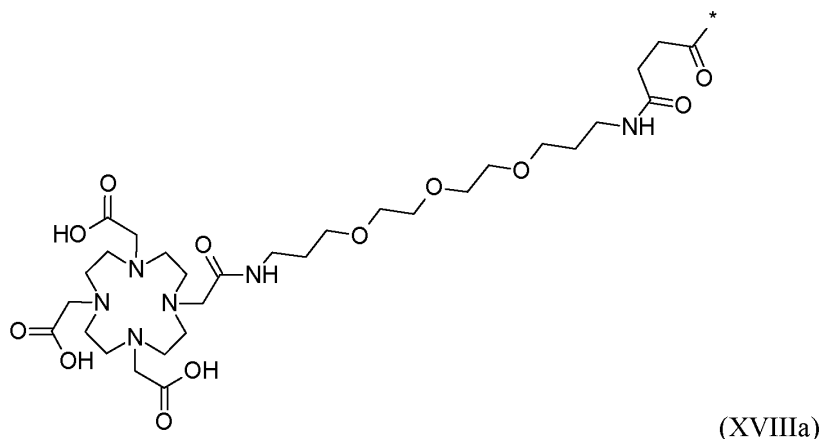
* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

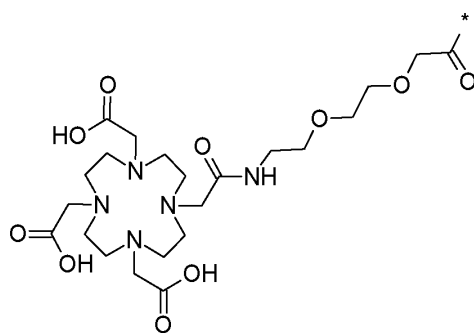
the moiety represented by any one of the above formulae (XVIIIa) to (XVIIIn) optionally comprises a radionuclide, the radionuclide being preferably selected from the

15 group consisting of $Al^{18}F$, ^{43}Sc , ^{44}Sc , ^{47}Sc , ^{51}Mn , ^{52}Mn , ^{64}Cu , ^{64}Cu , ^{67}Cu , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{89}Zr , ^{90}Y , ^{111}In , ^{149}Tb , ^{152}Tb , ^{153}Sm , ^{155}Tb , ^{161}Tb , ^{177}Lu , ^{201}Tl , ^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac , ^{226}Th and ^{227}Th .

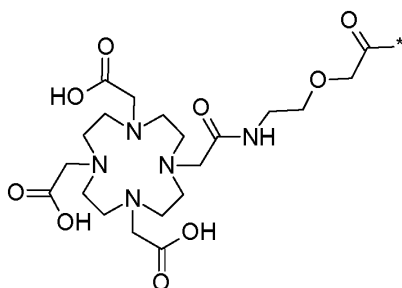
In a still more preferred embodiment, in formula (I), each group Z (i.e., Z^{1a} , Z^{1b} , Z^2 , Z^3 , Z^4 , Z^5 , Z^6 , Z^7 , Z^8 and Z^9) is independently a moiety represented by any one of the following formulae

20 (XVIIIa) to (XVIIIv):

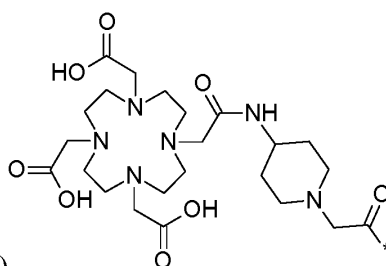




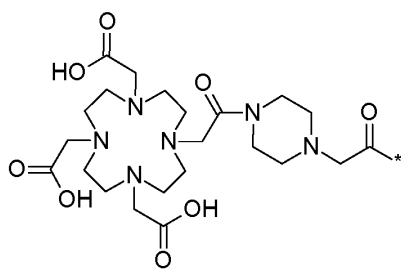
(XVIIIb)



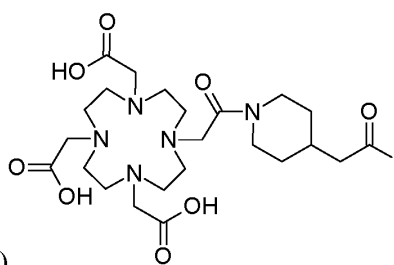
(XVIIIc)



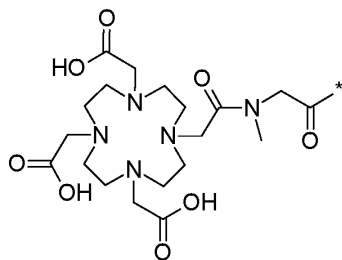
(XVIIIId)



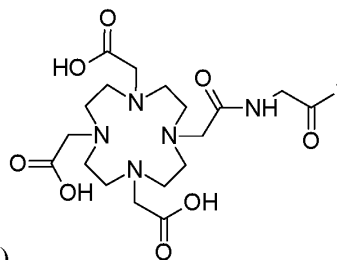
(XVIIIe)



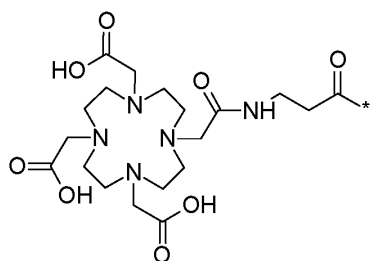
(XVIIIIf)



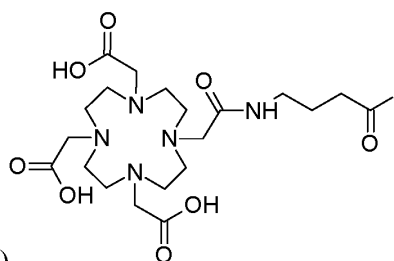
(XVIIIg)



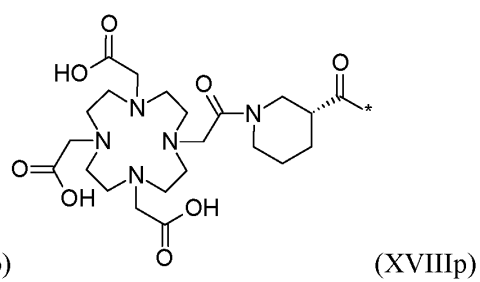
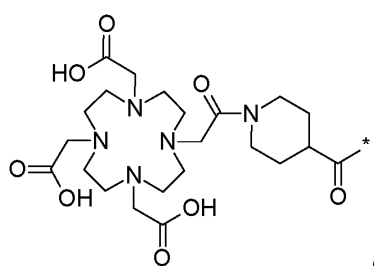
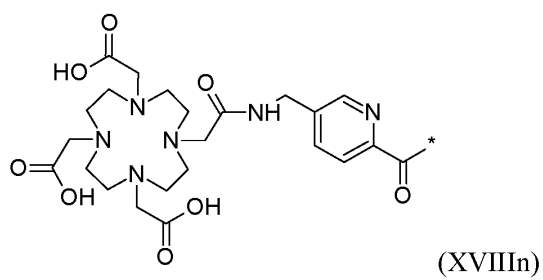
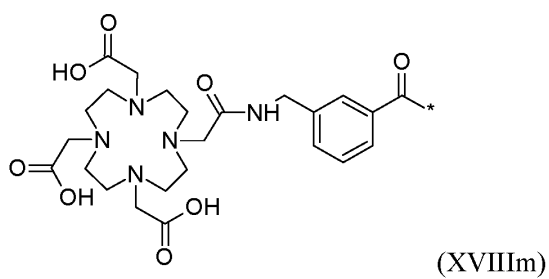
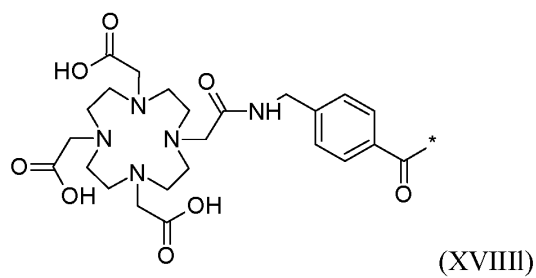
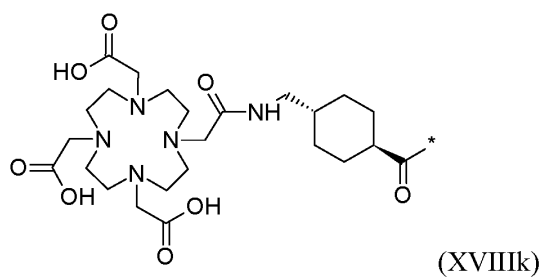
(XVIIIh)

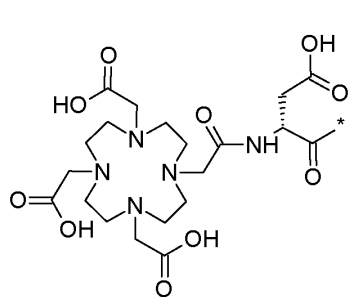


(XVIIIi)

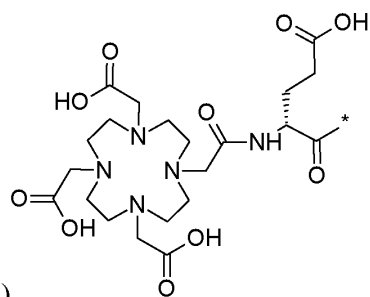


(XVIIIj)

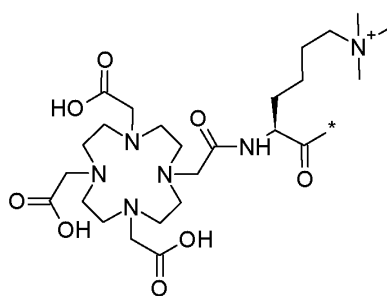




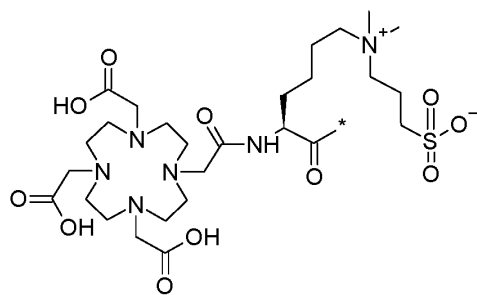
(XVIIIiq)



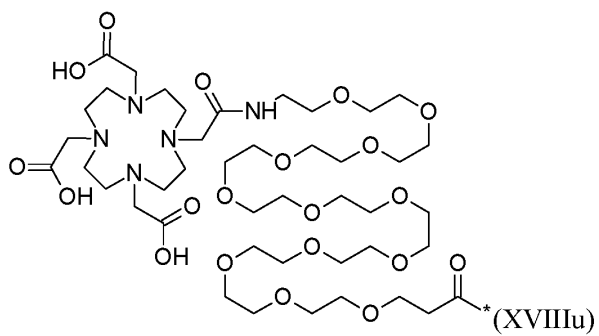
(XVIIIir)



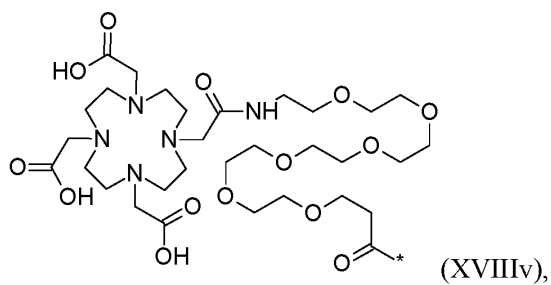
(XVIIIIs)



(XVIIIIt)



(XVIIIlu)



(XVIIIlv),

wherein,

* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

the moiety represented by any one of the above formulae (XVIIIa) to (XVIIIv)

5 optionally comprises a radionuclide, the radionuclide being preferably selected from the group consisting of Al^{18}F , ^{43}Sc , ^{44}Sc , ^{47}Sc , ^{51}Mn , ^{52}Mn , ^{64}Cu , ^{64}Cu , ^{67}Cu , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{89}Zr , ^{90}Y , ^{111}In , ^{149}Tb , ^{152}Tb , ^{153}Sm , ^{155}Tb , ^{161}Tb , ^{177}Lu , ^{201}Tl , ^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac , ^{226}Th and ^{227}Th .

10 2.1.3.2 Drug

According to one embodiment, the effector is a **drug**, preferably a cytotoxic drug. The cytotoxic drug can be covalently bound to the peptide structure, optionally by means of a linker which may be cleavable or not. According to this embodiment, it is preferred that the compound of the present invention does not comprise a chelator. In these embodiments, the drug, preferably
15 the cytotoxic drug, may be covalently bound to the peptide structure by means of linker moieties such as L1, L3, L4, or L6 (as described above).

Hereinafter are exemplary drugs that can be used as effector in the compound of the present invention:

(A) Antineoplastic agents such as

20 (A1) DNA-alkylating agents, e.g. duocarmycin (including synthetic analogues thereof: adozelesin, carzelesin, bizelesin, KW-2189 and CBI-TMI), nitrogen mustard analogues (e.g. cyclophosphamide chlorambucil, melphalan, chlormethine, ifosfamide, trofosfamide, prednimustine, bendamustine, chlornaphazine, estramustine, mechlorethamine, mechlorethamine oxide
25 hydrochloride, mannomustine, mitolactol, novembichin, phenesterine, uracil mustard), alkyl sulphonates (e.g. busulfan, treosulfan, mannosulfan, improsulfan and pipsulfan), ethylene imines (e.g. thiotepa, triaziquone, carboquone), nitrosoureas (e.g. carmustine, lomustine, semustine, streptozocin, chlorozotocin, fotemustine, nimustine, ranimustine), epoxides (e.g. etoglucid), other alkylating
30 agents (e.g. mitobronitol, pipobroman, temozolomide, dacarbazine);

(A2) Topoisomerase inhibitors, e.g. doxorubicin, morpholino-doxorubicin, cyanomorpholino-doxorubicin, 2-pyrrolino- doxorubicin, deoxydoxorubicin, etoposide, etoposide phosphate, irinotecan and metabolites thereof such as SN-

38, teniposide, topotecan, resveratrol, epipodophyllins (e.g. 9-aminocamptothecin, camptothecin, crisnatol, daunomycin, mitoxantrone, novantrone, retinoic acids (retinols), 9-nitrocamptothecin (RFS 2000));

(A3) RNA-polymerase II inhibitors, e.g. alpha-amanitin, other amatoxins;

5 (A4) DNA-cleaving agents, e.g. calicheamicin;

(A5) Antimitotic agents or microtubule disruptors, e.g. vinca alkaloids (e.g. vincristine, vinblastine, vindesine, vinorelbine, navelbin, vinflunide, vintafolide), taxanes (e.g. paclitaxel, docetaxel, paclitaxel polyglumex, cabazitaxel) and their analogs, maytansinoids (e.g. DM1, DM2, DM3, DM4, 10 maytansine and ansamitocins) and their analogs, cryptophycins (e.g. cryptophycin 1 and cryptophycin 8), epothilones, eleutherobin, discodermolide, bryostatins, dolostatins, auristatins (e.g. monomethyl auristatin E (MMAE), monomethyl auristatin F), tubulysins, cephalostatins; pancratistatin, sarcodictyin, spongistatin, demecolcine, mitomycins;

15 (A6) Anti-metabolites, e.g. DHFR inhibitors (e.g. methotrexate, trimetrexate, denopterin, pteropterin, aminopterin (4-aminopteroic acid) or other folic acid analogues such as raltitrexed, pemetrexed, pralatrexate), IMP dehydrogenase inhibitors (e.g. mycophenolic acid, tiazofurin, ribavirin, EICAR), ribonucleotide reductase inhibitors (e.g. hydroxyurea, deferoxamine), pyrimidine analogs (e.g. 20 cytarabine, fluorouracil, 5-fluorouracil and metabolites thereof, tegafur, carmofur, gemcitabine, capecitabine, azacitidine, decitabine, fluorouracil combinations, tegafur combinations, trifluridine combinations, cytosine arabinoside, ancitabine, floxuridine, doxifluridine), uracil analogs (e.g. 6-azauridine, deoxyuridine), cytosine analogs (e.g. enocitabine), purine analogs 25 (e.g. azathioprine, fludarabine, mercaptopurine, thiamiprine, thioguanine, cladribine, clofarabine, nelarabine), folic acid replenisher such as folinic acid;

(A7) A kinesin spindle protein inhibitor, e.g. filanesib;

(A8) Kinase inhibitors, e.g. ipatasertib, BIBW 2992 (anti-EGFR/Erb2), imatinib, gefitinib, pegaptanib, sorafenib, dasatinib, sunitinib, erlotinib, nilotinib, 30 lapatinib, axitinib, pazopanib, vandetanib, afatinib, vemurafenib, crizotinib, regorafenib, masitinib, dabrafenib, trametinib, ibrutinib, ceritinib, lenvatinib, nintedanib, cediranib, palbociclib, osimertinib, alectinib, alectinib, rociletinib, cobimetinib, midostaurin, olmutinib, E7080 (anti-VEGFR2), mubritinib,

ponatinib (AP24534), bafetinib (INNO-406), bosutinib (SKI-606), cabozantinib, vismodegib, iniparib, ruxolitinib, CYT387, tivozanib, ispinesib, temsirolimus, everolimus, ridaforolimus;

(A9) A nicotinamide phosphoribosyltransferase inhibitor e.g. CAS No.2241014-82-2;

5 (A10) A matrix metalloproteinase 9 inhibitor, e.g. derivatives of CGS27023A;

(A11) A phosphatase inhibitor, e.g. mycrocystin-LR;

(B) Immunomodulatory agents including immunostimulants, immunosuppressants, cyclosporine, cyclosporine A, aminocaproic acid, azathioprine, bromocriptine, chlorambucil, chloroquine, cyclophosphamide, corticosteroids (e.g. amcinonide, betamethasone, budesonide, hydrocortisone, flunisolide, fluticasone propionate, 10 fluocortolone, danazol, dexamethasone, prednisone, triamcinolone acetonide, beclometasone dipropionate), DHEA, hydroxychloroquine, meloxicam, methotrexate, mofetil, mycophenylate, sirolimus, tacrolimus, everolimus, fingolimod, ibrutinib, imiquimod, resiquimod, cytokines, peptidic immunomodulators such as TLR agonists 15 (e.g. CpG oligonucleotides);

(C) Anti-infectious disease agents including antibacterial drugs, antimycobacterial drugs and antiviral drugs. A non-limiting example of antibiotic used in an antibiotic-antibody drug conjugate is rifalogue, i.e. a rifamycin derivative;

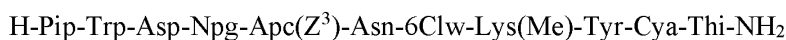
(D) Radionuclides, metabolites, pharmaceutically acceptable salts, and/or prodrugs of any 20 of the aforementioned agents (A) to (C).

According to one embodiment, the effector is a moiety derived from exatecan, PNU-159682, DM4, amanitin, duocarmycin, auristatin, maytansine, tubulysin, calicheamicin, SN-38, taxol, daunomycin, vinblastine, doxorubicin, methotrexate, pyrrolobenzodiazepine, pyrrole-based 25 kinesin spindle protein (KSP) inhibitors, indolino-benzodiazepine dimers, or radioisotopes and/or pharmaceutically acceptable salts thereof.

In an embodiment, the compound of the invention is present as a pharmaceutically acceptable salt.

2.2. Preferred compounds

In a preferred embodiment, the compound or salt of the present invention is represented by any 30 one of the following formulae:



	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-KMe2-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Har-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH ₂
5	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Guf-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-en
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Onf-NH ₂
10	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Off-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Thr-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Lys-6Clw-KMe3-Tyr-Ser-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
15	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Lys(Z ⁶)-Cya-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(Z ⁵)-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHMe
20	H-Pip-Trp-Cya-Npg-Orn(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Cya-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
	H-Nma-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
	H-KMe4-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂
25	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH ₂
30	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asp-Npg-Apc(Z ³)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Asn-Npg-Apc(Z ³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH ₂
	H-Pip-Trp-Cya-Npg-Apc(Z ³)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH ₂

- H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Egg-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Mff-NH₂
 5 H-Pip-Trp-Cya-Npg-Lys-Apc(Z⁴)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Lys(Z⁴)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Dmd-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 10 H-Pip-Trp-Cya-Nml-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Ida-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Mida-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmg-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Cya-Gel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Thr-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mgel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 20 H-Pip-Trp-Penox-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo(Me)-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Dab(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Mor-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 25 H-Pip-Trp-Cya-Npg-Apc(Z³)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Azp-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

- In a more preferred embodiment, the compound or salt of the present invention is represented
 30 by any one of the following formulae:

H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe2-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Har-Tyr-Cya-Thi-NH₂

- H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
5 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-RMe₂-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
10 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asn-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Pcnf-Cya-Thi-NH₂
15 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Guf-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-en
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Ocf-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Mff-NH₂
20 H-Pip-Trp-Cya-Npg-Apc(Z³)-Cya-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Nma-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Orn(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Off-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Ser-Thi-NH₂
25 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Thr-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys(Me)-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-Brw₆-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
30 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(Z⁵)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Mnpg-Orn(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Nmg-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Gel-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Thr-6Clw-KMe₃-Tyr-Cya-Thi-NH₂

- H-Pip-Trp-Cya-Mgel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Penox-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo(Me)-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Dab(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 5 H-Pip-Trp-Cya-Npg-Apc(Z³)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

In an even more preferred embodiment, the compound or salt of the present invention is represented by any one of the following formulae:

- 10 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH₂
 H-Nma-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 20 H-Pip-Trp-Cya-Npg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 25 H-Pip-Trp-Cya-Gel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Dab(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

- 30 In the above formulae, each group Z³, Z⁴, Z⁵ and Z⁶ is independently an effector E which may optionally comprise a linker moiety L, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α 1) a phosphorophore and (α 2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- 5 (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, NK cells and/or phagocytotic cells.

Still more preferably, each group Z^3 , Z^4 , Z^5 and Z^6 is independently a chelator which may optionally comprise a linker moiety L, wherein the chelator comprises a radionuclide, and
 10 wherein preferably the chelator is independently a residue of DOTA, DOTAGA, DOTAM, Crown, DOTP, NOTA, NODAGA, NODA-MPAA, HBED, TETA, CB-TE2A, DTPA, CHX-A''-DTPA, DFO, Macropa, HOPO ligand platform, TRAP, THP, AAZTA, DATA, NOPO, PCTA, PSC, sarcophagine, FSC, DEPA, DE4TA, NETA, NE3TA, H₄octapa, H₄CHXoctapa, H₄pypa, H₄py₄pa, HYNIC, N_xS_{4-x} (N₄, N₂S₂, N₃S), ^{99m}Tc(CO)₃-chelators.

15 Most preferably, each group Z^3 , Z^4 , Z^5 and Z^6 is independently a chelator which may optionally comprise a linker moiety L, wherein the chelator comprises a radionuclide, and wherein the chelator is independently a residue of is a residue of DOTA, DOTAGA, DOTAM, Crown, NOTA, NODAGA, NODA-MPAA, CB-TE2A, CHX-A''-DTPA, DFO, Macropa, THP, AAZTA, NOPO, PCTA, PSC, sarcophagine, NETA, H₄CHXoctapa, H₄pypa and N₄,
 20 preferably of DOTA, DOTAGA, DOTAM, NOTA, NODAGA, Macropa, Crown, NOPO, PCTA, PSC and N₄, more preferably of DOTA, DOTAM, Macropa, NOTA, PSC or NODAGA, and most preferably of DOTA.

In a preferred embodiment, the compound or salt of the present invention is represented by any one of the following formulae:

- 25 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH₂
- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₂-Tyr-Cya-Thi-NH₂
- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Har-Tyr-Cya-Thi-NH₂
- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂
- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH₂
- 30 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Pcnf-Cya-Thi-NH₂
- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Guf-Cya-Thi-NH₂

- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-en
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Onf-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Off-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH₂
5 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Thr-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe3-Tyr-Ser-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Lys(DOTA)-Cya-Thi-NH₂
10 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH₂
H-Ida-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Nml-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHMe
15 H-Pip-Trp-Cya-Npg-Orn(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Cya-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Nma-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-KMe4-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
20 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH₂
25 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asn-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
30 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egg-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mff-NH₂
H-Pip-Trp-Cya-Npg-Apc(NOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂

- H-Pip-Trp-Cya-Npg-Apc(NODAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(NOPO)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(BnTCMC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 5 H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-glu)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-Kzw)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 10 H-Pip-Trp-Cya-Npg-Apc(DOTAM)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ala-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 15 H-Nmg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Gel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Thr-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 20 H-Pip-Trp-Cya-Mgel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Penox-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo(Me)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Dab(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Mor-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 25 H-Nmo-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Azp-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂
 30 wherein the DOTA, NOTA, PSC, DOTAGA, NOPO, BnTCMC or NODAGA moiety optionally comprises a radionuclide, the radionuclide being preferably selected from the group consisting of Al¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁴⁷Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁴Cu, ⁶⁷Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ⁹⁰Y, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵³Sm, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ²¹²Pb, ²¹³Bi, ²²⁵Ac, ²²⁶Th and ²²⁷Th.

In a more preferred embodiment, the compound or salt of the present invention is represented by any one of the following formulae:

- 5 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-RMe₂-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Pcnf-Cya-Thi-NH₂
 10 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
 H-Nma-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Orn(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(NOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Cya-Npg-Apc(NODAGA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-Brw₆-KMe₃-Tyr-Cya-Thi-NH₂
 20 H-Pip-Trp-Cya-Mnpg-Orn(PSC)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Gel-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Thr-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Dab(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 25 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Phe-NH₂

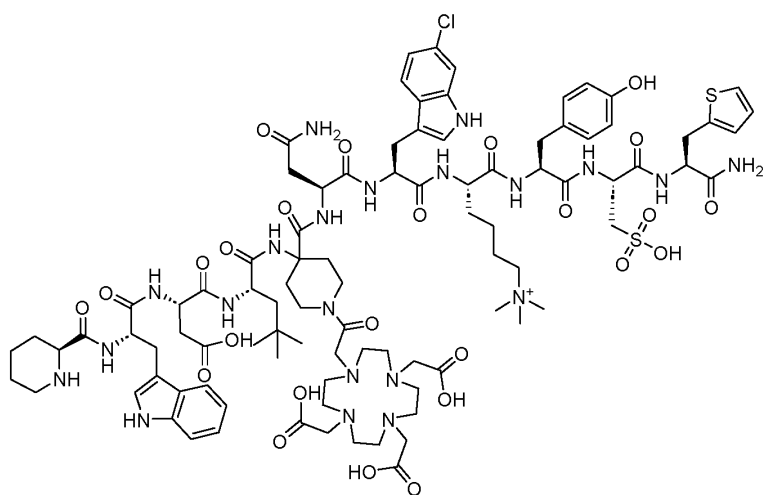
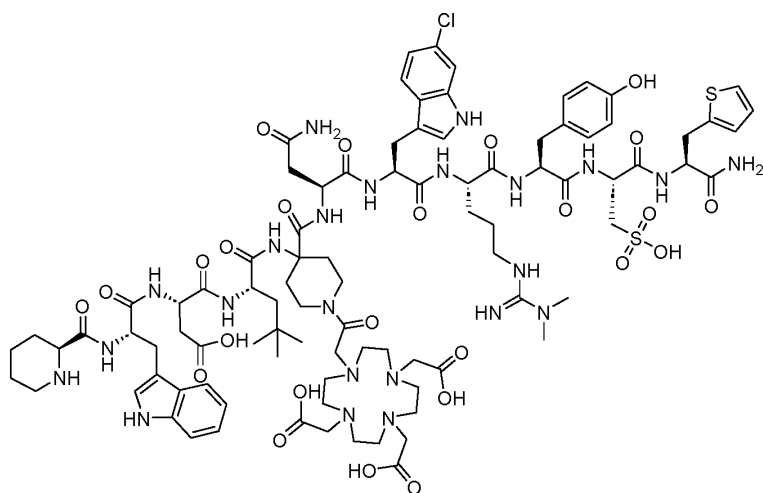
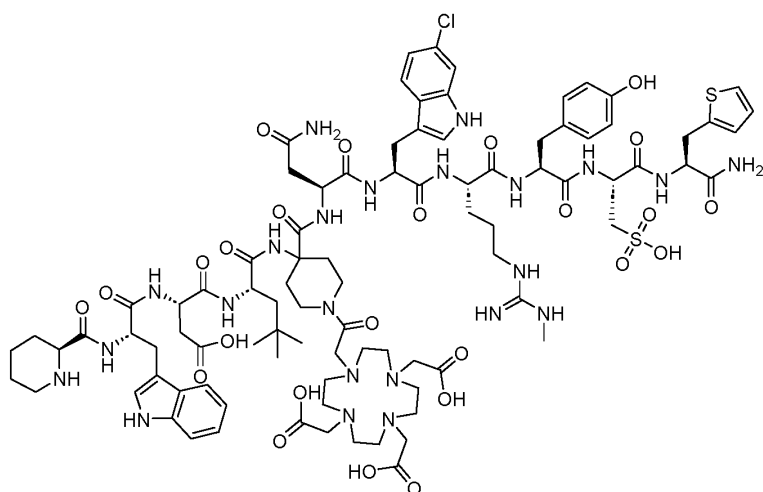
wherein the DOTA, NOTA, PSC or NODAGA moiety optionally comprises a radionuclide, the radionuclide being preferably selected from the group consisting of Al¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁴⁷Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁴Cu, ⁶⁷Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ⁹⁰Y, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵³Sm, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ²¹²Pb, ²¹³Bi, ²²⁵Ac, ²²⁶Th and ²²⁷Th.

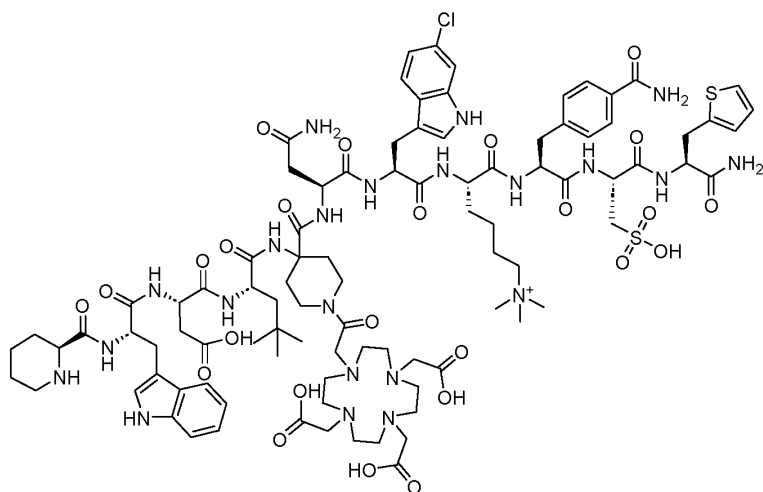
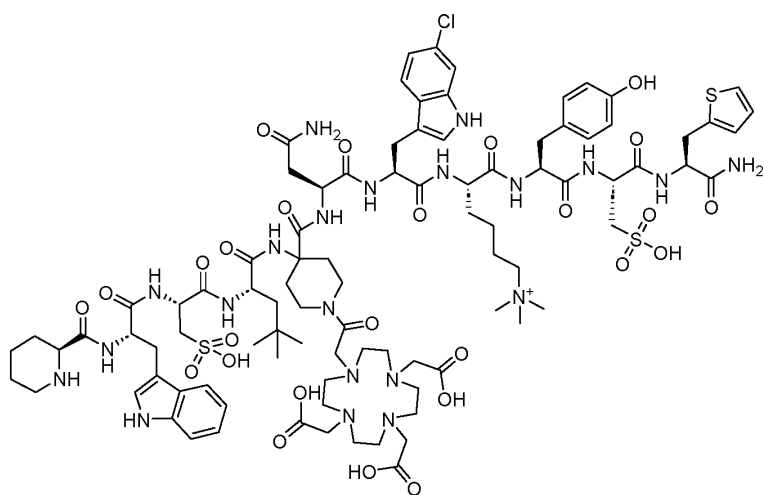
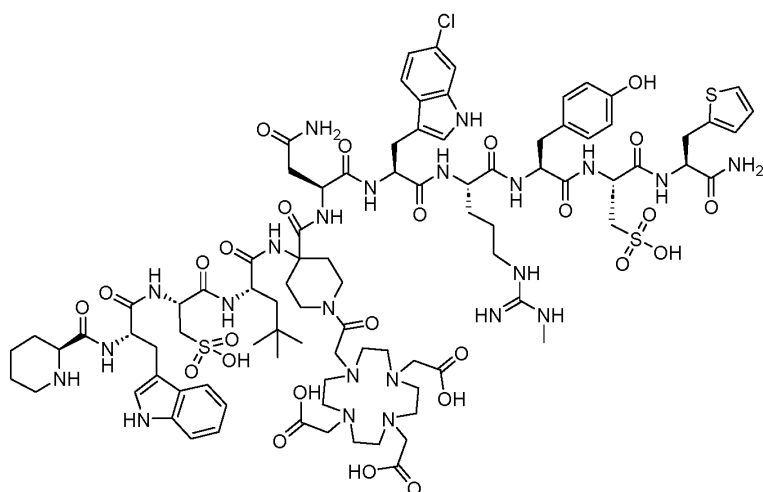
In some embodiments, the compound or salt of the present invention is represented by any one of the following formulae:

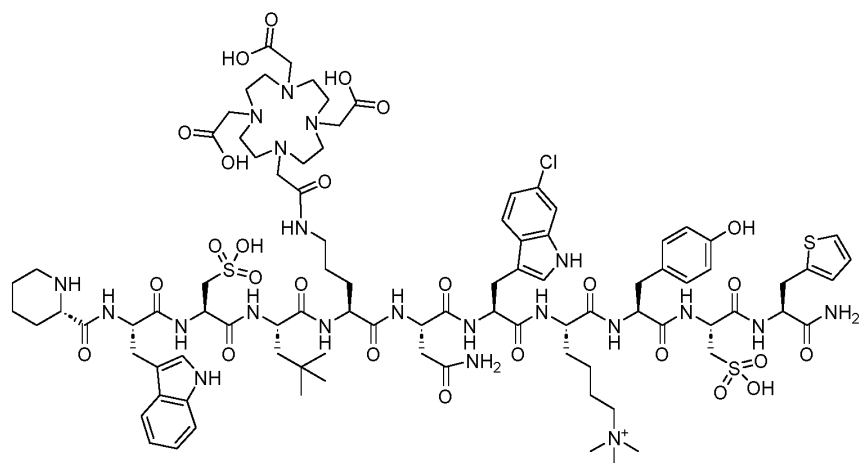
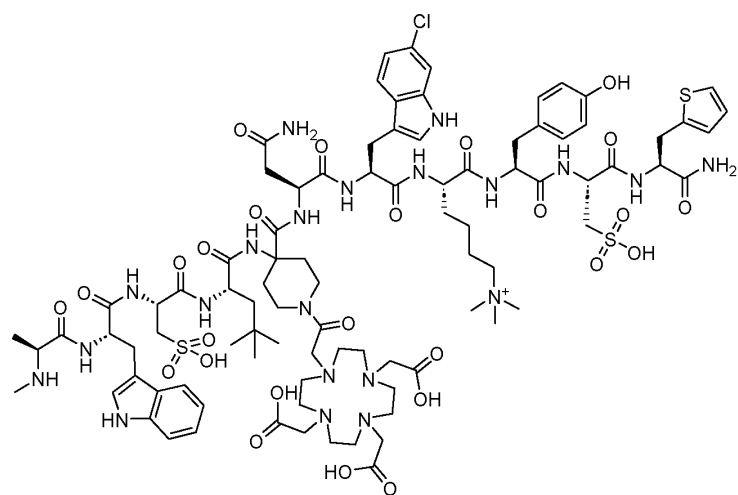
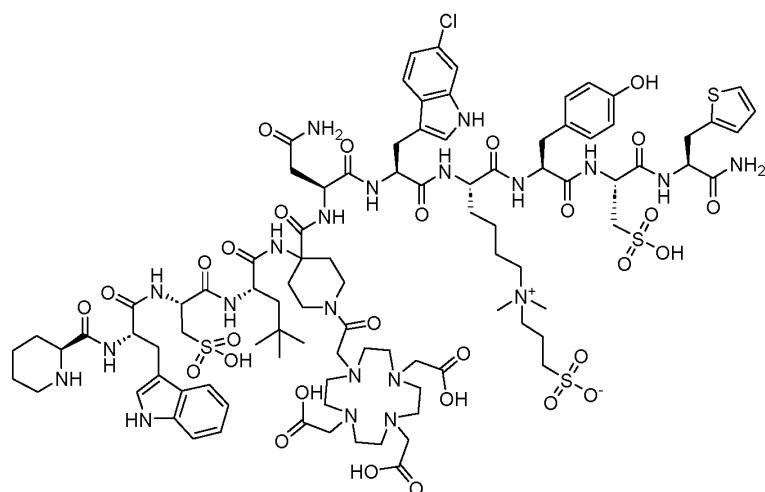
- H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-Ttds-Lys(DOTA)-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Lys(DOTA)-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Lys(DOTA)-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH₂
 5 H-Pip-Trp-Cya-Npg-Lys-Apc(DOTA)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Lys(DOTA)-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Ida(O3TdN2-DOTA)-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Lys(DOTA)-NH₂
 10 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-NH₂
 H-Pip-Trp-Cya-Npg-Apc(AF488-Ttds)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(DOTA)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Tap(DOTA)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(DOTA)-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH₂
 20 wherein AF488 refers to the fluorophore Alexa Fluor 488, and DOTA moiety optionally
 comprises a radionuclide, the radionuclide being preferably selected from the group
 consisting of Al¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁴⁷Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁴Cu, ⁶⁷Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr,
⁹⁰Y, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵³Sm, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ²¹²Pb, ²¹³Bi, ²²⁵Ac, ²²⁶Th
 and ²²⁷Th.

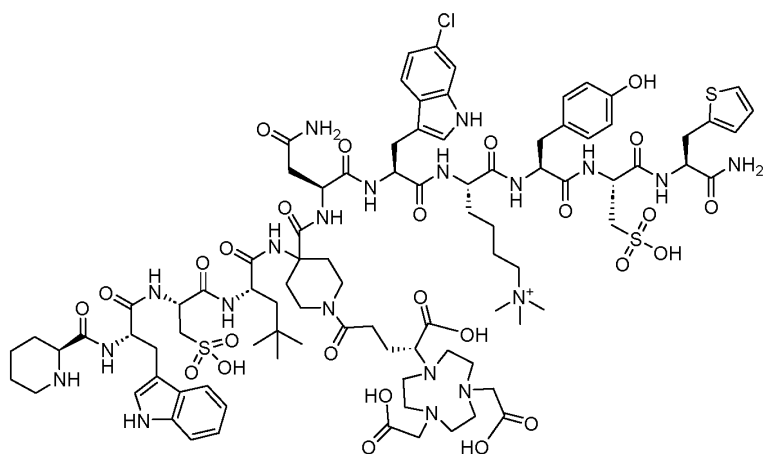
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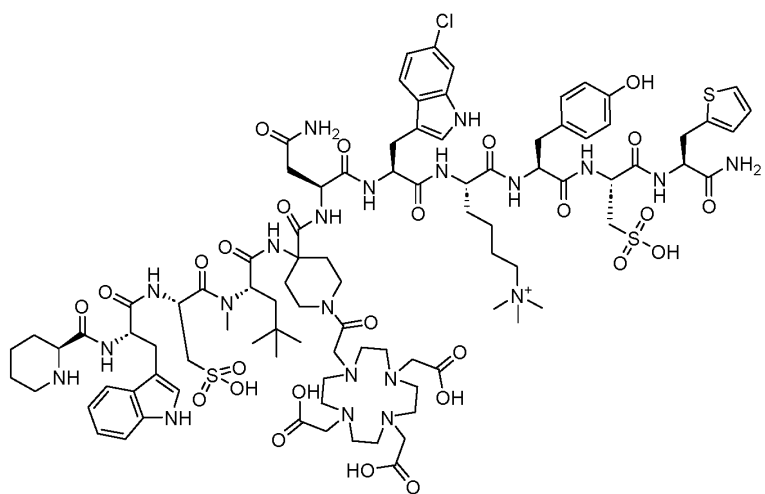
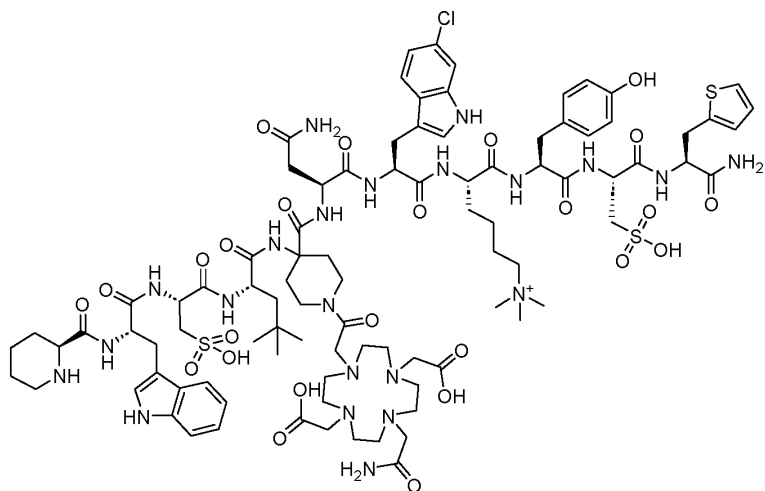
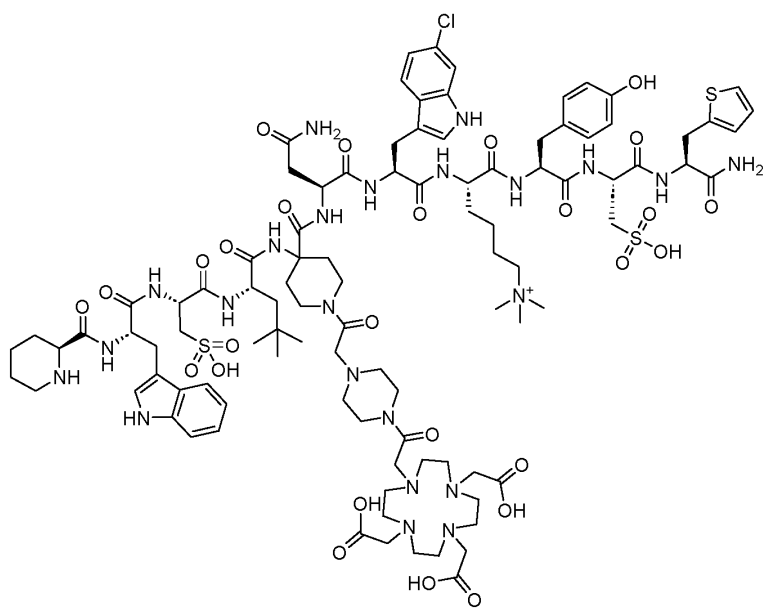
Most preferably, the compound or salt of the present invention is any one selected from the following compounds:

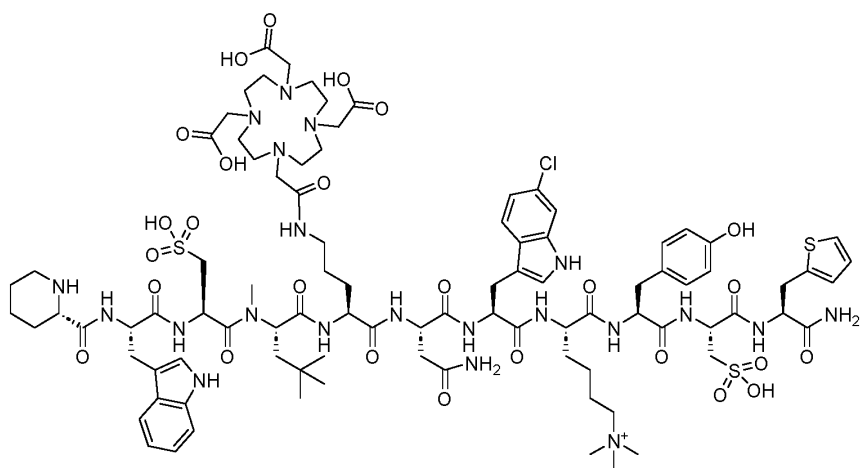
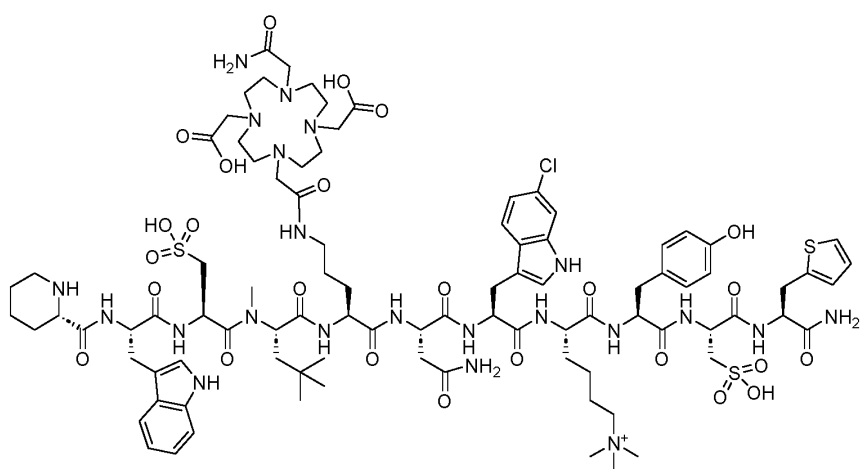
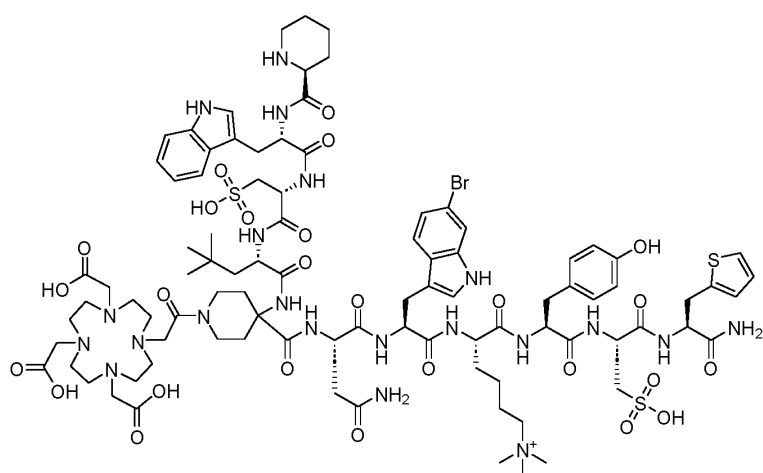


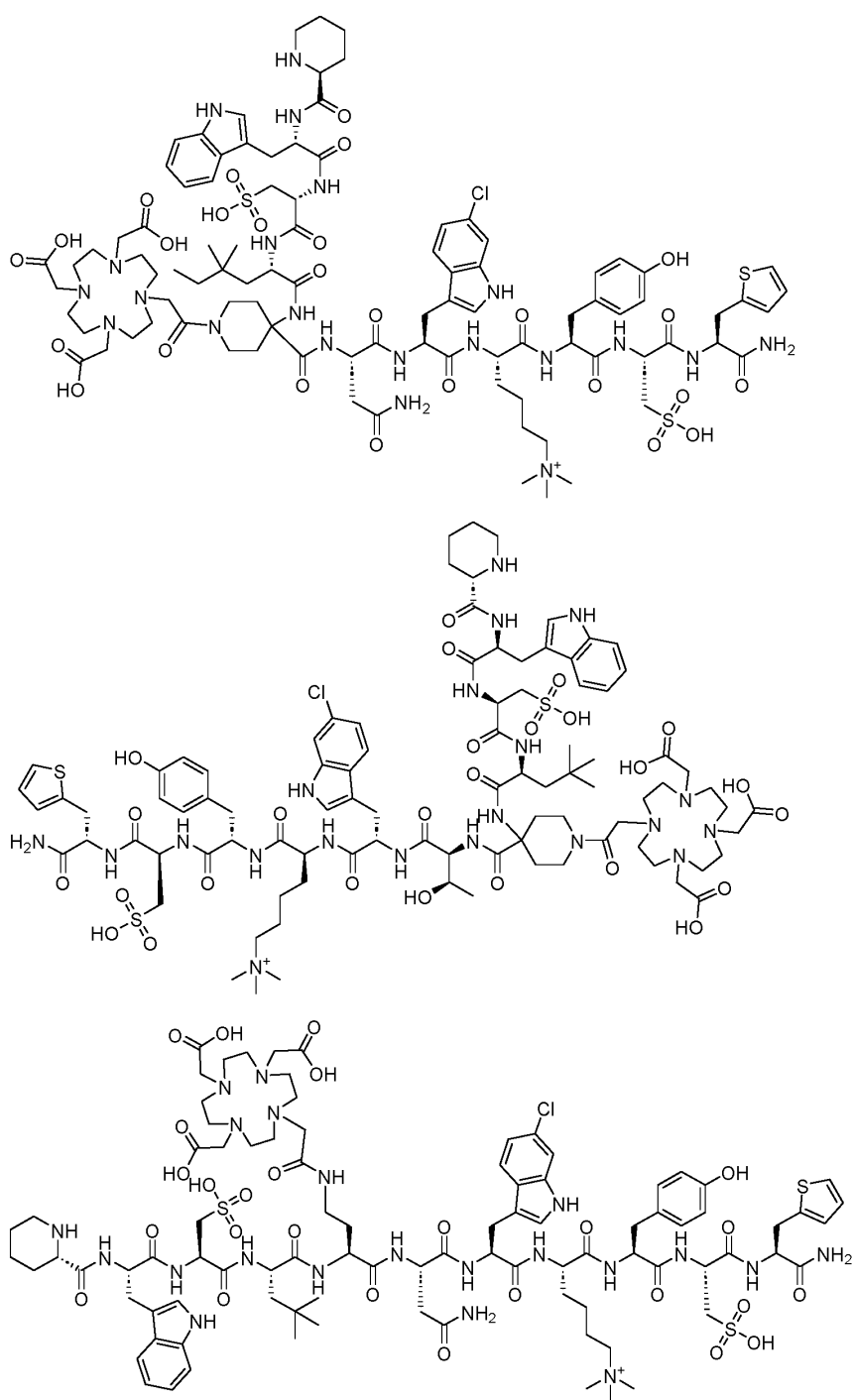


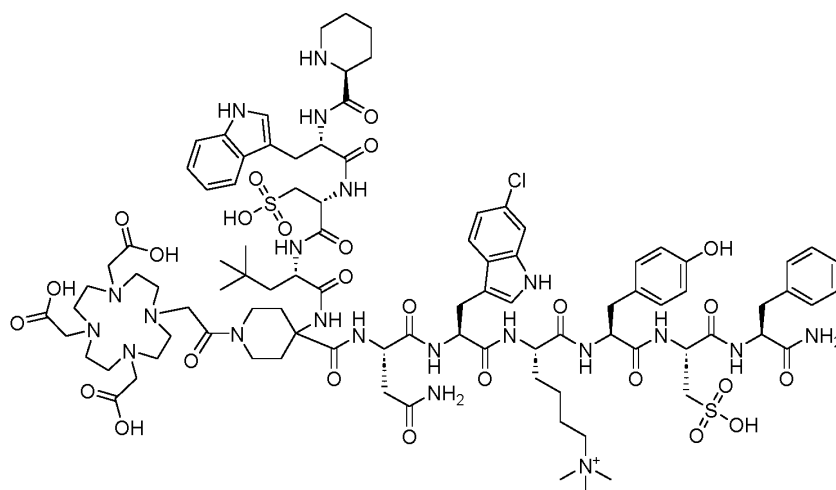












wherein the

depicted compounds are preferably in complex with a radionuclide, which is preferably selected from the group consisting of Al^{18}F , ^{43}Sc , ^{44}Sc , ^{47}Sc , ^{51}Mn , ^{52}Mn , ^{64}Cu , ^{64}Cu , ^{67}Cu , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{89}Zr , ^{90}Y , ^{111}In , ^{149}Tb , ^{152}Tb , ^{153}Sm , ^{155}Tb , ^{161}Tb , ^{177}Lu , ^{201}Tl , ^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac , ^{226}Th and ^{227}Th . In this context, the expression “in complex with a radionuclide” means that the DOTA, NOTA, PSC or NODAGA moiety in the above compounds comprises or chelates a radionuclide.

3. USE OF COMPOUND OR COMPOSITION FOR DIAGNOSTIC AND/OR THERAPEUTIC PURPOSES

In an embodiment, the compound or pharmaceutical composition of the present invention may be used in a method of diagnosing and/or treating a disease, preferably cancer, and more preferably a P-cadherin expressing cancer.

The P-cad expression pattern in solid tumors makes it a compelling therapeutic and diagnostic target. Severe overexpression can be observed in many solid tumors, dominantly across numerous cell layers. Head and neck tumors are particularly affected, as are tumors of the lung, breast, esophagus, cervix, thymus, uterus, mesothelium, pancreas, colon, rectum, bladder, and ovary (Subbiah, *et al.*, *Clin Cancer Res*, **2020**, 26: 5830). In breast cancer, high P-cadherin expression serves as a marker for particularly aggressive tumors. Here, P-cadherin has been shown to mediate increased cell migration and invasion (quite analogous to its natural function in early embryonic development). The consequences are metastasis and poor prognosis (Paredes, *et al.*, *Breast Cancer Res*, **2007**, 9: 214).

The compounds of the invention have a high binding affinity to P-cad. Because of this high binding affinity, the compounds of the invention are effective as, useful as and/or suitable as a

targeting agent and, if conjugated to another moiety, as a targeting moiety. As preferably used herein a targeting agent is an agent which interacts with the target molecule which is in the instant case said P-cad. In terms of cells and tissues thus targeted and targetable, respectively, by the compounds of the invention any cell and tissue, respectively, expressing said P-cad in particular is targeted and targetable, respectively.

As is known from the prior art, while the protein occupies the role of a developmental cadherin and is found in diverse fetal structures, its occurrence in adult tissues is extremely limited. In adult humans, expression is mostly limited to the basal (proliferative) layer of some epithelia such as in skin, ovary, uterus, thymus, lung, breast, and prostate (Imai, *et al.*, *Clin Cancer Res*, **2008**, *14*: 6487). In contrast, P-cad is highly expressed in a mammalian body and a human body in particular on several neoplastic cells in several tumor indications, whereas the expression of P-cad in other tissues of the mammalian and the human body is low. These P-cad-expressing tumor indications include but are not limited to breast (Albergaria, *et al.*, *Int J Dev Biol*, **2011**, *55*: 811, Margan, *et al.*, *Anticancer Res*, **2020**, *40*: 5557), colorectal (Kumara, *et al.*, *Oncoscience*, **2017**, *4*: 139), ovarian (Kayahashi, *et al.*, *BMC Cancer*, **2021**, *21*: 32), endometrial (Lewczuk, *et al.*, *Oncol Lett*, **2021**, *21*: 261), cervical (Li, *et al.*, *PLoS One*, **2016**, *11*: e0155910), head-and-neck (Seppälä, *et al.*, *Apmis*, **2021**, *129*: 717), pancreatic (Siret, *et al.*, *Br J Cancer*, **2018**, *118*: 546), biliary (Kim, *et al.*, *Medicine (Baltimore)*, **2016**, *95*: e4132), bladder (Wang, *et al.*, *Eur J Surg Oncol*, **2014**, *40*: 255), gastric and lung cancer (Imai, *et al.*, *Clin Cancer Res*, **2008**, *14*: 6487) as well as glioblastoma (Martins, *et al.*, *Mol Oncol*, **2022**, *16*: 2611), sarcoma (Thuault, *et al.*, *Oncogene*, **2013**, *32*: 1876) and cholangiocarcinoma (Sakamoto, *et al.*, *Cancer Sci*, **2015**, *106*: 1153). Most preferably, the disease is selected from the group comprising or consisting of ovarian cancer, colorectal cancer and breast cancer.

In a still further embodiment, the aforementioned indications may occur in organs and tissues selected from the group comprising external upper lip, external lower lip, external lip nos, upper lip mucosa, lower lip mucosa, mucosa lip nos, commissure lip, overlapping lesion of lip, base of tongue nos, dorsal surface tongue nos, border of tongue, ventral surface of tongue nos, anterior 2/3 of tongue nos, lingual tonsil, overlapping lesion of tongue, tongue nos, upper gum, lower gum, gum nos, anterior floor of mouth, lateral floor of mouth, overlapping lesion of floor of mouth, floor of mouth nos, hard palate, soft palate nos, uvula, overlapping lesion of palate, palate nos, cheek mucosa, vestibule of mouth, retromolar area, overlapping lesion of other and unspecified parts of mouth, mouth nos, parotid gland, submaxillary gland, sublingual gland, overlapping lesion of major salivary glands, major salivary gland nos, tonsillar fossa, tonsillar pillar, overlapping lesion of tonsil, tonsil nos, vallecula, anterior surface of epiglottis, lateral

wall oropharynx, posterior wall oropharynx, branchial cleft, overlapping lesion of oropharynx,
 oropharynx nos, superior wall of nasopharynx, posterior wall nasopharynx, lateral wall
 nasopharynx, anterior wall nasopharynx, overlapping lesion of nasopharynx, nasopharynx nos,
 pyriform sinus, postcricoid region, hypopharyngeal aspect of aryepiglottic fold, posterior wall
 5 hypopharynx, overlapping lesion of hypopharynx, hypopharynx nos, pharynx nos,
 laryngopharynx, waldeyer's ring, overlapping lesion of lip oral cavity and pharynx, cervical
 esophagus, thoracic esophagus, abdominal esophagus, upper third of esophagus, middle third
 of esophagus, esophagus lower third, overlapping lesion of esophagus, esophagus nos, cardia
 nos, fundus stomach, body stomach, gastric antrum, pylorus, lesser curvature of stomach nos,
 10 greater curvature of stomach nos, overlapping lesion of stomach, stomach nos, duodenum,
 jejunum, ileum, meckel's diverticulum, overlapping lesion of small intestine, small intestine
 nos, cecum, appendix, ascending colon, hepatic flexure of colon, transverse colon, splenic
 flexure of colon, descending colon, sigmoid colon, overlapping lesion of colon, colon nos,
 rectosigmoid junction, rectum nos, anus nos, anal canal, cloacogenic zone, overlapping lesion
 15 of rectum anus and anal canal, liver, intrahepatic bile duct, gallbladder, extrahepatic bile duct,
 ampulla of vater, overlapping lesion of biliary tract, biliary tract nos, head of pancreas, body
 pancreas, tail pancreas, pancreatic duct, islets of langerhans, neck of pancreas, overlapping
 lesion of pancreas, pancreas nos, intestinal tract nos, overlapping lesion of digestive system,
 gastrointestinal tract nos, nasal cavity, middle ear, maxillary sinus, ethmoid sinus, frontal sinus,
 20 sphenoid sinus, overlapping lesion of accessory sinuses, accessory sinus nos, glottis,
 supraglottis, subglottis, laryngeal cartilage, overlapping lesion of larynx, larynx nos, trachea,
 main bronchus, upper lobe lung, middle lobe lung, lower lobe lung, overlapping lesion of lung,
 lung nos, thymus, heart, anterior mediastinum, posterior mediastinum, mediastinum nos, pleura
 nos, overlapping lesion of heart mediastinum and pleura, upper respiratory tract nos,
 25 overlapping lesion of respiratory system and intrathoracic organs, respiratory tract nos, upper
 limb long bones joints, upper limb short bones joints, lower limb long bones joints, lower limb
 short bones joints, overlapping lesion of bones joints and articular cartilage of limbs, bone limb
 nos, skull and facial bone, mandible, vertebral column, rib sternum clavicle, pelvic bone,
 overlapping lesion of bones joints and articular cartilage, bone nos, blood, bone marrow, spleen,
 30 reticuloendothelial system nos, hematopoietic system nos, skin lip nos, eyelid nos, external ear,
 skin face, skin scalp neck, skin trunk, skin limb upper, skin limb lower, peripheral nerve head
 neck, peripheral nerve shoulder arm, peripheral nerve leg, peripheral nerve thorax, peripheral
 nerve abdomen, peripheral nerve pelvis, peripheral nerve trunk, overlapping lesion of
 peripheral nerves and autonomic nervous system, autonomic nervous system nos,

retroperitoneum, peritoneum, peritoneum nos, overlapping lesion of retroperitoneum and peritoneum, connective tissue head, connective tissue arm, connective tissue leg, connective tissue thorax, connective tissue abdomen, connective tissue pelvis, connective tissue trunk nos, overlapping lesion of connective subcutaneous and other soft tissues, connective tissue nos,

5 nipple, central portion of breast, upper inner quadrant of breast, lower inner quadrant of breast, upper outer quadrant of breast, lower outer quadrant of breast, axillary tail of breast, overlapping lesion of breast, breast nos, labium majus, labium minus, clitoris, overlapping lesion of vulva, vulva nos, vagina nos, endocervix, exocervix, overlapping lesion of cervix uteri, cervix uteri, isthmus uteri, endometrium, myometrium, fundus uteri, overlapping lesion of

10 corpus uteri, corpus uteri, uterus nos, ovary, fallopian tube, broad ligament, round ligament, parametrium, uterine adnexa, wolffian body, overlapping lesion of female genital organs, female genital tract nos, prepuce, glans penis, body penis, overlapping lesion of penis, penis nos, prostate gland, undescended testis, descended testis, testis nos, epididymis, spermatic cord, scrotum nos, tunica vaginalis, overlapping lesion of male genital organs, male genital organs

15 nos, kidney nos, renal pelvis, ureter, trigone bladder, dome bladder, lateral wall bladder, posterior wall bladder, ureteric orifice, urachus, overlapping lesion of bladder, bladder nos, urethra, paraurethral gland, overlapping lesion of urinary organs, urinary system nos, conjunctiva, cornea nos, retina, choroid, ciliary body, lacrimal gland, orbit nos, overlapping lesion of eye and adnexa, eye nos, cerebral meninges, spinal meninges, meninges nos,

20 cerebrum, frontal lobe, temporal lobe, parietal lobe, occipital lobe, ventricle nos, cerebellum nos, brain stem, overlapping lesion of brain, brain nos, spinal cord, cauda equina, olfactory nerve, optic nerve, acoustic nerve, cranial nerve nos, overlapping lesion of brain and central nervous system, nervous system nos, thyroid gland, adrenal gland cortex, adrenal gland medulla, adrenal gland nos, parathyroid gland, pituitary gland, craniopharyngeal duct, pineal

25 gland, carotid body, aortic body, overlapping lesion of endocrine glands and related structures, endocrine gland nos, head face or neck nos, thorax nos, abdomen nos, pelvis nos, upper limb nos, lower limb nos, other illdefined sites, overlapping lesion of ill-defined sites, lymph node face head neck, intrathoracic lymph node, intra-abdominal lymph nodes, lymph node axilla arm, lymph node inguinal region leg, lymph node pelvic, lymph nodes of multiple regions,

30 lymph node nos, unknown primary site.

In an embodiment of the present invention, the cancers listed herein are locally advanced, unresectable, metastatic, or any combination thereof.

In particular embodiments, the compound or composition of the present invention is for use in a method of diagnosing and/or treating cancer, preferably a P-cadherin expressing cancer,

wherein the cancer is selected from the group consisting of ovarian cancer, colorectal cancer, cholangiocarcinoma, non-small cell lung cancer (NSCLC) including squamous NSCLC, esophageal cancer, head-and-neck cancer including squamous cell carcinoma of head and neck (SCCHN), and tumors of the breast including triple negative breast cancer (TNBC), pancreatic cancer including pancreatic ductal adenocarcinoma (PDAC), endometrial cancer, cervical cancer, gastric cancer and sarcoma, and preferably from the group consisting of ovarian cancer, colorectal cancer, esophageal cancer, head-and-neck cancer and breast cancer.

The subjects treated with the compounds of the invention may be treated in combination with other non-surgical anti-proliferative (e.g., anti-cancer) drug therapy. In one embodiment, the compounds may be administered in combination with an anti-cancer compound such as a cytostatic compound. A cytostatic compound is a compound (e.g., a small molecule, a nucleic acid, or a protein) that suppresses cell growth and/or proliferation. In some embodiments, the cytostatic compound is directed towards the malignant cells of a tumor.

Suitable anti-proliferative drugs or cytostatic compounds to be used in combination with the compounds of the invention include anti-cancer drugs. Numerous anti-cancer drugs which may be used are well known and include, but are not limited to: Acivicin; Aclarubicin; Acodazole Hydrochloride; Acronine; Adozelesin; Aldesleukin; Altretamine; Ambomycin; Ametantrone Acetate; Aminoglutethimide; Amsacrine; Anastrozole; Anthramycin; Asparaginase; Asperlin; Azacitidine; Azetepa; Azotomycin; Batimastat; Benzodepa; Bicalutamide; Bisantrone Hydrochloride; Bisnafide Dimesylate; Bizelesin; Bleomycin Sulfate; Brequinar Sodium; Bropirimine; Busulfan; Cactinomycin; Calusterone; Caracemide; Carbetimer; Carboplatin; Carmustine; Carubicin Hydrochloride; Carzelesin; Cedefingol; Chlorambucil; Cirolemycin; Cisplatin; Cladribine; Crisnatol Mesylate; Cyclophosphamide; Cytarabine; Dacarbazine; Dactinomycin; Daunorubicin Hydrochloride; Decitabine; Dexormaplatin; Dezaguanine; Dezaguanine Mesylate; Diaziquone; Docetaxel; Doxorubicin; Doxorubicin Hydrochloride; Droloxifene; Droloxifene Citrate; Dromostanolone Propionate; Duazomycin; Edatrexate; Eflornithine Hydrochloride; Elsamitrucin; Enloplatin; Enpromate; Epiropidine; Epirubicin Hydrochloride; Erbulozole; Esorubicin Hydrochloride; Estramustine; Estramustine Phosphate Sodium; Etanidazole; Etoposide; Etoposide Phosphate; Etoprine; Fadrozole Hydrochloride; Fazarabine; Fenretinide; Floxuridine; Fludarabine Phosphate; Fluorouracil; Fluorocitabine; Fosquidone; Fostriecin Sodium; Gemcitabine; Gemcitabine Hydrochloride; Hydroxyurea; Idarubicin Hydrochloride; Ifosfamide; Ilmofofosine; Interferon Alfa-2a; Interferon Alfa-2b; Interferon Alfa-n1; Interferon Alfa-n3; Interferon Beta-I a; Interferon Gamma-I b; Iproplatin; Irinotecan Hydrochloride; Lanreotide Acetate; Letrozole; Leuprolide Acetate; Liarozole

Hydrochloride; Lometrexol Sodium; Lomustine; Losoxantrone Hydrochloride; Masoprocol; Maytansine; Mechlorethamine Hydrochloride; Megestrol Acetate; Melengestrol Acetate; Melphalan; Menogaril; Mercaptopurine; Methotrexate; Methotrexate Sodium; Metoprine; Meturedapa; Mitindomide; Mitocarcin; Mitocromin; Mitogillin; Mitomalcin; Mitomycin; 5 Mitosper; Mitotane; Mitoxantrone Hydrochloride; Mycophenolic Acid; Niraparib; Nocodazole; Nogalamycin; Olaparib; Ormaplatin; Oxisuran; Paclitaxel; Pegaspargase; Peliomycin; Pentamustine; Peplomycin Sulfate; Perfosfamide; Pipobroman; Pipsulfan; Piroxantrone Hydrochloride; Plicamycin; Plomestane; Porfimer Sodium; Porfiromycin; Prednimustine; Procarbazine Hydrochloride; Puromycin; Puromycin Hydrochloride; 10 Pyrazofurin; Riboprine; Rogletimide; Rucaparib; Safingol; Safingol Hydrochloride; Semustine; Simtrazene; Sparfosate Sodium; Sparsomycin; Spirogermanium Hydrochloride; Spiromustine; Spiroplatin; Streptonigrin; Streptozocin; Sulofenur; Talazoparib; Talisomycin; Taxol; Taxotere; Tecogalan Sodium; Tegafur; Teloxantrone Hydrochloride; Temoporfin; Teniposide; Teroxirone; Testolactone; Thiamiprine; Thioguanine; Thiotepa; Tiazofurin; 15 Tirapazamine; Topotecan Hydrochloride; Toremifene Citrate; Trestolone Acetate; Triciribine Phosphate; Trimetrexate; Trimetrexate Glucuronate; Tubulozole Hydrochloride; Uracil Mustard; Uredepa; Vapreotide; Velaparib; Verteporfin; Vinblastine Sulfate; Vincristine Sulfate; Vindesine; Vindesine Sulfate; Vinepidine Sulfate; Vinglycinatate Sulfate; Vinleurosine Sulfate; Vinorelbine Tartrate; Vinrosidine Sulfate; Vinzolidine Sulfate; Vorozole; Zeniplatein; 20 Zinostatin; and Zorubicin Hydrochloride.

Other anti-cancer drugs include, but are not limited to: 20-epi-1,25 dihydroxyvitamin D3; 5-ethynyluracil; abiraterone; acylfulvene; adecypenol; adozelesin; ALL-TK antagonists; ambamustine; amidox; amifostine; aminolevulinic acid; amrubicin; anagrelide; andrographolide; angiogenesis inhibitors; antagonist D; antagonist G; antarelix; anti- 25 dorsalizing morphogenetic protein-1; antiestrogen; antineoplaston; antisense oligonucleotides; aphidicolin glycinate; apoptosis gene modulators; apoptosis regulators; apurinic acid; ara-CDP-DL-PTBA; arginine deaminase; asulacrine; atamestane; atrimustine; axinastatin 1; axinastatin 2; axinastatin 3; azasetron; azatoxin; azatyrosine; baccatin III derivatives; balanol; batimastat; BCR/ABL antagonists; benzochlorins; benzoylstauroporine; beta lactam derivatives; beta- 30 alethine; betaclamycin B; betulinic acid; bFGF inhibitor; bisaziridinylspermine; bisnafide; bistratene A; breflate; budotitane; buthionine sulfoximine; calcipotriol; calphostin C; camptothecin derivatives; canarypox IL-2; capecitabine; carboxamide-amino-triazole; carboxyamidotriazole; CaRest M3; CARN 700; cartilage derived inhibitor; casein kinase inhibitors (ICOS); castanospermine; cecropin B; cetorelix; chlorins; chloroquinoxaline

sulfonamide; cicaprost; cis-porphyrin; clomifene analogues; clotrimazole; collismycin A; collismycin B; combretastatin A4; combretastatin analogue; conagenin; crambescidin 816; crisanol; cryptophycin 8; cryptophycin A derivatives; curacin A; cyclopentantraquinones; cycloplatam; cypemycin; cytarabine ocfosfate; cytolytic factor; cytostatin; dacliximab;

5 dehydrodidemnin B; deslorelin; dexifosfamide; dexrazoxane; dexverapamil; didemnin B; didox; diethylnorspermine; dihydro-5-azacytidine; dihydrotaxol, 9-; dioxamycin; diphenyl spiromustine; docosanol; dolasetron; doxifluridine; dronabinol; duocarmycin SA; ebselen; ecomustine; edelfosine; edrecolomab; eflomithine; elemene; emitefur; epirubicin; epristeride; estramustine analogue; estrogen agonists; estrogen antagonists; etanidazole; etoposide

10 phosphate; exemestane; filgrastim; finasteride; flavopiridol; flezelastine; fluasterone; fludarabine; fluorodaunorubicin hydrochloride; forfenimex; formestane; fotemustine; gadolinium texaphyrin; gallium nitrate; galocitabine; ganirelix; gelatinase inhibitors; glutathione inhibitors; hepsulfam; heregulin; hexamethylene bisacetamide; hypericin; ibandronic acid; idoxifene; idramantone; ilmofofosine; ilomastat; imidazoacridones; imiquimod;

15 immunostimulant peptides; insulin-like growth factor-I receptor inhibitor; interferon agonists; interferons; interleukins; iobenguane; iododoxorubicin; ipomeanol, 4-; irinotecan; iroplact; irsogladine; isobengazole; isohomohalicondrin B; itasetron; jasplakinolide; kahalalide F; lamellarin-N triacetate; lanreotide; leinamycin; lenograstim; lentinan sulfate; leptolstatin; leukemia inhibiting factor; leukocyte alpha interferon; leuprolide+estrogen+progesterone;

20 leuprorelin; levamisole; liarozole; linear polyamine analogue; lipophilic disaccharide peptide; lipophilic platinum compounds; lissoclinamide 7; lobaplatin; lombricine; lometrexol; lonidamine; losoxantrone; lovastatin; loxoribine; lurtotecan; lutetium texaphyrin; lysofylline; lytic peptides; maitansine; mannostatin A; marimastat; masoprocol; maspin; matrilysin inhibitors; matrix metalloproteinase inhibitors; merbarone; meterelin; methioninase;

25 metoclopramide; MIF inhibitor; mifepristone; miltefosine; mirimostim; mismatched double stranded RNA; mitoguazone; mitolactol; mitomycin analogues; mitonafide; mitotoxin fibroblast growth factor-saporin; mofarotene; molgramostim; monoclonal antibody, human chorionic gonadotrophin; monophosphoryl lipid A+myobacterium cell wall sk; mopidamol; multiple drug resistance gene inhibitor; multiple tumor suppressor 1-based therapy; mustard

30 anti cancer compound; mycaperoxide B; mycobacterial cell wall extract; myriaporone; N-acetyldinaline; N-substituted benzamides; nafarelin; nagrestip; naloxone+pentazocine; napavin; naphterpin; nartograstim; nedaplatin; nemorubicin; neridronic acid; neutral endopeptidase; nilutamide; nisamycin; nitric oxide modulators; nitroxide antioxidant; nitrullyn; O6-benzylguanine; octreotide; okicenone; oligonucleotides; onapristone; ondansetron;

ondansetron; oracin; oral cytokine inducer; osaterone; oxaliplatin; oxaunomycin; paclitaxel analogues; paclitaxel derivatives; palauamine; palmitoylrhizoxin; pamidronic acid; panaxytriol; panomifene; parabactin; pazelliptine; pegaspargase; peldesine; pentosan polysulfate sodium; pentostatin; pentozole; perflubron; perfosfamide; perillyl alcohol;

5 phenazinomycin; phenylacetate; phosphatase inhibitors; picibanil; pilocarpine hydrochloride; pirarubicin; piritrexim; placetin A; placetin B; plasminogen activator inhibitor; platinum complex; platinum compounds; platinum-triamine complex; porfimer sodium; porfiromycin; propyl bis-acridone; prostaglandin J2; proteasome inhibitors; protein A-based immune modulator; protein kinase C inhibitor; protein kinase C inhibitors, microalgal; protein tyrosine

10 phosphatase inhibitors; purine nucleoside phosphorylase inhibitors; purpurins; pyrazoloacridine; pyridoxylated hemoglobin polyoxyethylene conjugate; raf antagonists; raltitrexed; ramosetron; ras farnesyl protein transferase inhibitors; ras inhibitors; ras-GAP inhibitor; retelliptine demethylated; rhenium Re 186 etidronate; rhizoxin; ribozymes; RII retinamide; rohitukine; romurtide; roquinimex; rubiginone B1; ruboxyl; saintopin; SarCNU;

15 sarcophytol A; sargramostim; Sdi 1 mimetics; senescence derived inhibitor 1; sense oligonucleotides; signal transduction inhibitors; signal transduction modulators; single chain antigen binding protein; sizofuran; sobuzoxane; sodium borocaptate; sodium phenylacetate; solverol; somatomedin binding protein; sonermin; sparfosic acid; spicamycin D; spiromustine; splenopentin; spongistatin 1; squalamine; stem cell inhibitor; stem-cell division inhibitors;

20 stipiamide; stromelysin inhibitors; sulfinosine; superactive vasoactive intestinal peptide antagonist; suradista; suramin; swainsonine; synthetic glycosaminoglycans; tallimustine; tamoxifen methiodide; tauromustine; tazarotene; tecogalan sodium; tegafur; tellurapyrylium; telomerase inhibitors; temozolomide; tetrachlorodecaoxide; tetrazomine; thaliblastine; thalidomide; thiocoraline; thrombopoietin; thrombopoietin mimetic; thymalfasin; thymopoietin

25 receptor agonist; thymotrinan; thyroid stimulating hormone; tin ethyl etiopurpurin; titanocene dichloride; topsentin; toremifene; totipotent stem cell factor; translation inhibitors; tretinoin; triacetyluridine; tricinibine; tropisetron; turosteride; tyrosine kinase inhibitors; tyrphostins; UBC inhibitors; ubenimex; urogenital sinus-derived growth inhibitory factor; urokinase receptor antagonists; variolin B; vector system, erythrocyte gene therapy; velaresol; veramine;

30 verdins; vinorelbine; vinxaltine; vitaxin; zanoterone; zilascorb; and zinostatin stimalamer.

The compounds of the present invention can also be used in combination with any of the following treatments:

Therapy in combination with inhibitors of Poly(ADP-ribose) polymerases (PARP), a class of chemotherapeutic agents directed at targeting cancers with defective DNA-damage repair

(Yuan, *et al.*, *Expert Opin Ther Pat*, **2017**, 27: 363). Such PARP inhibitors include but are not limited to olaparib, rupacarib, velaparib, niraparib, talazoparib, pamiparib, iniparib, E7449, and A-966492.

Therapy in combination with inhibitors of signaling pathways and mechanisms leading to repair of DNA single and double strand breaks as e.g. nuclear factor-kappaB signaling (Pilie, *et al.*, *Nat Rev Clin Oncol*, **2019**, 16: 81; Zhang, *et al.*, *Chin J Cancer*, **2012**, 31: 359). Such inhibitors include but are not limited to inhibitors of ATM and ATR kinases, checkpoint kinase 1 and 2, DNA-dependen protein kinase, and WEE1 kinase (Pilie, *et al.*, *Nat Rev Clin Oncol*, **2019**, 16: 81).

Therapy in combination with an immunomodulator (Khalil, *et al.*, *Nat Rev Clin Oncol*, **2016**, 13: 394), a cancer vaccine (Hollingsworth, *et al.*, *NPJ Vaccines*, **2019**, 4: 7), an immune checkpoint inhibitor (e.g. PD-1, PD-L1, CTLA-4-inhibitor) (Wei, *et al.*, *Cancer Discov*, **2018**, 8: 1069), a Cyclin-D-Kinase 4/6 inhibitor (Goel, *et al.*, *Trends Cell Biol*, **2018**, 28: 911), an antibody being capable of binding to a tumor cell and/or metastases and being capable of inducing antibody-dependent cellular cytotoxicity (ADCC) (Kellner, *et al.*, *Transfus Med Hemother*, **2017**, 44: 327), a T cell- or NK cell engager (e.g. bispecific antibodies) (Yu, *et al.*, *J Cancer Res Clin Oncol*, **2019**, 145: 941), a cellular therapy using expanded autologous or allogeneic immune cells (e.g. chimeric antigen receptor T (CAR-T) cells) (Khalil, *et al.*, *Nat Rev Clin Oncol*, **2016**, 13: 394). Immune checkpoint inhibitors include but are not limited to nivolumab, ipilimumab, pembrolizumab, atezolizumab, avelumab, durvalumab, and cemiplimab.

According to the present invention, the compounds may be administered prior to, concurrent with, or following other anti-cancer compounds. The administration schedule may involve administering the different agents in an alternating fashion. In other embodiments, the compounds may be delivered before and during, or during and after, or before and after treatment with other therapies. In some cases, the compound is administered more than 24 hours before the administration of the other anti-proliferative treatment. In other embodiments, more than one anti-proliferative therapy may be administered to a subject. For example, the subject may receive the present compounds, in combination with both surgery and at least one other anti-proliferative compound. Alternatively, the compound may be administered in combination with more than one anti-cancer drug.

In an embodiment, the compounds of the present invention are used to detect cells and tissues overexpressing P-cad, whereby such detection is achieved by conjugating a detectable label to

the compounds of the invention, preferably a detectable radionuclide. In a preferred embodiment, the cells and tissues detected are diseased cells and tissues and/or are either a or the cause for the disease and/or the symptoms of the disease, or are part of the pathology underlying the disease. In a further preferred embodiment, the diseased cells and tissues are causing and/or are part of an oncology indication (e.g. neoplasms, tumors, and cancers).

In another embodiment, the compounds of the present invention are used to treat cells and tissues overexpressing P-cad. In a preferred embodiment, the cells and tissues treated are diseased cells and tissues and/or are either a or the cause for the disease and/or the symptoms of the disease, or are part of the pathology underlying the disease. In a further preferred embodiment, the diseased cells and tissues are causing and/or are part of an oncology indication (e.g. neoplasms, tumors, and cancers) and the therapeutic activity is achieved by conjugating therapeutically active effector to the compounds of the present invention, preferably a therapeutically active radionuclide.

An effective amount is a dosage of the compound sufficient to provide a therapeutically or medically desirable result or effect in the subject to which the compound is administered. The effective amount will vary with the particular condition being treated, the age and physical condition of the subject being treated, the severity of the condition, the duration of the treatment, the nature of the concurrent or combination therapy (if any), the specific route of administration and like factors within the knowledge and expertise of the health practitioner. For example, in connection with methods directed towards treating subjects having a condition characterized by abnormal cell proliferation, an effective amount to inhibit proliferation would be an amount sufficient to reduce or halt altogether the abnormal cell proliferation so as to slow or halt the development of or the progression of a cell mass such as, for example, a tumor. As used in the embodiments, "inhibit" embraces all of the foregoing.

In other embodiments, a therapeutically effective amount will be an amount necessary to extend the dormancy of micrometastases or to stabilize any residual primary tumor cells following surgical or drug therapy.

In a preferred embodiment, the compound of the present invention is for use in the treatment and/or prevention of a disease, whereby such treatment is targeted radionuclide therapy. Targeted radionuclide therapy is a form of radiation therapy (also called radiotherapy) using molecules labeled with a radionuclide to deliver a toxic level of radiation to sites of disease. Targeted radionuclide therapy may be applied systemically or locally. In contrast, in external beam radiation therapy a source outside of the body is producing a high-energy beam, which is

then focused at sites of disease, passing through the skin into the body. It is as well distinguished from internal radiation therapy (brachytherapy), where a radioactive implant is placed at or near the site of disease.

Preferably, radionuclide therapy makes use of or is based on different forms of radiation emitted by a radionuclide. Such radiation can, for example, be any one of alpha (α), beta (β) or gamma (γ) radiation caused by the emission of photons, emission of electrons including but not limited to β^- -particles and Auger-electrons, emission of protons, emission of neutrons, emission of positrons or emission of α -particles. Depending on the kind of particle or radiation emitted by said radionuclide, radionuclide therapy can, for example, be distinguished as β -particle radionuclide therapy, α -particle radionuclide therapy or Auger electron radionuclide therapy. All of these forms of radionuclide therapy are encompassed by the present invention, and all of these forms of radionuclide therapy can be realized by the compound of the invention, preferably under the proviso that the radionuclide attached to the compound of the invention, more preferably as an effector, is providing for this kind of radiation.

Radionuclide therapy preferably works by damaging the DNA of cells. The damage is caused by a β -particle, α -particle, or Auger electron directly or indirectly ionizing the atoms which make up the DNA chain. Indirect ionization happens as a result of the ionization of water, forming free radicals, notably hydroxyl radicals, which then damage the DNA.

In the most common forms of radionuclide therapy, most of the radiation effect is through free radicals. Because cells have mechanisms for repairing DNA damage, breaking the DNA on both strands proves to be the most significant technique in modifying cell characteristics. Because cancer cells generally are undifferentiated and stem cell-like, they reproduce more, and have a diminished ability to repair sub-lethal damage compared to most healthy differentiated cells. The DNA damage is inherited through cell division, accumulating damage to the cancer cells, causing them to die or reproduce more slowly.

Oxygen is a potent radiosensitizer, increasing the effectiveness of a given dose of radiation by forming DNA-damaging free radicals. Therefore, use of high-pressure oxygen tanks, blood substitutes that carry increased oxygen, hypoxic cell radiosensitizers such as misonidazole and metronidazole, and hypoxic cytotoxins, such as tirapazamine may be applied.

The total radioactive dose may be fractionated, i.e. spread out over time in one or more treatments for several important reasons. Fractionation allows normal cells time to recover, while tumor cells are generally less efficient in repair between fractions. Fractionation also

allows tumor cells that were in a relatively radio-resistant phase of the cell cycle during one treatment to cycle into a sensitive phase of the cycle before the next fraction is given.

It is generally known that different cancers respond differently to radiation therapy. The response of a cancer to radiation is described by its radiosensitivity. Highly radiosensitive cancer cells are rapidly killed by modest doses of radiation. These include leukemias, most lymphomas, and germ cell tumors.

Radionuclide therapy is in itself painless. Many low-dose palliative treatments cause minimal or no side effects. Treatment to higher doses may cause varying side effects during treatment (acute side effects), in the months or years following treatment (long-term side effects), or after re-treatment (cumulative side effects). The nature, severity, and longevity of side effects depends on the organs that receive the radiation, the treatment itself (type of radionuclide, dose, fractionation, concurrent chemotherapy), and the patient.

It is within the present inventions that the method for the treatment of a disease of the invention may realize each and any of the above strategies which are as such known in the art, and which insofar constitute further embodiments of the invention.

It is also within the present invention that the compound of the invention is used in a method for the diagnosis of a disease as disclosed herein. Such method, preferably, comprises the step of administering to a subject in need thereof a diagnostically effective amount of the compound of the invention.

In accordance with the present invention, an imaging method is selected from the group consisting of scintigraphy, Single Photon Emission Computed Tomography (SPECT) and Positron Emission Tomography (PET).

Scintigraphy is a form of diagnostic test or method used in nuclear medicine, wherein radiopharmaceuticals are internalized by cells, tissues and/or organs, preferably internalized *in vivo*, and radiation emitted by said internalized radiopharmaceuticals is captured by external detectors (gamma cameras) to form and display two-dimensional images. In contrast thereto, SPECT and PET forms and displays three-dimensional images. Because of this, SPECT and PET are classified as separate techniques to scintigraphy, although they also use gamma cameras to detect internal radiation. Scintigraphy is unlike a diagnostic X-ray where external radiation is passed through the body to form an image.

Single Photon Emission Tomography (SPECT) scans are a type of nuclear imaging technique using gamma rays. They are very similar to conventional nuclear medicine planar imaging using

a gamma camera. Before the SPECT scan, the patient is injected with a radiolabeled compound emitting gamma rays that can be detected by the scanner. A computer collects the information from the gamma camera and translates this into two-dimensional cross-sections. These cross-sections can be added back together to form a three-dimensional image of an organ or a tissue.

5 SPECT involves detection of gamma rays emitted singly, and sequentially, by the radionuclide provided by the radiolabeled compound. To acquire SPECT images, the gamma camera is rotated around the patient. Projections are acquired at defined points during the rotation, typically every 3 - 6 degrees. In most cases, a full 360 degree rotation is used to obtain an optimal reconstruction. The time taken to obtain each projection is also variable, but 15 - 20

10 seconds is typical. This gives a total scan time of 15 - 20 minutes. Multi-headed gamma cameras are faster. In recent years, several SPECT systems have become available that are composed of stationary rather than rotating detectors. Since SPECT acquisition is very similar to planar gamma camera imaging, the same radiopharmaceuticals may be used.

Positron Emitting Tomography (PET) is a non-invasive, diagnostic imaging technique for

15 measuring the biochemical, physiological and pathophysiological processes within the human body. PET is unique since it is able to produce images of the body's basic biochemistry or functions. Traditional diagnostic techniques, such as X-rays, CT scans, or MRI, produce images of the body's anatomy or structure. The premise with these techniques is that any changes in structure or anatomy associated with a disease can be seen. Biochemical and physiological

20 processes are also altered by a disease, and may occur before any gross changes in anatomy. PET is an imaging technique that can visualize some of these early biochemical and physiological changes. PET scanners rely on radiation emitted from the patient to create the images. Each patient is given a minute amount of a radioactive compound that either closely resembles a natural substance used by the body or binds specifically to a receptor or molecular

25 structure. As the radioisotope undergoes positron emission decay (also known as positive beta decay), it emits a positron, the antiparticle counterpart of an electron. After traveling up to a few millimeters, the positron encounters an electron and annihilates, producing a pair of annihilation (gamma) photons moving in opposite directions. These are detected when they reach a scintillation material in the scanning device, creating a burst of light, which is detected

30 by photomultiplier tubes or silicon avalanche photodiodes. The technique depends on simultaneous or coincident detection of the pair of photons. Photons that do not arrive in pairs, i.e., within a few nanoseconds, are ignored. All coincidences are forwarded to the image processing unit where the final image data is produced using image reconstruction procedures.

SPECT/CT and PET/CT is the combination of SPECT and PET with computed tomography (CT). The key benefits of combining these modalities are improving the reader's confidence and accuracy. With traditional PET and SPECT, the limited number of photons emitted from the area of abnormality produces a very low-level background that makes it difficult to anatomically localize the area. Adding CT helps determine the location of the abnormal area from an anatomic perspective and categorize the likelihood that this represents a disease.

It is within the present inventions that the method for the diagnosis of a disease of the invention may realize each and any of the above strategies which are as such known in the art, and which insofar constitute further embodiments of the invention.

The compound of the invention has a high binding affinity to P-cad. Because of this high binding affinity, the compound of the invention is effective as, useful as and/or suitable as a targeting agent and, if conjugated to another moiety, as a targeting moiety. As preferably used herein a targeting agent is an agent which interacts with the target molecule which is in the instant case said P-cad. In terms of cells and tissues thus targeted by the compound of the invention any cell and tissue, respectively, expressing said P-cad is or may be targeted.

In an embodiment, the compound interacts with a P-cadherin (P-cad), preferably with human P-cad having an amino acid sequence of SEQ ID NO: 1 or a homolog thereof, wherein the amino acid sequence of the homolog has an identity of P-cad that is at least 85% to the amino acid sequence of SEQ ID NO: 1. In preferred embodiments, the identity is 90%, preferably 95 %, 96 %, 97 %, 98 % or 99%.

The identity between two nucleic acid molecules can be determined as known to the person skilled in the art. More specifically, a sequence comparison algorithm may be used for calculating the percent sequence homology for the test sequence(s) relative to the reference sequence, based on the designated program parameters. The test sequence is preferably the sequence or protein or polypeptide which is said to be identical or to be tested whether it is identical, and if so, to what extent, to a different protein or polypeptide, whereby such different protein or polypeptide is also referred to as the reference sequence and is preferably the protein or polypeptide of wild type, more preferably the human P-cad of SEQ ID NO: 1.

Optimal alignment of sequences for comparison can be conducted, e.g., by the local homology algorithm of Smith & Waterman (Smith, *et al.*, *Advances in Applied Mathematics*, **1981**, 2: 482), by the homology alignment algorithm of Needleman & Wunsch (Needleman, *et al.*, *J Mol Biol*, **1970**, 48: 443), by the search for similarity method of Pearson & Lipman (Pearson, *et al.*, *Proc Natl Acad Sci U S A*, **1988**, 85: 2444), by computerized implementations of these

algorithms (GAP, BESTFIT, FASTA, and TFASTA in the Wisconsin Genetics Software Package, Genetics Computer Group, 575 Science Dr., Madison, Wis.), or by visual inspection.

One example of an algorithm that is suitable for determining percent sequence identity is the algorithm used in the basic local alignment search tool (hereinafter "BLAST "), see, e.g.

5 Altschul et al., 1990 (Altschul, *et al.*, *J Mol Biol*, **1990**, 215: 403) and Altschul et al., 1997 (Altschul, *et al.*, *Nucleic Acids Res*, **1997**, 25: 3389). Software for performing BLAST analyses is publicly available through the National Center for Biotechnology Information (hereinafter "NCBI"). The default parameters used in determining sequence identity using the software available from NCBI, e.g., BLASTN (for nucleotide sequences) and BLASTP (for amino acid
10 sequences) are described in McGinnis et al. (McGinnis, *et al.*, *Nucleic Acids Res*, **2004**, 32: W20).

Compounds of the present invention are useful to stratify patients, i.e. to create subsets within a patient population that provide more detailed information about how the patient will respond to a given drug. Stratification can be a critical component to transforming a clinical trial from
15 a negative or neutral outcome to one with a positive outcome by identifying the subset of the population most likely to respond to a novel therapy.

Stratification includes the identification of a group of patients with shared "biological" characteristics to select the optimal management for the patients and achieve the best possible outcome in terms of risk assessment, risk prevention and achievement of the optimal treatment
20 outcome

A compound of the present invention may be used to assess or detect, a specific disease as early as possible (which is a diagnostic use), the risk of developing a disease (which is a susceptibility/risk use), the evolution of a disease including indolent vs. aggressive (which is a prognostic use) and it may be used to predict the response and the toxicity to a given treatment
25 (which is a predictive use).

It is also within the present invention that the compound of the invention is used in a theragnostic method. The concept of theragnostics is to combine a therapeutic agent with a corresponding diagnostic test that can increase the clinical use of the therapeutic drug. The concept of theragnostics is becoming increasingly attractive and is widely considered the key
30 to improving the efficiency of drug treatment by helping doctors identify patients who might profit from a given therapy and hence avoid unnecessary treatments.

The concept of theragnostics is to combine a therapeutic agent with a diagnostic test that allows doctors to identify those patients who will benefit most from a given therapy. In an embodiment

and as preferably used herein, a compound of the present invention is used for the diagnosis of a patient, i.e. identification and localization of the primary tumor mass as well as potential local and distant metastases. Furthermore, the tumor volume can be determined, especially utilizing three-dimensional diagnostic modalities such as SPECT or PET. Only those patients having P-cad-positive tumor masses and who, therefore, might profit from a given therapy are selected for a particular therapy and hence unnecessary treatments are avoided. Preferably, such therapy is a P-cad-targeted therapy using a compound of the present invention. In one particular embodiment, chemically identical tumor-targeted diagnostics, preferably imaging diagnostics for scintigraphy, PET or SPECT and radiotherapeutics are applied. Such compounds only differ in the radionuclide and therefore usually have a very similar if not identical pharmacokinetic profile. This can be realized using a chelator and a diagnostic or therapeutic radiometal. Alternatively, this can be realized using a precursor for radiolabeling and radiolabeling with either a diagnostic or a therapeutic radionuclide. In one embodiment diagnostic imaging is used preferably by means of quantification of the radiation of the diagnostic radionuclide and subsequent dosimetry which is known to those skilled in the art and the prediction of drug concentrations in the tumor compared to vulnerable side effect organs. Thus, a truly individualized drug dosing therapy for the patient is achieved.

In an embodiment and as preferably used herein, the theragnostic method is realized with only one theragnostically active compound such as a compound of the present invention labeled with a radionuclide emitting diagnostically detectable radiation (e.g. positrons or gamma rays) as well as therapeutically effective radiation (e.g. electrons or alpha particles).

The invention also contemplates a method of intraoperatively identifying/disclosing diseased tissues expressing P-cad in a subject. Such method uses a compound of the invention, whereby such compound of the invention preferably comprises as effector a diagnostically active agent.

According to a further embodiment of the invention, the compound of the invention, particularly if complexed with a radionuclide, may be employed as adjunct or adjuvant to any other tumor treatment including, surgery as the primary method of treatment of most isolated solid cancers, radiation therapy involving the use of ionizing radiation in an attempt to either cure or improve the symptoms of cancer using either sealed internal sources in the form of brachytherapy or external sources, chemotherapy such as alkylating agents, antimetabolites, anthracyclines, plant alkaloids, topoisomerase inhibitors, and other antitumor agents, hormone treatments that modulate tumor cell behavior without directly attacking those cells, targeted agents which directly target a molecular abnormality in certain types of cancer including

monoclonal antibodies and tyrosine kinase inhibitors, angiogenesis inhibitors, immunotherapy, cancer vaccination, palliative care including actions to reduce the physical, emotional, spiritual, and psycho-social distress to improve the patient's quality of life and alternative treatments including a diverse group of health care systems, practices, and products that are not part of conventional medicine.

In an embodiment of the methods of the invention, the subject is a patient. In an embodiment, a patient is a subject which has been diagnosed as suffering from or which is suspected of suffering from or which is at risk of suffering from or developing a disease, whereby the disease is a disease as described herein and preferably a disease involving P-cad.

10 Dosages employed in practicing the methods for treatment and diagnosis, respectively, where a radionuclide is used and more specifically attached to or part of the compound of the invention will vary depending, e.g., on the particular condition to be treated, for example the known radiosensitivity of the tumor type, the volume of the tumor and the therapy desired. In general, the dose is calculated on the basis of radioactivity distribution to each organ and on observed target uptake. A γ -emitting complex may be administered once or at several times for diagnostic imaging. In animals, an indicated dose range may be from 0.1 ng/kg to 5 mg/kg of the compound of the invention complexed, e.g., with 1 kBq to 200 MBq of a γ -emitting radionuclide, including, but not limited to, ^{111}In or ^{89}Zr . For instance, an indicated dose range of the compound of the invention when complexed with a γ -emitting radionuclide may be from 15 0.2 mg/kg to 2 mg/kg, e.g., from 0.4 mg/kg to 1 mg/kg, such as about 0.6 mg/kg or 0.8 mg/kg. In an embodiment, an indicated dose range of the compound of the invention when complexed with a γ -emitting radionuclide is from 0.1 $\mu\text{g/kg}$ to 10.0 $\mu\text{g/kg}$, e.g., 0.1 $\mu\text{g/kg}$ to 5.0 $\mu\text{g/kg}$, e.g., 0.1 $\mu\text{g/kg}$ to 2.0 $\mu\text{g/kg}$ such as about 0.5 $\mu\text{g/kg}$, or 0.8 $\mu\text{g/kg}$, or 1.0 $\mu\text{g/kg}$. An γ - or β -emitting complex of the compound of the invention may be administered at several time points 25 e.g., 1 dose about every 28 days, e.g., over a period of 1 to 3 weeks or longer e.g., over a period of 16 to 32 weeks. In animals, an indicated dosage range may be of from 0.1 ng/kg to 5 mg/kg of the compound of the invention complexed, e.g., with 1 kBq to 200 MBq of an γ - or β -emitting radionuclide, including, but not limited to, ^{225}Ac or ^{177}Lu . For instance, an indicated dose range of the compound of the invention when complexed with an γ - or β -emitting radionuclide may 30 be from 0.2 mg/kg to 2 mg/kg, e.g., from 0.4 mg/kg to 1 mg/kg, such as about 0.6 mg/kg or 0.8 mg/kg. In larger mammals, for example humans, an indicated dosage range is from 0.1 to 100 $\mu\text{g/kg}$, e.g., 0.1 $\mu\text{g/kg}$ to 10.0 $\mu\text{g/kg}$, e.g., 0.1 $\mu\text{g/kg}$ to 5.0 $\mu\text{g/kg}$, e.g., such as about 1.0 $\mu\text{g/kg}$, or 2.0 $\mu\text{g/kg}$, or 4.0 $\mu\text{g/kg}$, of the compound of the invention complexed with, e.g., 10 to 400 MBq ^{111}In or ^{89}Zr . In larger mammals, for example humans, an indicated dosage range is of

from 0.1 ng/kg to 100 µg/kg of the compound of the invention complexed with, e.g., 1 to 100000 MBq of an α - or β -emitting radionuclide, including, but not limited to, ^{225}Ac or ^{177}Lu . Preferably, in larger mammals, for example humans, an indicated dosage range of the compound of the invention when complexed with a β -emitting radionuclide such as ^{177}Lu , e.g.,
5 with 200 to 50000 MBq, preferably 500 to 20000 MBq, more preferably 1000 to 15000 MBq, such as 1500 to 10000 MBq of β -emitting radionuclide, is from 0.01 µg/kg to 80 µg/kg, more preferably from 0.1 µg/kg to 50 µg/kg, such as about 1.0 µg/kg to 35 µg/kg, or 2.0 µg/kg to 20 µg/kg. In one aspect, in larger mammals, for example humans, the effective dose resulting from, e.g., the intravenous administration of the compound of the invention complexed with, e.g., 1
10 to 100000 MBq of an γ - or β -emitting radionuclide, including, but not limited to, ^{225}Ac or ^{177}Lu , is from 0.01 mSv/MBq to 10.0 mSv/MBq, e.g., 0.1 mSv/MBq to 1 mSv/MBq, such as about 0.1 mSv/MBq to 0.5 mSv/MBq, or 0.2 mSv/MBq to 0.3 mSv/MBq. In one further aspect, in larger mammals, for example humans, the effective dose resulting from, e.g., the intravenous administration of the compound of the invention complexed with a β -emitting radionuclide such
15 as ^{177}Lu is typically less than 5.0 mSv/MBq, more typically less than 2.0 mSv/MBq, even more typically less than 1.0 mSv/MBq, and most typically less than 0.5 mSv/MBq. Furthermore, in this aspect, the effective dose may be 0.05 mSv/MBq or more, e.g., 0.08 mSv/MBq or more, e.g., 0.1 mSv/MBq or more. In an embodiment, the effective dose resulting from, e.g., the intravenous administration of the compound of the invention complexed with a β -emitting
20 radionuclide such as ^{177}Lu is less than 1.0 mSv/MBq, e.g., less than 0.5 mSv/MBq, e.g., 0.35 mSv/MBq, such as about 0.25 mSv/MBq. Furthermore, in this embodiment, the effective dose may be 0.1 mSv/MBq or more, e.g., 0.1 mSv/MBq or more, e.g., 0.15 mSv/MBq or more. In another aspect, in larger mammals, for example humans, the radiation dose delivered to a tumor after, e.g., the intravenous administration of the compound of the invention complexed with a
25 β -emitting radionuclide such as ^{177}Lu results ranges from about 4.4 to about 660 Gy.

4. COMPOSITION, PHARMACEUTICAL COMPOSITION AND KIT

In a further aspect, the instant invention is related to a composition and a pharmaceutical composition in particular, comprising the compound of the invention.

30 The pharmaceutical composition of the present invention comprises at least one compound of the invention and, optionally, one or more carrier substances, excipients and/or adjuvants. The pharmaceutical composition may additionally comprise, for example, one or more of water, buffers such as, e.g., neutral buffered saline or phosphate buffered saline, ethanol, mineral oil, vegetable oil, dimethylsulfoxide, carbohydrates such as e.g., glucose, mannose, sucrose or

dextrans, mannitol, proteins, adjuvants, polypeptides or amino acids such as glycine, antioxidants, chelating agents such as EDTA or glutathione and/or preservatives. Furthermore, one or more other active ingredients may, but need not, be included in the pharmaceutical composition of the invention.

- 5 The pharmaceutical composition of the invention may be formulated for any appropriate route of administration, including, for example, topical such as, e.g., transdermal or ocular, oral, buccal, nasal, vaginal, rectal or parenteral administration. The term parenteral as used herein includes subcutaneous, intradermal, intravascular such as, e.g., intravenous, intramuscular, intrathecal and intraperitoneal injection, as well as any similar injection or infusion technique.
- 10 A preferred route of administration is intravenous administration.

In an embodiment of the invention the compound of the invention comprising a radionuclide is administered by any conventional route, in particular intravenously, e.g. in the form of injectable solutions or suspensions. The compound of the invention may also be administered advantageously by infusion, e.g., by an infusion of 30 to 60 min.

- 15 Depending on the site of the tumor, the compound of the invention may be administered as close as possible to the tumor site, e.g. by means of a catheter. Such administration may be carried out directly into the tumor tissue or into the surrounding tissue or into the afferent blood vessels. The compound of the invention may also be administered repeatedly in doses, preferably in divided doses.
- 20 According to a preferred embodiment of the invention, a pharmaceutical composition of the invention comprises a stabilizer, e.g., a free radical scavenger, which inhibits autoradiolysis of the compound of the invention. Suitable stabilizers include, e.g., ethanol, *N*-acetylcysteine, methionine, ascorbic acid, gentisic acid or derivatives thereof. Ascorbic acid and gentisic acid are preferred.
- 25 A pharmaceutical composition of the invention may comprise further additives, e.g. an agent to adjust the pH between 7.2 and 7.4, e.g. sodium or ammonium acetate or Na_2HPO_4 . Preferably, the stabilizer is added to the non-radioactive compound of the invention and introduction of the radionuclide, for instance the complexation with the radionuclide, is performed in the presence of the stabilizer, either at room temperature or, preferably, at a
- 30 temperature of from 40 to 120° C. The complexation may conveniently be performed under air free conditions, e.g., under N_2 or Ar. Further stabilizer may be added to the composition after complexation.

Excretion of the compound of the invention, particularly if the effector comprises a chelator, essentially takes place through the kidneys. Further protection of the kidneys from radioactivity accumulation may be achieved by administration of lysine or arginine or an amino acid solution having a high content of lysine and/or arginine, e.g., a commercially available amino acid solution such as Synthamin®-14 or -10, prior to the injection of or together with the compound of the invention, particularly if the effector is a radionuclide. Protection of the kidneys may also be achieved by administration of plasma expanders such as, e.g., gelofusine, either instead of or in addition to amino acid infusion. Protection of the kidneys may also be achieved by administration of diuretics providing a means of forced diuresis which elevates the rate of urination. Such diuretics include high ceiling loop diuretics, thiazides, carbonic anhydrase inhibitors, potassium-sparing diuretics, calcium-sparing diuretics, osmotic diuretics and low ceiling diuretics. A pharmaceutical composition of the invention may contain, apart from a compound of the invention, at least one of these further compounds intended for or suitable for kidney protection, preferably kidney protection of the subject to which the compound of the invention is administered.

It will be understood by a person skilled in the art that the compound of the invention is disclosed herein for use in various methods. It will be further understood by a person skilled in the art that the composition of the invention and the pharmaceutical composition of the invention can be equally used in said various methods. It will also be understood by a person skilled in the art that the composition of the invention and the pharmaceutical composition are disclosed herein for use in various methods. It will be equally understood by a person skilled in the art that the compound of the invention can be equally used in said various methods.

It will be acknowledged by a person skilled in the art that the composition of the invention and the pharmaceutical composition of the invention contain one or more further compounds in addition to the compound of the invention. To the extent that such one or more further compounds are disclosed herein as being part of the composition of the invention and/or of the pharmaceutical composition of the invention, it will be understood that such one or more further compounds can be administered separately from the compound of the invention to the subject which is exposed to or the subject of a method of the invention. Such administration of the one or more further compounds can be performed prior, concurrently with or after the administration of the compound of the invention. It will also be acknowledged by a person skilled in the art that in a method of the invention, apart from a compound of the invention, one or more further compound may be administered to a subject. Such administration of the one or more further compounds can be performed prior, concurrently with or after the administration

of the compound of the invention. To the extent that such one or more further compounds are disclosed herein as being administered as part of a method of the invention, it will be understood that such one or more further compounds are part of a composition of the invention and/or of a pharmaceutical composition of the invention. It is within the present invention that the compound of the invention and the one or more further compounds may be contained in the same or a different formulation. It is also within the present invention that the compound of the invention and the one or more further compounds are not contained in the same formulation, but are contained in the same package containing a first formulation comprising a compound of the invention, and a second formulation comprising the one or more further compounds, whereby the type of formulation may be the same or may be different.

It is within the present invention that more than one type of a compound of the invention is contained in the composition of the invention and/or the pharmaceutical composition of the invention. It is also within the present invention that more than one type of a compound of the invention is used, preferably administered, in a method of the invention.

It will be acknowledged that a composition of the invention and a pharmaceutical composition of the invention may be manufactured in conventional manner.

Radiopharmaceuticals have decreasing content of radioactivity with time, as a consequence of the radioactive decay. The physical half-life of the radionuclide is often short for radiopharmaceutical diagnostics. In these cases, the final preparation has to be done shortly before administration to the patient. This is in particular the case for positron emitting radiopharmaceuticals for tomography (PET radiopharmaceuticals). It often leads to the use of semi-manufactured products such as radionuclide generators, radioactive precursors and kits.

Preferably, a kit of the invention comprises apart from one or more than one compounds of the invention typically at least one of the followings: instructions for use, final preparation and/or quality control, one or more optional excipient(s), one or more optional reagents for the labeling procedure, optionally one or more radionuclide(s) with or without shielded containers, and optionally one or more device(s), whereby the device(s) is/are selected from the group comprising a labeling device, a purification device, an analytical device, a handling device, a radioprotection device or an administration device.

Shielded containers known as "pigs" for general handling and transport of radiopharmaceutical containers come in various configurations for holding radiopharmaceutical containers such as bottles, vials, syringes, etc. One form often includes a removable cover that allows access to

the held radiopharmaceutical container. When the pig cover is in place, the radiation exposure is acceptable.

A labeling device is selected from the group of open reactors, closed reactors, microfluidic systems, nanoreactors, cartridges, pressure vessels, vials, temperature controllable reactors, mixing or shaking reactors and combinations thereof.

A purification device is preferably selected from the group of ion exchange chromatography columns or devices, size-exclusion chromatography columns or devices, affinity chromatography columns or devices, gas or liquid chromatography columns or devices, solid phase extraction columns or devices, filtering devices, centrifugations vials columns or devices.

10 An analytical device is preferably selected from the group of tests or test devices to determine the identity, radiochemical purity, radionuclidic purity, content of radioactivity and specific radioactivity of the radiolabelled compound.

A handling device is preferably selected from the group consisting of devices for mixing, diluting, dispensing, labeling, injecting and administering radiopharmaceuticals to a subject.

15 A radioprotection device is used in order to protect doctors and other personnel from radiation when using therapeutic or diagnostic radionuclides. The radioprotection device is preferably selected from the group consisting of devices with protective barriers of radiation-absorbing material selected from the group consisting of aluminum, plastics, wood, lead, iron, lead glass, water, rubber, plastic, cloth, devices ensuring adequate distances from the radiation sources, devices reducing exposure time to the radionuclide, devices restricting inhalation, ingestion, or
20 other modes of entry of radioactive material into the body and devices providing combinations of these measures.

An administration device is preferably selected from the group of syringes, shielded syringes, needles, pumps, and infusion devices. Syringe shields are commonly hollow cylindrical structures that accommodate the cylindrical body of the syringe and are constructed of lead or tungsten with a lead glass window that allows the handler to view the syringe plunger and liquid
25 volume within the syringe.

It is within the present invention that the term “in an embodiment” or “in an embodiment of the invention” refers to each and any aspect of the invention, including any embodiment thereof.

30

5. FIGURES

Figure 1 - Amino acid sequences of human P-cadherin (PCad) (SEQ ID NO: 1) and E-cadherin (SEQ ID NO: 2).

Figure 2A-C - Representative radio-HPLC-chromatograms for ^{111}In -PCAD-359 (A), ^{68}Ga -PCAD-359 (B), and radio-TLC chromatogram for ^{177}Lu -PCAD-359 (C) at the end of synthesis.

Figure 3 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by SPECT-imaging of ^{111}In -PCAD-062 (A) and ^{111}In -PCAD-196 (B) 1 h, 4 h, 24 h and 48 h post injection into the mouse model.

Figure 4 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by SPECT-imaging of ^{111}In -PCAD-197 (A) and ^{111}In -PCAD-283 (B) 1 h, 4 h, 24 h and 48 h post injection into the mouse model.

Figure 5 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by SPECT-imaging of ^{111}In -PCAD-289 (A) and ^{111}In -PCAD-357 (B) 1 h, 4 h, 24 h and 48 h post injection into the mouse model.

Figure 6 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by SPECT-imaging of ^{111}In -PCAD-449 1 h, 4 h, 24 h and 48 h post injection into the mouse model.

Figure 7 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by SPECT-imaging of ^{111}In -PCAD-152 (A) and ^{111}In -PCAD-279 (B) 1 h, 4 h, 24 h, 48 h and 72 h post injection into the mouse model.

Figure 8 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by SPECT-imaging of ^{111}In -PCAD-359 (A) and ^{177}Lu -PCAD-359 (B) 1 h, 4 h, 24 h, 48 h and 72 h post injection into the mouse model.

Figure 9 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by PET-imaging of ^{68}Ga -PCAD-127 (A) and ^{68}Ga -PCAD-168 (B) 1 h and 3 h post injection into the mouse model.

Figure 10 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by PET-imaging of ^{68}Ga -PCAD-284 (A) and ^{68}Ga -PCAD-314 (B) 1 h and 3 h post injection into the mouse model.

Figure 11 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by PET-imaging of ^{68}Ga -PCAD-359 (A) and ^{68}Ga -PCAD-375 (B) 1 h and 3 h post injection into the mouse model.

Figure 12 - Percentage of injected dose per gram of tissue (%ID/g) uptake in the blood pool, kidneys, liver and HEK-P-cad tumor as determined by PET-imaging of ^{68}Ga -PCAD-424 1 h and 3 h post injection into the mouse model.

Figure 13 - Organ uptake (%IA/g $\pm$ SD) of ^{212}Pb -PCAD-253 (51-54 kBq, 0.25-0.28 nmol) in athymic nude mice bearing subcutaneous HEK-P-cad tumors after 1 and 20 hours post injection. N = 3 mice per group.

Figure 14 - Organ uptake (% IA/g $\pm$ SD) of ^{212}Pb -PCAD-253 (43-46 kBq, 0.44-0.48 nmol) in athymic nude mice bearing subcutaneous HCC-1954 tumors after 1 and 20 hours post injection. N = 3 mice per group.

Figure 15 - Organ uptake (%IA/g $\pm$ SD) of ^{212}Pb -PCAD-359 (66–68 kBq, 0.65–0.71 nmol) in athymic nude mice bearing subcutaneous HEK-P-cad tumors after 1 and 20 hours post injection. N = 3 mice per group.

Figure 16 - Changes in (A) body weight (grams $\pm$ SD) as well as (B) tumor volumes ($\text{mm}^3 \pm$ SD) over time and (C) at day 28 in athymic nude mice bearing HCC-1954 tumors treated with vehicle, 0.25, 0.5 or 1 MBq ^{212}Pb -PCAD-253. N = 3 mice in group A and N = 5 mice in groups B–D. The body weights and tumor volumes of sacrificed mice were held constant for calculation of averages. After Day 21, N = 2 in group A. The bottom of the boxes in (C) represents the 25th percentile, the solid lines represent the medians, the top of the boxes represent the 75th percentile and the whiskers represent the 5th and 95th percentiles. *p < 0.05; one-way ANOVA with Dunnett's multiple comparison test.

6. EXAMPLES

The following Examples have been included to provide guidance to one of ordinary skill in the art for practicing representative embodiments of the presently disclosed subject matter. In light of the present disclosure and the general level of skill in the art, those of skill can appreciate that the following Examples are intended to be exemplary only and that numerous changes, modifications, and alterations can be employed without departing from the scope of the presently disclosed subject matter. The synthetic descriptions and specific examples that follow

are only intended for the purposes of illustration, and are not to be construed as limiting in any manner to make compounds of the disclosure by other methods.

Abbreviations used herein and the following examples in particular are as follows:

ACN	means acetonitrile
AF488	means Alexa Fluor 488 Dye
Alloc	means allyloxycarbonyl
Bio-P-cad	means biotinylated P-cadherin
Boc	means <i>tert</i> -butyloxycarbonyl
BPS	means blood pool surrogate, refers to a ROI drawn around the heart ventricle
BSA	means bovine serum albumin
CAT	means category (of activity in biological assay)
CT	means computed tomography
DAD	means diode array detector/detection
DCM	means dichloromethane
Dde	means <i>N</i> -(1-(4,4-dimethyl-2,6-dioxocyclohexylidene)ethyl)
DICOM	means digital imaging and communications in medicine
DEG	means PS crosslinked with di-ethylene glycol- dimethacrylate
DIC	means diisopropyl carbodiimide
DIPEA	means <i>N,N</i> -diisopropylethylamine
DMF	means <i>N,N</i> -dimethylformamide
DMSO	means dimethyl sulfoxide
DOTA	means 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid
DOTAGA	means 1,4,7,10-tetraazacyclododecane, 1-(glutaric acid)-4,7,10-triacetic acid
DTPA	means diethylenetriaminepentaacetic acid
EDT	means 1,2-ethanedithiol

EDTA	means ethylenediaminetetraacetic acid
eq.	means equivalents
ESI	means electrospray ionization
FACS	means fluorescence-activated cell sorting
FBS	means fetal bovine serum
Fc	means fragment crystallizable region of an antibody
Fc	means 5(6)-fluorescein isothiocyanate
Fmoc	means 9-fluorenylmethoxycarbonyl
FMPB	means 4-(4-Formyl-3-methoxyphenoxy)butyryl
FOV	means field of view
GuHCl	means guanidinium hydrochloride
HATU	means <i>O</i> -(7-azabenzotriazol-1-yl)- <i>N,N,N',N'</i> -tetramethyluronium hexafluorophosphate
HEK	means human embryonic kidney
HEK-P-cad	means cells of a HEK293 clone stably expressing human P-cadherin
HEPES	means 4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid
HOAc	means acetic acid
HPLC	means high-performance liquid chromatography
HPLC/MS	means high-performance liquid chromatography mass spectrometry
IA	means injected activity
IC50	means half-maximal inhibitory concentration
ID	means injected dose
ivDde	means 1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)-3-methylbutyl
ITLC	means instant thin layer chromatography
Kd	means dissociation constant
LC	means liquid chromatography

LC/Q-TOF-MS	means liquid chromatography quadrupole time-of-flight mass spectrometry
LC/TOF-MS	means liquid chromatography time-of-flight mass spectrometry
LC-MS	means liquid chromatography mass spectrometry
M	means molar, i.e. mol per Liter
m/z	means mass divided by charge
MBq	means megabecquerel
MeOH	means methanol
MFI	means median fluorescence intensity
min	means minute(s)
MLEM	means maximum-likelihood expectation-maximization
MS	means mass spectrometry
MTBE	means methyl- <i>tert</i> -butylether
MW	means molecular weight
NA	means not available
ND	means not determined
NEP	means neutral endopeptidase, also known as neprilysin
NHS	means <i>N</i> -hydroxysuccinimide
NMP	means <i>N</i> -methyl-2-pyrrolidone
NMRI nude mice	means Naval Medical Research Institute nude mice
NSCLC	means non-small cell lung cancer
OSEM	means ordered subset expectation maximization
PBS	means phosphate buffered saline
PDAC	means pancreatic ductal adenocarcinoma
PET	means Positron Emission Tomography

pIC ₅₀	means the negative decadic logarithm of the IC ₅₀ value when converted to molar
pK _D	means the negative decadic logarithm of the K _D value when converted to molar
ppm	means parts per million
PS	means polystyrene
RCP	means radiochemical purity
ROI	means region of interest
RP	means reversed phase
RPMI-1640	means cell culture growth medium RPMI-1640
RT	means room temperature
RU	means resonance units
SCCHN	means squamous cell carcinoma of head and neck
SCK	means single cycle kinetic
SPE	means solid phase extraction
SPECT	means single photon emission computed tomography
SPPS	means solid phase peptide synthesis
SPR	means surface plasmon resonance
t _{1/2}	means half-life
tBu	means <i>tert</i> -butyl
TFA	means trifluoroacetic acid or trifluoroacetate
THF	means Tetrahydrofuran
TIPS	means triisopropylsilane
TLC	means thin-layer chromatography
TNBC	means triple-negative breast cancer
TOF	means time-of-flight detection

t _R	means retention time
UHPLC	means Ultra High Performance Liquid Chromatography
UV	means ultraviolet

Materials, Instruments and Methods

The materials and methods as well as general methods are further illustrated by the following examples.

5 Materials:

Solvents:

Solvents were used in the specified quality without further purification. Acetonitrile (Super Gradient, HPLC, VWR); dichloromethane (synthesis grade, Roth); dimethylsulfoxide (for preparative HPLC: BioScience Grade, Roth – for synthesis: pure, Thermo Scientific), ethyl acetate (synthesis grade, Roth); *N,N*-dimethylformamide (peptide synthesis grade, Biosolve); 1-methyl-2-pyrrolidone (peptide grade, IRIS BioTech); methanol (p. a., Merck); cyclohexane (synthesis grade, Roth); methyl-tert-butylether (synthesis grade, Roth); THF; water: Milli-Q Plus, Millipore, demineralized.

Chemicals:

Chemicals were either synthesized according to or in analogy to literature procedures, or purchased from Sigma-Aldrich-Merck (Deisenhofen, Germany), Bachem (Bubendorf, Switzerland), BLD Pharmatech GmbH (Kaiserslautern, Germany), VWR (Darmstadt, Germany), Novabiochem (Merck Group, Darmstadt, Germany), Acros Organics (distribution company Fisher Scientific GmbH, Schwerte, Germany), Iris Biotech (Marktredwitz, Germany), Amatek Chemical (Jiangsu, China), Roth (Karlsruhe, Deutschland), Molecular Devices (Chicago, USA), Broadpharm (San Diego, USA), Biochrom (Berlin, Germany), Peptech (Cambridge, MA, USA), Synthetech (Albany, OR, USA), Pharmacore (High Point, NC, USA), PCAS Biomatrix Inc (Saint-Jean-sur-Richelieu, Quebec, Canada), Alfa Aesar (Karlsruhe, Germany), Tianjin Nankai Hecheng S&T Co., Ltd (Tianjin, China), CheMatech (Dijon, France), JenKem Technology (Plano, TX, USA), and Anaspec (San Jose, CA, USA) or other companies and used in the assigned quality without further purification.

Solid phase synthesis resins and resin linkers:

Solid-phase synthesis was performed on polystyrene resin (PS – polystyrene cross-linked with 1,4-divinylbenzene or DEG – polystyrene cross-linked with di-ethylene-glycol-dimethacrylate) modified with a Rink amide, Sieber amide, 2-chloro-trityl, or FMPB [4-(4-formyl-3-methoxyphenoxy)butyryl] linker.

5 Instruments and Instrument-Methods:

HPLC/MS analyses:

HPLC/MS analyses were performed by injection of 5 µl of a solution of the sample, using a 2-step gradient for all chromatograms (5-65% B in 12 min, followed by 65-90% B in 0.5 min, A: 0.1% TFA in water and B: 0.1% TFA in ACN). RP columns were purchased from Dr. Maisch (ReproSil-Pur 120 C18-AQ, 3 µm, 50 x 3.00 mm, flow 0.8 mL, HPLC at room temperature); Mass spectrometer: Agilent 6230 LC/TOF-MS or Agilent 6530 LC/Q-TOF-MS, ESI ionization. MassHunter Qualitative Analysis B.07.00 SP2 was used as software. UV detection was done at $\lambda = 230$ nm. Retention times (t_R) are indicated in the decimal system (e.g. 1.9 min = 1 min 54 s) and are referring to detection in the UV spectrometer. For the evaluation of observed compound masses the ‘Find Compounds by Formula’-feature was used. More precisely, the individual ‘neutral mass of a compound (in units of Daltons)’-values and the corresponding isotope distribution pattern were used to confirm compound identity. The accuracy of the mass spectrometer was approx. ± 5 ppm.

Product purification methods – Preparative HPLC:

Preparative HPLC separations were performed on reversed phase columns (generally Kinetex 5µ XB-C18 100 Å, 150 x 30 mm from Phenomenex) as stationary phase. 0.1% TFA in water (A) and 0.1% TFA in ACN (B) were used as mobile phase which were mixed in linear binary gradients. The gradients are described as: “10 to 40% B in 20 min”, which means a linear gradient from 10% B (and correspondingly 90% A) to 40% B (and correspondingly 60% A) was run over 20 min. The flow rate was typically 40 mL/min. A typical gradient for the purification of the compounds of the invention started at 15-35% B and ended after 20 min at 35-60% B. The difference between the percentage of B at end and start was at least 10%. A commonly used gradient was “20 to 40% B in 20 min”. Samples were preferably dissolved in DMSO or mixtures of HOAc and water.

Product purification methods – Solid phase extraction (SPE):

In case of solid phase extraction, 250 mg Varian Bondesil-ENV was placed in a 15 mL polystyrene syringe. The column was pre-washed with methanol (1 x 5 mL) and water (3 x 5

mL) before the reaction solution or the solution containing the product to be purified was applied to the column. To remove excess salt, the column was washed again with water (3 x 5 mL). Afterwards, the product was eluted with 5 mL of 50% ACN in water (first fraction) followed by at least 5 mL of 50% ACN in water containing 0.1% TFA or until elution of the compound was complete.

Automated/Semi-automated Solid-Phase Synthesis equipment:

Automated solid-phase synthesis of peptides and polyamides was performed on a Tetras Peptide Synthesizer (Advanced ChemTech) in 25 µmol, 50 µmol or 100 µmol scales. Some manual steps were performed in plastic syringes equipped with frits (material PE, Roland Vetter Laborbedarf OHG, Ammerbuch, Germany). Coupling at elevated temperatures was performed on a Chorus Peptide Synthesizer (Gyros Protein Technologies) or alternatively in a ThermoMixer C machine (Eppendorf SE, Hamburg, Germany). If reactions at elevated temperatures were part of the sequence assembly, usually the whole sequence was synthesized on the Chorus Peptide Synthesizer.

General procedures for Automated/Semi-automated Solid-Phase Synthesis

The amounts of reagents in the protocols described correspond to the 25 µmol scale, unless stated otherwise.

Resin loading – Rink amide/Sieber amide linker (C-terminal primary amides):

For the synthesis of C-terminal peptide amides (primary amides), the Rink amide linker (on DEG resin – initial resin loading ranging from 0.5 – 0.8 mmol/g) was used. For the synthesis of protected peptides with C-terminal amides, the Sieber amide linker (on PS resin – initial loading 0.57 mmol/g) was used. The resin was initially swollen in DMF (3 mL) for at least 30 minutes and subsequently washed with DMF (3 mL, 1 minute). The first building block was loaded onto the linker by performing the procedure for the coupling of carboxylic acid building blocks as described below.

Resin loading – 2-chloro trityl linker (C-terminal acids, amines or alcohols):

For synthesis of C-terminal peptide acids, amines or alcohols, the 2-chloro trityl linker (on PS resin – initial resin loading 1.8 mmol/g) was used. The resin was initially swollen in DCM (3 mL) for at least 30 minutes and subsequently washed with DCM (3 mL, 1 minute). Then the Fmoc amino acid building block (for a C-terminal acid) or an amine building block such as diethylene amine (for a C-terminal amine) was loaded onto the linker by treating the resin for 1 hour with a mixture of this building block (0.125 mmol, 5 eq.) and DIPEA (156 µL,

0.9 mmol, 36 eq.) in DCM (1 mL). For a C-terminal alcohol, the used building block was an Fmoc amino alcohol (instead of the Fmoc amino acid) and the reaction was carried out for 12 hours. Afterwards, the resin was washed with methanol (3 mL, 5 minutes) and DMF (3 mL, 3 x 1 minute).

5 *Resin loading – FMPB linker (C-terminal secondary amides):*

For synthesis of C-terminal substituted peptide amides (secondary amides), the FMPB linker [4-(4-formyl-3-methoxyphenoxy)butyryl on PS resin – initial resin loading ~ 1.0 mmol/g) was used. The resin was initially swollen in DMF (3 mL) for at least 30 minutes and subsequently washed with DMF (3 mL, 1 minute). The amine (0.25 mmol, 10 eq. – e.g. n-hexylamine) was
10 dissolved in 1% acetic acid in DMF (1.5 mL). After agitation of the resin for 30 minutes at room temperature, NaBH₃CN (0.25 mmol, 10 eq.) was added and the resin was agitated at 50°C overnight. The resin was washed with DMF, MeOH and DMF (3 mL each, 3x 1 minute). For volatile amines (e.g. ethyl amine), a mixture of 10 eq of the amine hydrochloride and 10 eq of the free amine was employed and the reaction was carried out at room temperature overnight.
15 The first sequence building block was then coupled following the procedure for carboxylic acid building blocks at 50 °C and with an extended coupling time of 2 hours. This coupling was repeated twice.

Coupling of carboxylic acid building blocks: (e.g. Fmoc amino acids)

Unless stated otherwise, coupling of amino acid building blocks or carboxylic acids in general
20 was performed as follows: to the swollen resin were added the corresponding carboxylic acid building block solution (0.3 M in DMF or NMP, 0.45 mL, 5eq.), the DIPEA solution (0.9 M in DMF, 0.3 mL, 10 eq.), and the HATU solution (0.4 M in DMF, 0.325 mL, 5 eq.). The resin was shaken for 45 min at room temperature. Afterwards the resin was washed with DMF (3 mL, 5 x 1 minute). If necessary, the coupling step was repeated and/or performed at 50°C. For
25 racemization prone building blocks, DIPEA was replaced by 2,4,6-collidine (0.9 M in DMF, 0.3 mL, 10 eq.).

Coupling of chelator building blocks: (e.g. DOTA, NOTA, or NODAGA)

The corresponding chelator building block (DOTA(tBu)₃-OH, DOTAGA(tBu)₄-OH, NOTA(tBu)₂-OH or NODAGA(tBu)₃-OH) was coupled as described for the coupling of
30 ordinary carboxylic acid building blocks but the coupling time was increased to 90 min. Afterwards, a DIC solution (3.2 M in DMF, 0.1 mL, 12.5 eq.) was added to the reaction mixture and the resin was agitated for further 90 minutes at room temperature or extended to 10 h if the reaction was not complete. Afterwards the resin was washed with DMF (3 mL, 5 x 1 minute).

For coupling of DOTAM, the reaction was performed with 4 eq. of DOTAM, 4 eq. of HATU and 8 eq. of DIPEA in DMSO and allowed to proceed overnight after addition of DIC.

Coupling of NHS esters in solution:

For the coupling of a NHS ester to a peptide precursor in solution, the peptide was dissolved in a minimal volume of DMSO and the pH value of the resulting solution was adjusted to ~8 by careful addition of small volumes of DIPEA. A solution of the NHS ester (e.g. AF488 NHS ester, 1.3 eq. in relation to the amount of peptide) in a minimal volume of DMSO was added to the solution and the pH value re-adjusted to 8 by addition of DIPEA. Reaction progress was monitored by LC-MS after approximately 1 hour and if required, more NHS ester was added to drive the reaction to completion. After completion of the reaction, the solution was directly subjected to purification via *Preparative HPLC* or for further processing, the solvents were evaporated *in vacuo* and the remnants lyophilized from a mixture of water/acetonitrile.

Fmoc deprotection:

After swelling in DMF for 30 min, the resin was washed with DMF once (3 mL, 1 x 1 minute), treated with piperidine/DMF (1:4 v/v, 3 mL, 2 and 20 minutes) and subsequently washed with DMF (3 mL, 5x 1 minute).

Alloc/Allyl deprotection:

DCM was de-oxygenated by passing a stream of nitrogen through the stirred solvent. The oxygen-free solvent was used to wash the resin (3 mL, 3x 1 minute). Then, a mixture of 1,3-dimethylbarbituric acid (0.1 mmol, 4 eq.) and tetrakis(triphenylphosphine)palladium(0) (6.25 μ mol, 0.25 eq.) in oxygen-free DCM (1 mL) was added to the resin. The resin was agitated for 30 min and then washed with DCM, methanol, DMF, 0.5% DIPEA in DMF, 0.5% sodium diethyldithiocarbamate in DMF, DMF and DCM (each washing step was repeated 3 times, 1 minute each).

Dde/ivDde deprotection:

After swelling in DMF, the resin was washed with DMF (3 mL, 1x 1 minute), treated with hydrazine-hydrate/DMF (2:98 v/v, 3 mL 3x 10 minutes) and subsequently washed with DMF (3 mL, 5x 1 minute).

Monomethylation of primary amines:

The resin containing a nominal amount of 50 μ mol free primary amine was swollen or thoroughly washed with DCM. First, the amino group was protected with a nosyl group by

treating the resin with a solution of 2-nitrobenzenesulfonyl chloride (44.5 mg, 200 μ mol, 4 eq.) and sym-collidine (66.1 μ L, 500 μ mol, 10 eq.) in DCM (2 mL) for 30 min at RT. Afterwards, the resin was washed with DCM, THF and finally dry THF (3 mL each, 3x 1 minute). After adding a solution of triphenylphosphane (131.5 mg, 500 μ mol, 10 eq.) and MeOH (dry, 41 μ L, 1 mmol, 20 eq.) in THF (dry, 1 mL), a solution of diisopropyl azodicarboxylate (DIAD) (98.4 μ L, 500 μ mol, 10 eq.) in THF (dry, 0.5 mL) was added to the resin. After 30 minutes of agitation, the resin was washed with THF (3 mL, 3x 1 minute) and the Mitsunobu reaction was repeated three times. Then, the resin was washed with DMF (3 mL, 3x 1 minute) and the nosyl protecting group was finally removed by treating the resin with a solution of β -mercapoethanol (34.9 μ L, 500 μ mol, 10 eq.) and 1,8-diazabicyclo(5.4.0)undec-7-ene (DBU) (37.4 μ L, 250 μ mol, 5 eq.) in DMF (1 mL) for 30 minutes. Finally, the resin was washed with DMF (3 mL, 3x 1 minute).

Dimethylation of primary amines:

The resin containing a nominal amount of 50 μ mol free primary amine was swollen in dry THF for 30 min. A solution of formaldehyde (37% in water, 39.3 μ L, 0.5 mmol, 10 eq.) and sodium triacetoxyborohydride (106 mg, 0.5 mmol, 10 eq.) in 1% acetic acid in THF (2 mL) was added to the resin and allowed to shake at room temperature overnight. Finally, the resin was washed with DMF, MeOH and DMF (3 mL each, 3x 1 minute).

Reduction of nitrobenzenes to anilines:

The resin was swollen in DMF for 30 min. A solution of SnCl_2 (1 M in DMF, 1 mL) was added to the resin which was shaken at room temperature overnight. Finally, the resin was washed with DMF (3 mL each, 5x 1 minute).

Alkylation of tertiary amines with 1,3-propanesultone:

To the resin (nominal amount of 50 μ mol) swollen in DMF was added a solution of 1,3-propanesultone (61 mg, 0.5 mmol, 10 eq.) and DIPEA (43 μ L, 0.25 mmol, 5 eq.) in DMF (2 mL). The reaction shaken was allowed to shake at 50°C overnight and afterwards washed thoroughly with methanol and DMF (3 mL each, 5x 1 minute).

Boc protection:

To the resin (nominal amount of 50 μ mol) swollen in DMF was added a solution of di-*tert*-butyl dicarbonate (107 μ L, 0.5 mmol, 10 eq.) 0.1 M *N*-methylmorpholine in a 1:1 mixture of DMF/DCM (v/v, 2 mL). The reaction was allowed to shake at room temperature for 45 min and afterwards washed thoroughly with DMF (3 mL, 5x 1 minute).

Solid phase peptide synthesis (SPPS):

After loading of the C-terminal/initial building block onto the resin linker of a resin, the linear sequence of a peptide was assembled by iterative repetition of *Fmoc deprotection* and *Coupling of carboxylic acid building blocks* (Fmoc amino acid building blocks). For synthesis of a free amine at the very N-terminus, a final '*Fmoc deprotection*' was applied. Alternatively, an N-Boc-protected amino acid building block was used for coupling of the N-terminal residue.

Complete resin cleavage and deprotection of peptides:

After completion of the assembly of the sequence, the resin was finally washed with DCM (3 mL, 4x 1 minute), dried *in vacuo* overnight and treated with TFA, EDT, water and TIPS (94/2.5/2.5/1 – 2.5 mL) for 2 hours (or 4 hours in case of sequences containing tBu ester protected chealtors). Afterwards, the cleavage solution was poured into a chilled mixture of MTBE and cyclohexane (1/1, 10-fold excess compared to the volume of cleavage solution), centrifuged at 4 °C for 5 minutes. The residue was lyophilized from water/acetonitrile prior to purification or further modification.

15 Cleavage of protected fragments from hyper-acid labile resin:

After completion of the assembly of the sequence, the resin (100 µmol nominal) was washed with DCM (3 mL, 4x 1 minute) and then dried *in vacuo*. Then, the resin was treated with a solution of TFA, TIPS, EDT and DCM (1/2.5/1/95.5 – 4 mL – 10x 2 minutes). Individual cleavage fractions were neutralized by addition of DIPEA. After the final treatment of the resin with dilute acid, it was washed with MeOH and DCM. All cleavage fractions and washing solutions were combined and concentrated under reduced pressure. Ice-water was added to the remaining solution and the precipitated crude product obtained by centrifugation. The resulting residue was typically subjected to purification via *Preparative HPLC*.

Preparation of compounds:

Specific embodiments for the preparation of compounds of the invention are prepared by using the preferred general methods disclosed above, other published methods or methods known by persons skilled in the art. Unless otherwise specified, all starting materials and reagents are either of standard commercial grade and are used without further purification or are readily prepared from such materials by routine methods. Those skilled in the art of organic synthesis will recognize in light of the instant disclosure that starting materials and reaction conditions may be varied including additional steps employed to produce compounds encompassed by the present invention.

Example 1: Synthesis Ia: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-252)

The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 µmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After cleavage of the linear peptide from the synthesis resin employing '*Complete resin cleavage and deprotection of peptides*' (cleavage time 2 hours), the obtained crude peptide was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 20 min – Kinetex) to yield 31.65 mg of the pure title compound (37.4%). HPLC t_R = 6.7 min. LC/TOF-MS: exact mass 1689.655 (calculated 1689.655). C₇₆H₁₀₄ClN₁₇O₁₉S₃ (MW = 1692.404).

Example 2: Synthesis Ib: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-NHHex (PCAD-151)

A PS resin with an FMPB linker was reacted with n-hexylamine using the '*Resin loading – FMPB linker (C-terminal secondary amides)*' method followed by assembly of the linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-NHHex) according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 µmol scale applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After cleavage of the linear peptide from the synthesis resin employing '*Complete resin cleavage and deprotection of peptides*' (cleavage time 2 hours), the obtained crude peptide was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 15 min – Kinetex) to yield 2.76 mg of the pure title compound (6.8%). HPLC t_R = 7.4 min. LC/TOF-MS: exact mass 1620.709 (calculated 1620.724). C₇₅H₁₁₀ClN₁₆O₁₈S₂ (MW = 1623.360).

Example 3: Synthesis Ic: Synthesis of compound H-Lac-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-195)

The linear sequence of the peptide (H-Lac-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 µmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of L-lactic acid as final step. The resin-bound peptide was then treated with piperidine as described in '*Fmoc deprotection*' to cleave undesired ester formed on the unprotected OH group of the lactic acid residue. After cleavage of the linear peptide from the synthesis resin employing '*Complete resin cleavage and*

deprotection of peptides' (cleavage time 2 hours), the obtained crude peptide was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 15 min – Kinetex) to yield 10.08 mg of the pure title compound (24.4%). HPLC t_R = 7.0 min. LC/TOF-MS: exact mass 1650.615 (calculated 1650.607). $C_{73}H_{100}ClN_{16}O_{20}S_3$ (MW = 1653.324).

5 **Example 4: Synthesis Id: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-OH (PCAD-136)**

Starting from a PS resin with a 2-chlorotrityl linker to which Fmoc-Thi-OH was loaded, the linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-OH) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 μ mol scale applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After cleavage of the linear peptide from the synthesis resin employing '*Complete resin cleavage and deprotection of peptides*' (cleavage time 2 hours), the obtained crude peptide was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 15 min – Kinetex) to yield 17.19 mg of the pure title compound (40.6%). HPLC t_R = 6.7 min. LC/TOF-MS: exact mass 1690.631 (calculated 1690.639). $C_{76}H_{104}ClN_{16}O_{20}S_3$ (MW = 1693.388).

Example 5: Synthesis IIa: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-359)

The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 μ mol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield 34.25 mg of the pure title compound (33.0%). HPLC t_R = 6.6 min. LC/TOF-MS: exact mass 2075.830 (calculated 2075.835). $C_{92}H_{130}ClN_{21}O_{26}S_3$ (MW = 2078.804).

Example 6: Synthesis IIb: Synthesis of compound H-Nmk(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-353)

The linear sequence of the peptide (Boc-Nmk-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 µmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Nmk(Fmoc)-OH as final step followed by deprotection of the Nmk side chain employing an 'Fmoc deprotection'. DOTA(tBu)₃-OH was coupled to the liberated Nmk side chain using the '*Coupling of chelator building blocks*' method. Afterwards, the branched peptide (H-Nmk(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 15 min – Kinetex) to yield 13.81 mg of the pure title compound (29.4%). HPLC *t_R* = 6.4 min. LC/TOF-MS: exact mass 1876.930 (calculated 1876.936). C₈₉H₁₂₈N₂₀O₂₅ (MW = 1878.091).

Example 7: Synthesis IIc: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Pheol-OH (PCAD-296)

A PS resin with a 2-chlorotrityl linker was reacted with the protected amino alcohol Fmoc-Pheol-OH using the '*Resin loading - 2-chloro trityl linker (C-terminal acids, amines or alcohols)*' method followed by assembly of the linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Pheol-OH) according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 µmol scale applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards, the branched peptide (H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Pheol-OH) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 20 min – Kinetex) to yield 7.81 mg of the pure title compound (7.6%). HPLC *t_R* = 6.9 min. LC/TOF-MS: exact mass 2056.886 (calculated 2056.883). C₉₄H₁₃₄ClN₂₀O₂₆S₂ (MW = 2059.777).

Example 8: Synthesis IId: Synthesis of compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHPr (PCAD-401)

A PS resin with an FMPB linker was reacted with n-propylamine using the '*Resin loading – FMPB linker (C-terminal secondary amides)*' method followed by assembly of the linear

sequence of the peptide (Boc-Pip-Trp-Asp-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHPr) according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 μ mol scale applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)3-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards, the branched peptide (H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHPr) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 15 min – Kinetex) to yield 2.76 mg of the pure title compound (5.3%). HPLC t_R = 5.7 min. LC/TOF-MS: exact mass 2081.916 (calculated 2081.915). $C_{96}H_{136}ClN_{21}O_{25}S_2$ (MW = 2084.830).

Example 9: Synthesis IIe: Synthesis of compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-My-Cya-Thi-NH₂ (PCAD-114)

The linear sequence of the peptide (Boc-Pip-Trp-Asp-Npg-Apc(Alloc)-Asn-6Clw-KMe3-My-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 μ mol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. The resin-bound peptide was then treated with piperidine as described in '*Fmoc deprotection*' to cleave undesired ester formed on the unprotected phenolic OH group of the My residue. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)3-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-My-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 15 min – Kinetex) to yield 3.15 mg of the pure title compound (6.2%). HPLC t_R = 5.4 min. LC/TOF-MS: exact mass 2039.875 (calculated 2039.868). $C_{93}H_{130}ClN_{21}O_{25}S_2$ (MW = 2042.750).

Example 10: Synthesis II f: Synthesis of compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ay3-Cya-Thi-NH₂ (PCAD-074)

The linear sequence of the peptide (Boc-Pip-Trp-Asp-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Ny3-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-*

automated Solid-Phase Synthesis' in a 25 μ mol scale on a DEG Rink amide resin applying the 'Solid phase peptide synthesis (SPPS)' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an 'Alloc/Allyl deprotection', DOTA(tBu)₃-OH was coupled employing the 'Coupling of chelator building blocks' method. Afterwards, the branched peptide (Boc-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Ny₃-Cya-Thi-NH₂) was subjected to 'Reduction of nitrobenzenes to anilines' in order to transform the Ny₃ to the Ay₃ residue. The resin-bound peptide was then treated with piperidine as described in 'Fmoc deprotection' to cleave undesired ester formed on the unprotected phenolic OH group of the Ay₃ residue. Afterwards the peptide (H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Ay₃-Cya-Thi-NH₂) was cleaved from the synthesis resin according to 'Complete resin cleavage and deprotection of peptides' (cleavage time 4 hours), and the obtained crude material was subjected to purification by 'Preparative HPLC' (20 to 40% B in 15 min – Kinetex) to yield 2.04 mg of the pure title compound (4.0%). HPLC t_R = 4.8 min. LC/TOF-MS: exact mass 2054.878 (calculated 2054.879). C₉₃H₁₃₁ClN₂₂O₂₅S₂ (MW = 2057.764).

Example 11: Synthesis IIg: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-284)

The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) was assembled according to the 'General procedures for Automated/Semi-automated Solid-Phase Synthesis' in a 25 μ mol scale on a DEG Rink amide resin applying the 'Solid phase peptide synthesis (SPPS)' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an 'Alloc/Allyl deprotection', SPPS was continued with coupling of Fmoc-PPAc-OH employing the 'Coupling of carboxylic acid building blocks' method followed by 'Fmoc deprotection', and a final 'Coupling of chelator building blocks' to attach DOTA(tBu)₃-OH. Afterwards the branched peptide (H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to 'Complete resin cleavage and deprotection of peptides' (cleavage time 4 hours), and the obtained crude material was subjected to purification by 'Preparative HPLC' (20 to 40% B in 15 min – Kinetex) to yield 3.90 mg of the pure title compound (7.1%). HPLC t_R = 6.5 min. LC/TOF-MS: exact mass 2201.913 (calculated 2201.914). C₉₈H₁₄₁ClN₂₃O₂₇S₃ (MW = 2204.961).

Example 12: Synthesis IIIa: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂ (PCAD-062)

The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-Lys(Dde)-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 µmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. The side chain of the lysine residue was subjected to a '*Dde/ivDde deprotection*' and the '*Dimethylation of primary amines*' method was followed to transform the Lys to a KMe₂ residue. The '*Alkylation of tertiary amines with 1,3-propanesultone*' protocol was used to convert the KMe₂ residue in the peptide sequence (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe₂-Tyr-Cya-Thi-NH₂) to the Kzw residue. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield 9.47 mg of the pure title compound (8.7%). HPLC t_R = 5.4 min. LC/TOF-MS: exact mass 2183.826 (calculated 2183.823). C₉₄H₁₃₄ClN₂₁O₂₉S₄ (MW = 2185.914).

Example 13: Synthesis IIIb: Synthesis of compound H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-255)

The linear sequence of the peptide (H-Npg-Apc(Alloc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 µmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Fmoc-Npg-OH as final step followed by '*Fmoc deprotection*' to liberate the α amine moiety of the resin-bound Npg residue. Following the '*Monomethylation of primary amines*' method, the Npg residue was converted to an N-methylated Npg residue (i.e. Mnpg). SPPS was continued to assemble the full linear sequence (Boc-Pip-Trp-Cya-Mnpg-Apc(Alloc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) with N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 20 min – Kinetex) to yield 14.70 mg of the pure title

compound (14.0%). HPLC t_R = 6.8 min. LC/TOF-MS: exact mass 2089.856 (calculated 2089.850). $C_{93}H_{133}ClN_{21}O_{26}S_3$ (MW = 2092.831).

Example 14: Synthesis IIIc: Synthesis of compound H-KMe4-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-448)

- 5 The linear sequence of the peptide (Boc-Nmk-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 μ mol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Nmk(Fmoc)-OH as final step followed by '*Fmoc deprotection*' to liberate the side chain of the
- 10 Nmk residue. Trimethylation of the Nmk side chain was achieved stepwise by first employing the '*Dimethylation of primary amines*' protocol followed by two rounds of treatment with 0.2 M methyl iodide in DMF for 1 hour each to add the third methyl group. After removal of the Alloc protecting group from the Apc side chain of the resulting peptide (Boc-KMe4-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) employing an '*Alloc/Allyl deprotection*',
- 15 DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-KMe4-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield
- 20 9.02 mg of the pure title compound (8.4%). HPLC t_R = 6.2 min. LC/TOF-MS: exact mass 2149.925 (calculated 2149.932). $C_{96}H_{142}ClN_{22}O_{26}S_3$ (MW = 2152.949).

Example 15: Synthesis IIId: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(DOTA-Kzw)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-314)

- The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 μ mol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', SPPS was continued with coupling of Alloc-Lys(Fmoc)-OH
- 30 employing the '*Coupling of carboxylic acid building blocks*' method followed by '*Fmoc deprotection*' to remove the Fmoc group from the lysine side chain. The side chain of the lysine residue on the branched peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc-Lys)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was subjected to '*Dimethylation of primary amines*'. The resulting Boc-Pip-

Trp-Cya-Npg-Apc(Alloc-KMe2)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ sequence was employed in '*Alkylation of tertiary amines with 1,3-propanesultone*' in order to convert the KMe2 to a Kzw residue. After removal of the Alloc protecting group from the α amine of the Kzw residue in Boc-Pip-Trp-Cya-Npg-Apc(Alloc-Kzw)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ employing an '*Alloc/Allyl deprotection*', DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Pip-Trp-Cya-Npg-Apc(DOTA-Kzw)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield 5.33 mg of the pure title compound (4.5%). HPLC t_R = 6.6 min. LC/TOF-MS: exact mass 2353.958 (calculated 2353.965). C₁₀₃H₁₅₃ClN₂₃O₃₀S₄ (MW = 2357.174).

Example 16: Synthesis IVa: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(AF488-Ttds)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-221)

The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 μ mol scale on a Sieber amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', SPPS was continued with coupling of Fmoc-Ttds-OH employing the '*Coupling of carboxylic acid building blocks*' method followed by '*Fmoc deprotection*'. Afterwards, the protected branched peptide (Boc-Pip-Trp-Cya-Npg-Apc(H-Ttds)-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Cleavage of protected fragments from hyper-acid labile resin*'. AF488-NHS ester was reacted with 30 mg of the crude protected peptide following the '*Coupling of NHS esters in solution*' method (but using DMF instead of DMSO). After removal of volatiles, the crude protected conjugate (Boc-Pip-Trp-Cya-Npg-Apc(AF488-Ttds)-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂) was deprotected by treatment with TFA for 30 min and the TFA was evaporated *in vacuo*. The obtained deprotected product was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 20 min – Kinetex) to yield 2.00 mg of the pure title compound (1.6%). HPLC t_R = 7.0 min. LC/TOF-MS: exact mass 2507.839 (calculated 2507.832). C₁₁₁H₁₄₂ClN₂₁O₃₄S₅ (MW = 2511.231).

Example 17: Synthesis IVb: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(NOPO)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-221)

The linear sequence of the peptide (Boc-Pip-Trp-Cya-Npg-Apc(Alloc)-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂) was assembled according to the 'General procedures for Automated/Semi-automated Solid-Phase Synthesis' in a 100 µmol scale on a Sieber amide resin applying the 'Solid phase peptide synthesis (SPPS)' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an 'Alloc/Allyl deprotection', the partially protected intermediate was cleaved from the synthesis resin according to 'Cleavage of protected fragments from hyper-acid labile resin' and subjected to purification by 'Preparative HPLC' (40 to 90% B in 30 min – Kinetex) to yield 87.1 mg of Boc-Pip-Trp-Cya-Npg-Apc-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂ (41.7% of theory). To a solution of this intermediate containing a free amine (33.0 mg, 15.7 µmol) in 200 µL of DMF were added 10 µL of DIPEA to adjust the pH value to approximately 8. To a solution of NOPO (15.6 mg, 31.4 µmol, 2 eq.) and DIPEA (21.9 µL, 125 µmol, 8 eq.) in a mixture of DMF/DMSO (1:1, v/v, 200 µL) was added a solution of HATU (23.8 mg, 62.8 µmol, 4 eq.) in 100 µL of DMF. After only a second of preactivation, the chelator mix was immediately transferred to the peptide, and the pH of the obtained solution was re-adjusted to 8 with DIPEA. For full conversion, the NOPO conjugation step was repeated once employing 2/3 of the initial amount. After completion of the reaction as judged by LC/TOF-MS, volatiles were removed *in vacuo* followed by lyophilization from a mixture of water/acetonitrile. Peptide deprotection (and hydrolysis of the NOPO phosphilactone which forms concomitantly during the NOPO conjugation) was achieved by treatment with TFA for 30 min followed by evaporation of the TFA *in vacuo*. The obtained crude product was subjected to purification by 'Preparative HPLC' (25 to 45% B in 20 min – Kinetex) to yield 5.48 mg of the pure title compound (16.1% of theory). HPLC *t_R* = 7.0 min. LC/TOF-MS: exact mass 2166.765 (calculated 2166.774). C₉₀H₁₃₅ClN₂₀O₂₈P₃S₃ (MW = 2169.728).

Example 18: Synthesis IVc: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(BnTCMC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-072)

The linear sequence of the partially protected peptide intermediate Boc-Pip-Trp-Cya-Npg-Apc-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂ was prepared as described in synthesis IVb (Example 18). To a solution of this intermediate containing a free amine (25.0 mg, 12.0 µmol) in 500 µL of a water/acetonitrile mixture (1:1, v/v) were added 25 µL of DIPEA to adjust the pH value to approximately 8 followed by addition of p-SCN-Bn-TCMC (S-2-(4-

isothiocyanatobenzyl)-1,4,7,10-tetraaza-1,4,7,10-tetra(2-carbamoylmethyl)cyclododecane) (12.5 mg, 18 μ mol, 1.5 eq.). After completion of the reaction as judged by LC/TOF-MS, volatiles were removed by lyophilization. Full peptide deprotection was achieved by treatment with TFA for 15 min followed by precipitation upon addition of chilled mixture of MTBE and cyclohexane (1/1, 10-fold excess compared to the volume of cleavage solution). The obtained crude product was lyophilized from a mixture of water/acetonitrile and subjected to purification by 'Preparative HPLC' (20 to 40% B in 15 min – Kinetex) to yield 10.91 mg of the pure title compound (40.6% of theory). HPLC t_R = 6.7 min. LC/TOF-MS: exact mass 2236.932 (calculated 2236.923). $C_{100}H_{142}ClN_{26}O_{23}S_4$ (MW = 2240.079).

10 Example 19: Synthesis IVd: Synthesis of compound H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-253)

The linear sequence of the partially protected peptide intermediate Boc-Pip-Trp-Cya-Npg-Apc-Asn(Trt)-6Clw-KMe3-Tyr(tBu)-Cya-Thi-NH₂ was prepared as described in synthesis IVb (Example 18). To a solution of this intermediate containing a free amine (40.0 mg, 19.1 μ mol) in 500 μ L of DMSO were added 10 μ L of DIPEA to adjust the pH value to approximately 8 followed by addition of PSC-NHS ester (57.4 μ mol, 3.0 eq.). After completion of the reaction as judged by LC/TOF-MS, volatiles were removed by lyophilization. Full peptide deprotection was achieved by treatment with a TFA/TIPS mixture (98:2, v/v) for 30min followed by evaporation of volatiles *in vacuo*. The obtained crude product was subjected to purification by 'Preparative HPLC' (25 to 45% B in 20 min – Kinetex) to yield 10.75 mg of the pure title compound (25.1% of theory). HPLC t_R = 6.8 min. LC/TOF-MS: exact mass 2074.842 (calculated 2074.851). $C_{92}H_{132}ClN_{22}O_{25}S_3$ (MW = 2077.820).

Example 20: Synthesis V: Synthesis of compound H-Ida(O3TdN2-DOTA)-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-063)

The linear sequence of the peptide (Boc-Ida-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the 'General procedures for Automated/Semi-automated Solid-Phase Synthesis' in a 25 μ mol scale on a DEG Rink amide resin with lower loading (0.18 mmol/g) applying the 'Solid phase peptide synthesis (SPPS)' method with an N-terminal coupling of Boc-Ida-OH as final step. The resin-bound free carboxylate group of the N-terminal Ida residue was activated by addition of HATU (19 mg, 50 μ mol, 2 eq.) and DIPEA (8.7 μ L, 50 μ mol, 2 eq.) in 1 mL of DMF. After 1 min of reaction, the reactor was purged and washed one with 1 mL of DMF followed by addition of 4,7,10-trioxa-1,13-tridecanediamine (27.3 μ L, 125 μ mol, 5 eq.) in DMF (1 mL). After 45 min of reaction, the resin was washed with DMF

(3 mL, 3x 1 minute) and subjected to reaction with DOTA(tBu)₃-OH using the '*Coupling of chelator building blocks*' method. Afterwards, the resulting peptide (H-Ida(O³TdN²-DOTA)-Trp-Cya-Npg-Apc-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 15 min – Kinetex) to yield 1.39 mg of the pure title compound (2.4%). HPLC t_R = 6.5 min. LC/TOF-MS: exact mass 2281.955 (calculated 2281.961). C₁₀₀H₁₄₉ClN₂₃O₃₀S₃ (MW = 2285.044).

Example 21: Synthesis VI: Synthesis of compound H-Pip-Trp-Asp-Npg-Apc(CuDOTA)-Asn-6Clw-KMe₃-TzaOH-Cya-Thi-NH₂ (PCAD-078)

The linear sequence of the peptide (Boc-Pip-Trp-Asp-Npg-Apc(Alloc)-Asn-6Clw-KMe₃-Aza-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 25 μmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Boc-Pip-OH as final step. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*', DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-TzaOH-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours). The obtained crude material was subjected to click reaction: to this end, the azide containing peptide was allowed to react overnight at RT in a degassed mixture of with propargyl alcohol (7.5 μL, 125 μmol, 5 eq.), sodium ascorbate (50 mg, 250 μmol, 10 eq.), tris(3-hydroxypropyltriazolylmethyl)amine (THPTA) (10 mg, 25 μmol, 1 eq.) and copper(II) sulfate pentahydrate (13 mg, 50 μmol, 2 eq.) in methanol/water (20 mL, 1:1, v/v) under nitrogen atmosphere. Volatiles were removed *in vacuo* and the click product (that concomitantly formed a copper (II) complex) was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 15 min – Kinetex) to yield 2.12 mg of the pure title compound (4.0%). HPLC t_R = 5.2 min. LC/TOF-MS: exact mass 2105.786 (calculated 2105.783). C₉₀H₁₂₈ClCuN₂₄O₂₅S₂ (MW = 2109.259).

Example 22: Synthesis VII: Preparation of 'cold' metal complexes of compounds of the invention

General procedure for the preparation of a peptide comprising a chelator-metal-complex from the corresponding peptide comprising an uncomplexed chelator:

0.1 mM solution of the peptide comprising the uncomplexed chelator in 0.4 M sodium acetate buffer (pH = 5) was diluted with a 0.1 mM solution of the corresponding metal salt in water such that the molar ratio of peptide to metal was adjusted to 1 : 3. The solution was stirred at 50 °C for 20 min. The solution was then subjected to solid phase extraction. Fractions containing the pure product were pooled and freeze dried.

A. Indium complex of H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-413)

Starting from 5 mg of peptide (2.4 μmol) and InCl₃ × 4 H₂O as Indium donor, a yield of 4.22 mg of the pure title compound (80.3%) was obtained. HPLC t_R = 6.9 min. LC/TOF-MS: exact mass 2185.705 (calculated 2185.715). C₉₂H₁₂₈ClInN₂₁O₂₆S₃ (MW = 2190.599).

B. Lutetium complex of H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-237)

Starting from 5 mg of peptide (2.4 μmol) and LuCl₃ as Lutetium donor, a yield of 4.32 mg of the pure title compound (80.0%) was obtained. HPLC t_R = 7.0 min. LC/TOF-MS: exact mass 2247.742 (calculated 2247.752). C₉₂H₁₂₈ClLuN₂₁O₂₆S₃ (MW = 2250.747).

C. Gallium complex of H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-350)

Starting from 10 mg of peptide (4.8 μmol) and Ga(NO₃)₃ × H₂O as Gallium donor, a yield of 8.35 mg of the pure title compound (81.1%) was obtained. HPLC t_R = 6.7 min. LC/TOF-MS: exact mass 2141.727 (calculated 2141.737). C₉₂H₁₂₈ClGa₂₁O₂₆S₃ (MW = 2145.504).

D. Lead(II) complex of H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-260)

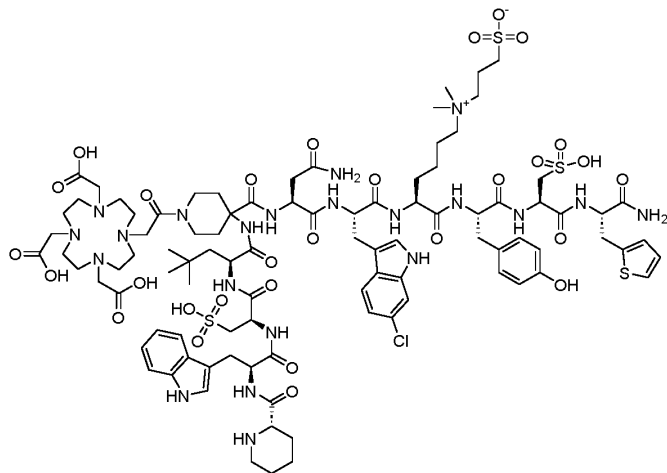
Deviating from the general procedure, a 0.4 M ammonium acetate buffer (pH 6) was used and the reaction was performed at 55°C for 30 min for preparation of lead(II) complexes. Starting from 6 mg of peptide (2.9 μmol) and Pb(OAc)₂ × 3 H₂O as lead(II) donor, a yield of 5.98 mg of the pure title compound (90.3%) was obtained. HPLC t_R = 6.9 min. LC/TOF-MS: exact mass 2277.794 (calculated 2277.792). C₉₂H₁₂₉ClN₂₁O₂₆PbS₃ (MW = 2284.005).

Example 23: Synthesized compounds summary

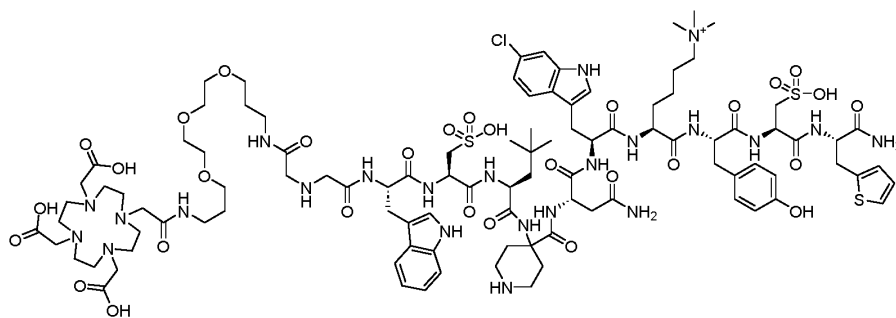
Characterization data (HPLC/MS) for the compounds shown below is included in Table 9, following Example 25. Reference to the synthetic strategy used to prepare each compound is also included in Table 9.

The following compounds were synthesized:

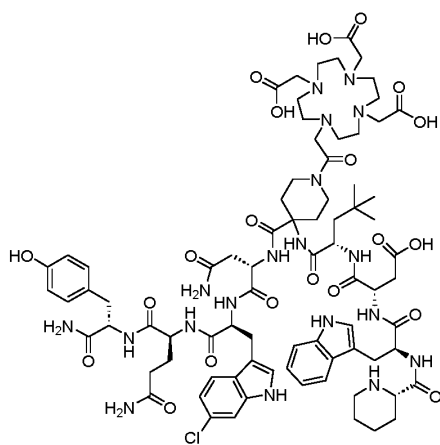
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂ (PCAD-062) of the following formula



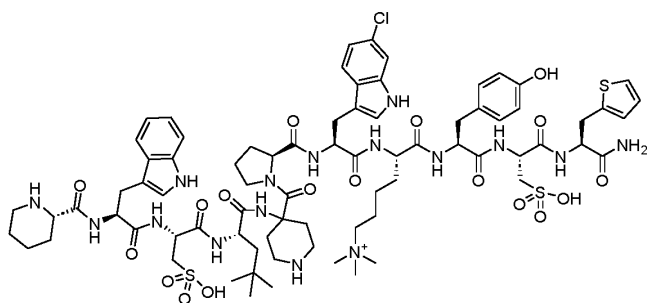
- 5 compound H-Ida(O3TdN2-DOTA)-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-063) of the following formula



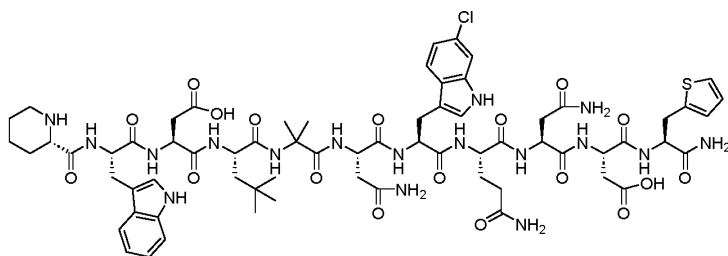
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-NH₂ (PCAD-064) of the following formula



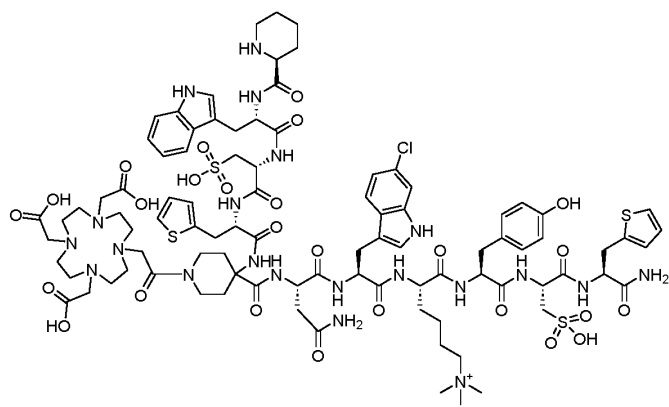
compound H-Pip-Trp-Cya-Npg-Apc-Pro-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-065) of the following formula



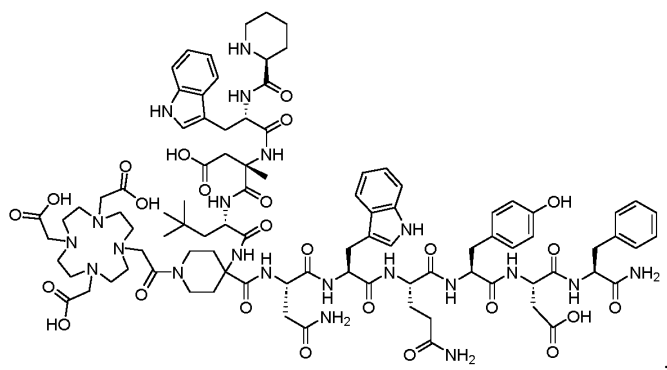
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Asn-Asp-Thi-NH₂ (PCAD-066) of the
5 following formula



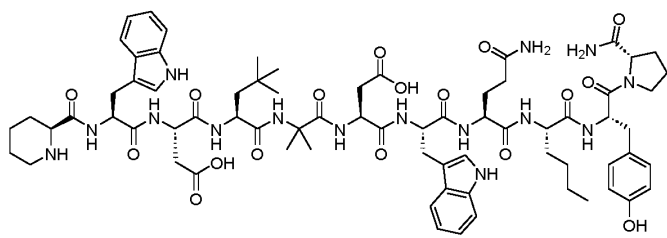
compound H-Pip-Trp-Cya-Thi-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-068) of the following formula



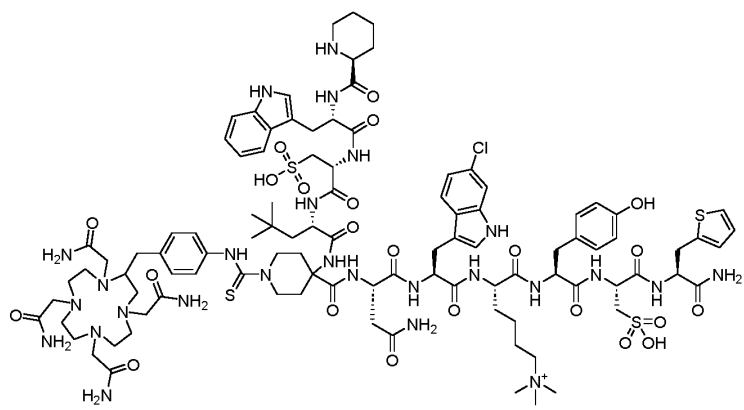
compound H-Pip-Trp-Amd-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH₂ (PCAD-070) of the following formula



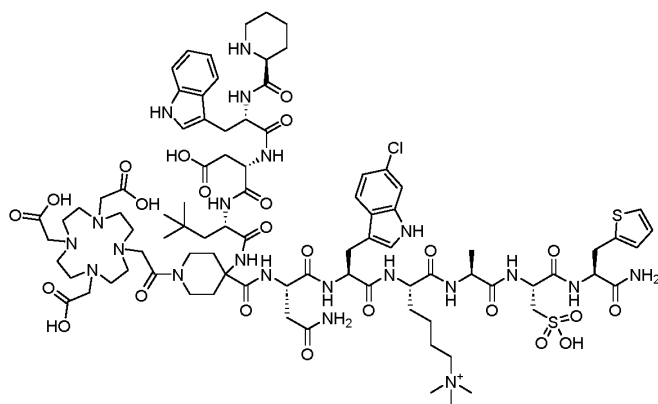
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Nle-Tyr-Pro-NH₂ (PCAD-071) of the following formula



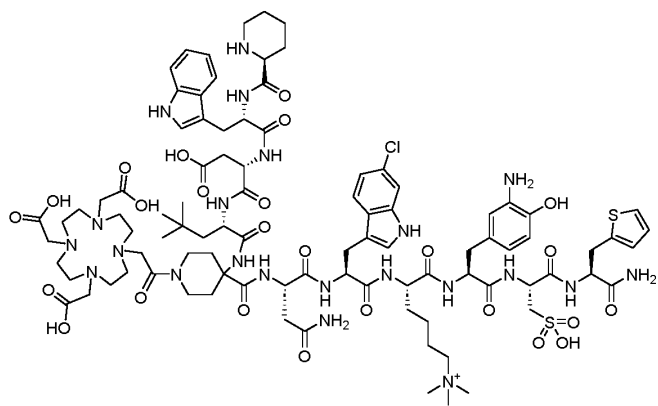
compound H-Pip-Trp-Cya-Npg-Apc(BnTCMC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-072) of the following formula



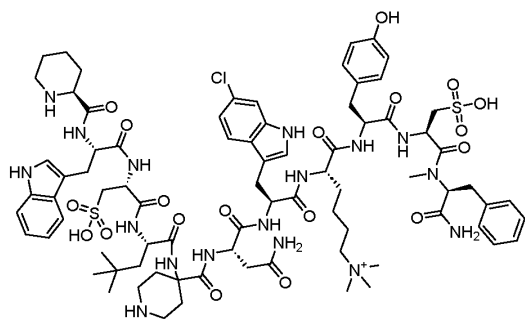
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ala-Cya-Thi-NH₂ (PCAD-073) of the following formula



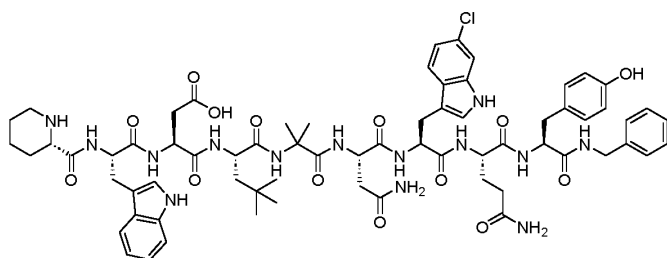
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ay3-Cya-Thi-NH₂ (PCAD-074) of the following formula



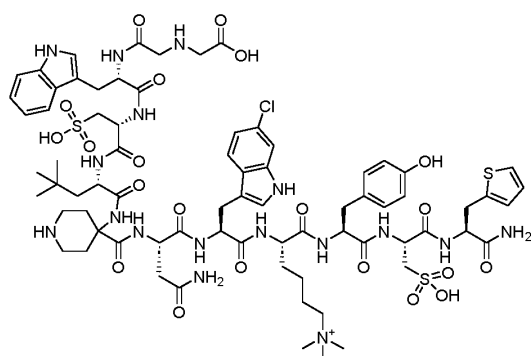
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Nmf-NH₂ (PCAD-075) of the following formula



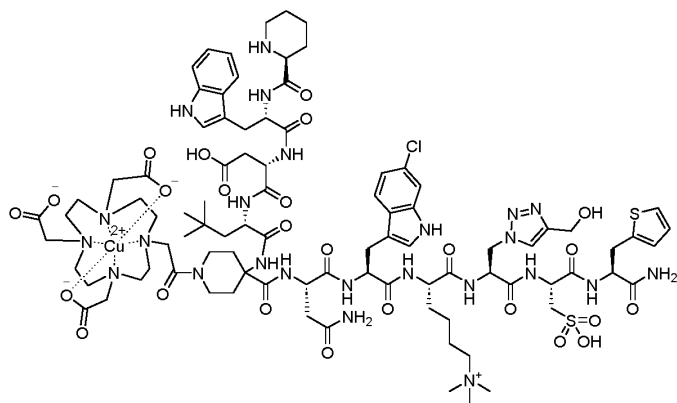
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NHBz (PCAD-076) of the following formula



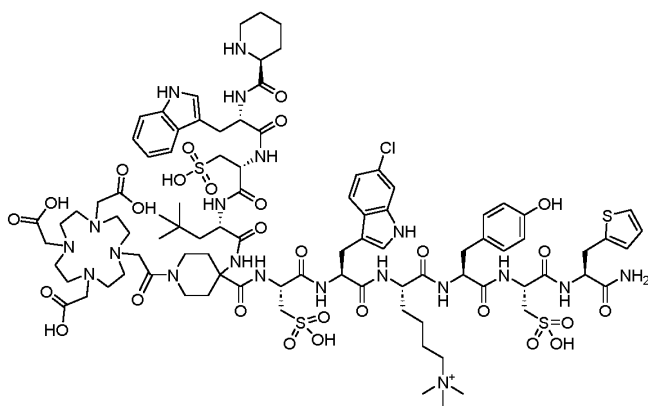
5 compound H-Ida-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-077) of the following formula



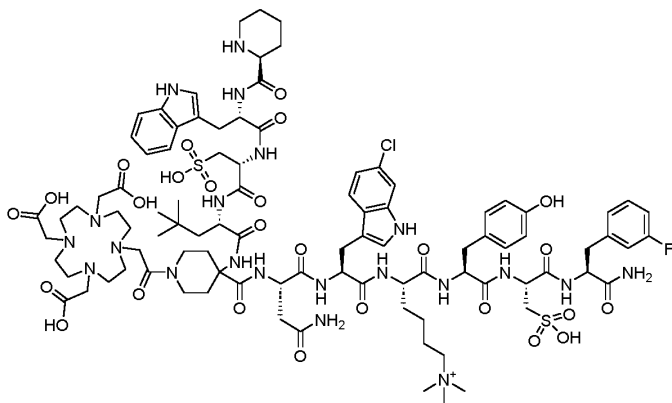
compound H-Pip-Trp-Asp-Npg-Apc(CuDOTA)-Asn-6Clw-KMe3-TzaOH-Cya-Thi-NH₂ (PCAD-078) of the following formula



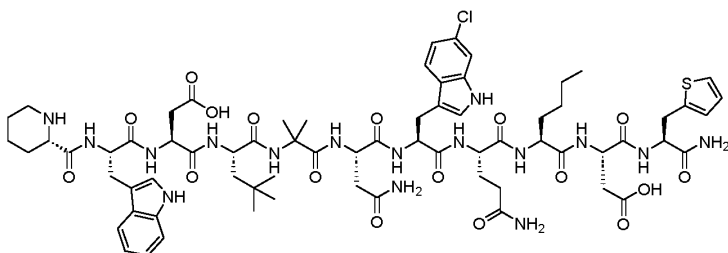
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Cya-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-079) of the following formula



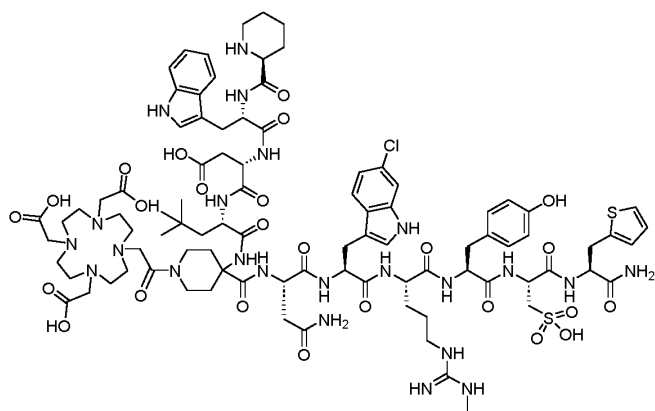
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mff-NH₂ (PCAD-080) of the following formula



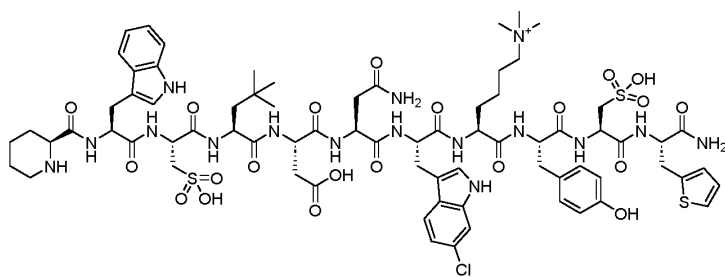
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Nle-Asp-Thi-NH₂ (PCAD-081) of the following formula



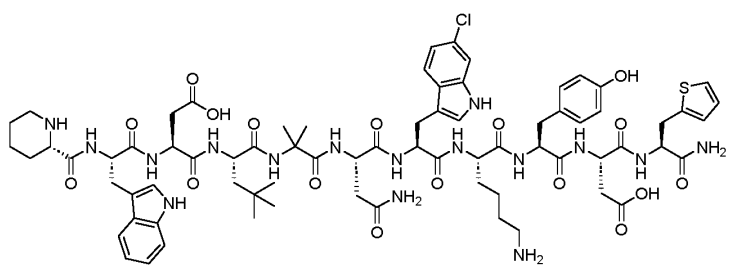
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂ (PCAD-082) of the following formula



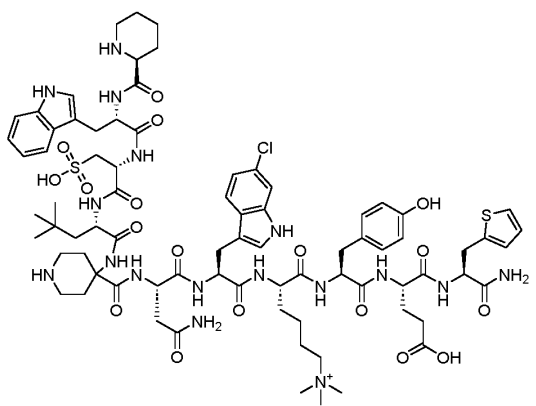
5 compound H-Pip-Trp-Cya-Npg-Asp-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-083) of the following formula



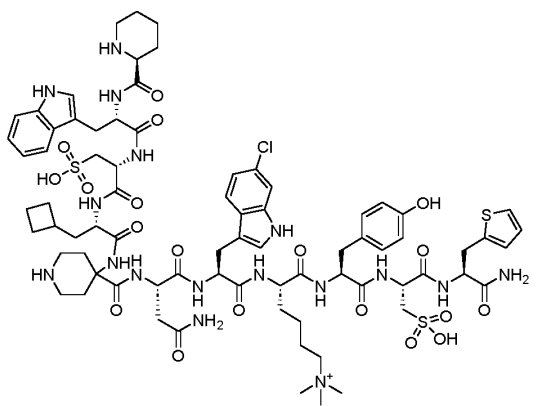
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂ (PCAD-084) of the following formula



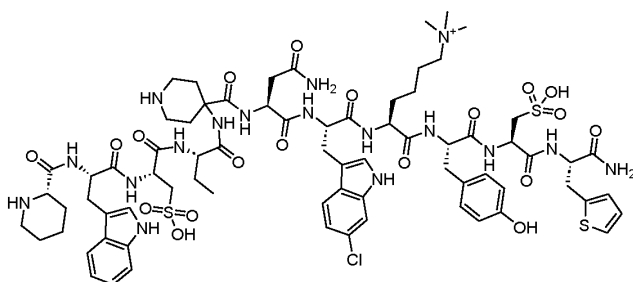
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Glu-Thi-NH₂ (PCAD-085) of the following formula



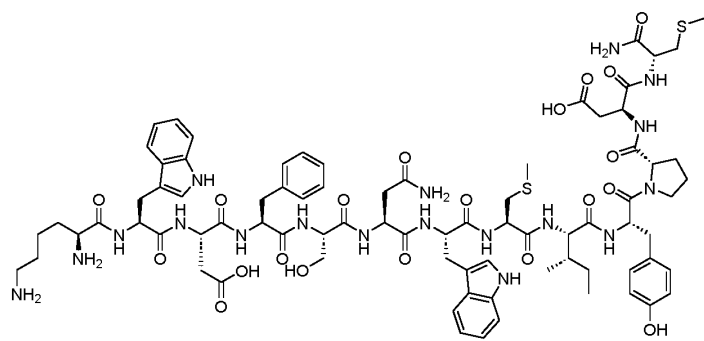
5 compound H-Pip-Trp-Cya-Cba-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-086) of the following formula



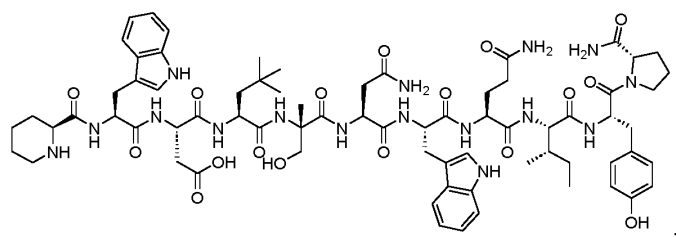
compound H-Pip-Trp-Cya-Abu-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-087) of the following formula



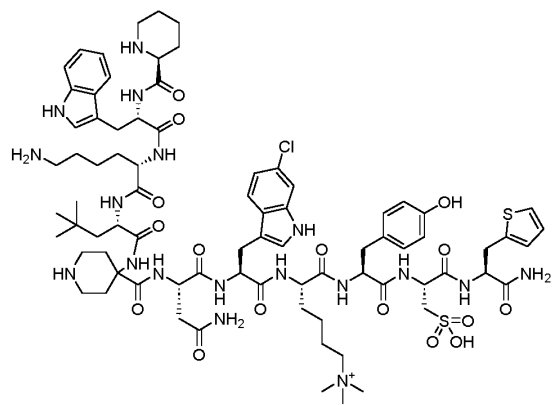
compound H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Smc-Ile-Tyr-Pro-Asp-Smc-NH₂ (PCAD-089) of the following formula



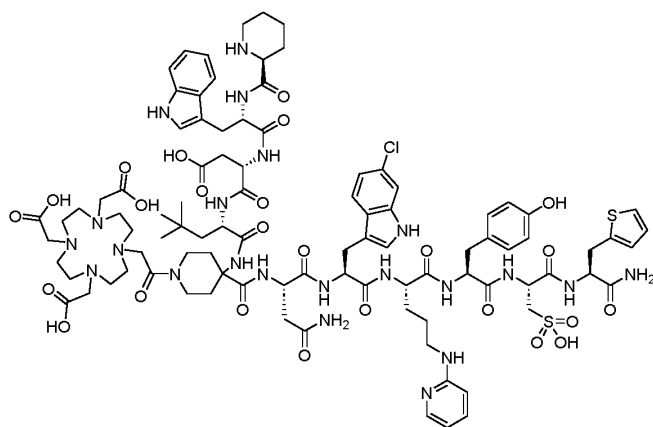
5 compound H-Pip-Trp-Asp-Npg-Ams-Asn-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-090) of the following formula



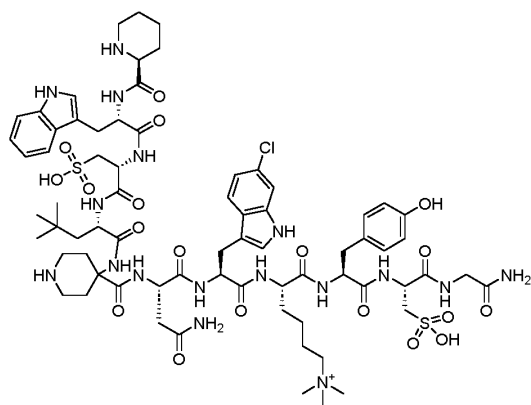
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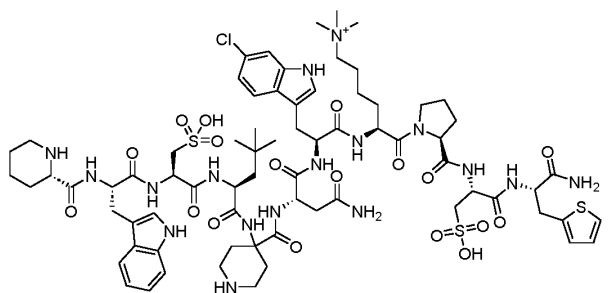
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH₂ (PCAD-093) of the following formula



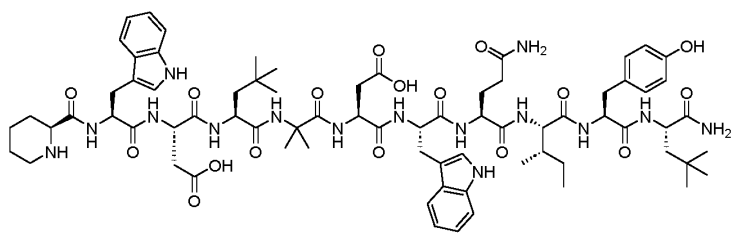
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe₃-Tyr-Cya-Gly-NH₂ (PCAD-094) of the following formula



compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe₃-Pro-Cya-Thi-NH₂ (PCAD-095) of the following formula

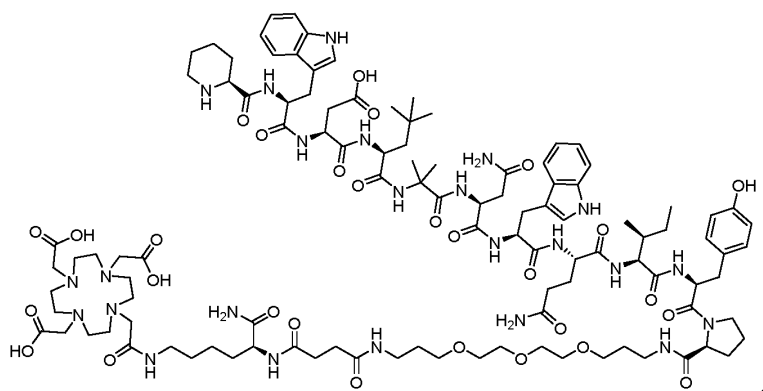


compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Npg-NH₂ (PCAD-096) of the following formula

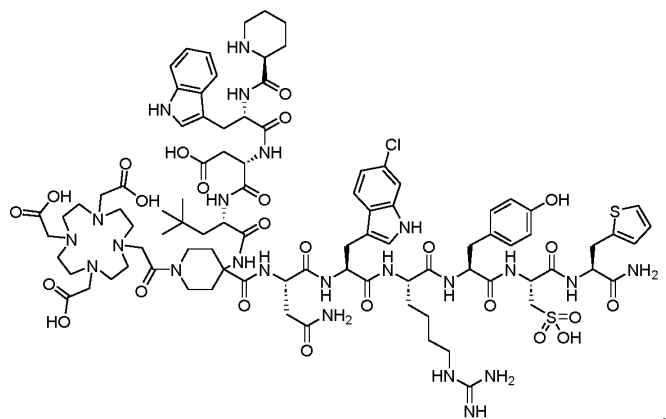


compound H-Pip-Trp-Asp-Npg-Aib-Asn-Trp-Gln-Ile-Tyr-Pro-Ttds-Lys(DOTA)-NH₂ (PCAD-098) of the following formula

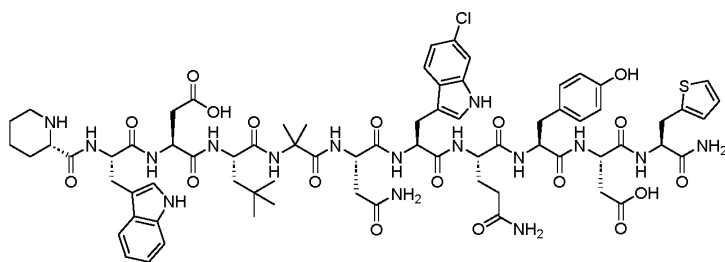
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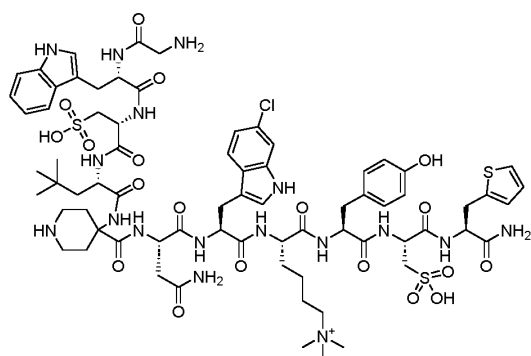
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Har-Tyr-Cya-Thi-NH₂ (PCAD-099) of the following formula



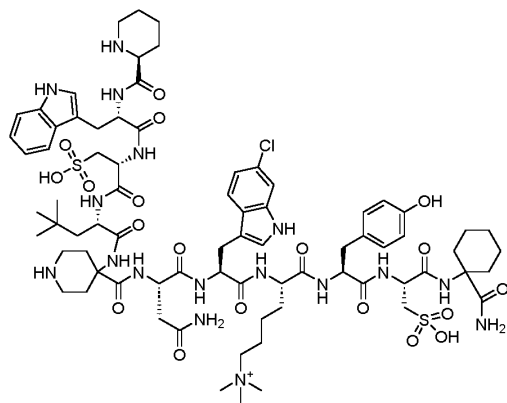
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-Asp-Thi-NH₂ (PCAD-100) of the following formula



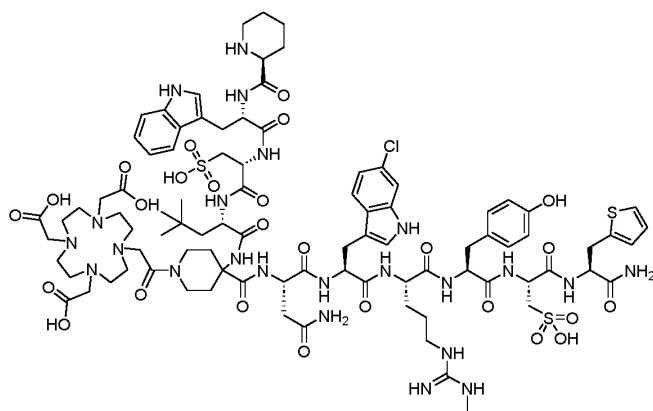
5 compound H-Gly-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-102) of the following formula



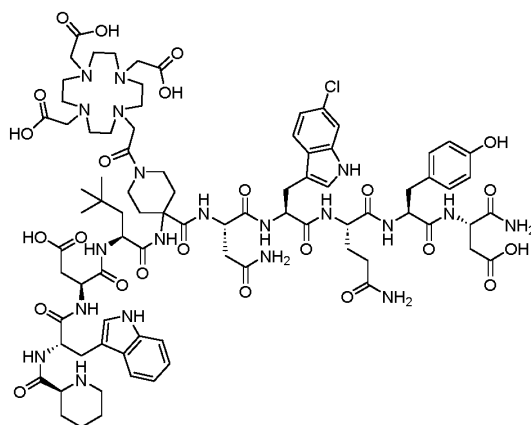
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Egz-NH₂ (PCAD-104) of the following formula



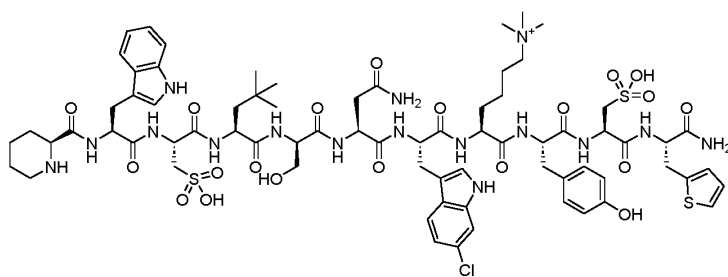
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂ (PCAD-106) of the following formula



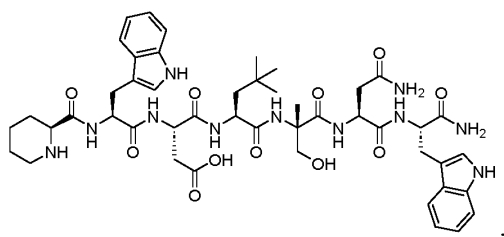
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Asp-NH₂ (PCAD-108) of the following formula



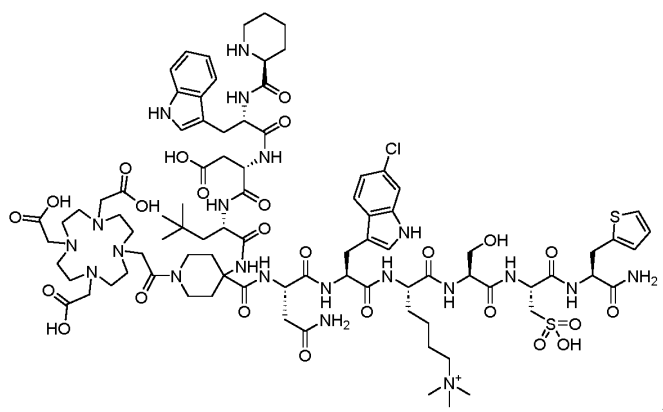
compound H-Pip-Trp-Cya-Npg-ser-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-110) of the following formula



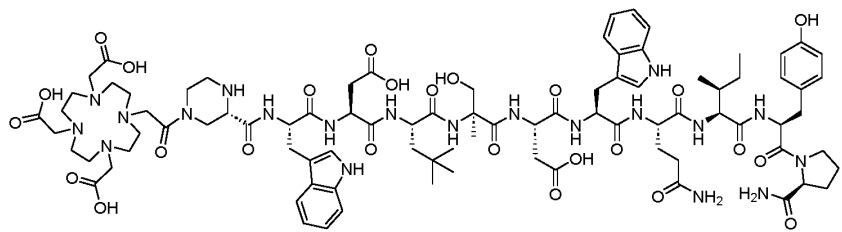
compound H-Pip-Trp-Asp-Npg-Ams-Asn-Trp-NH₂ (PCAD-111) of the following formula



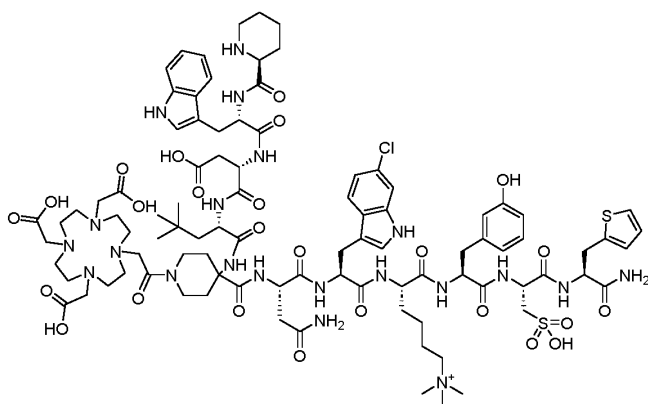
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ser-Cya-Thi-NH₂ (PCAD-112) of the following formula



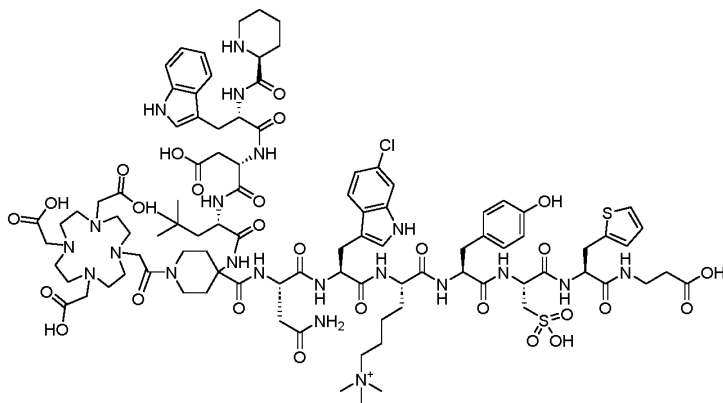
compound H-Ppaz(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-113) of the following formula



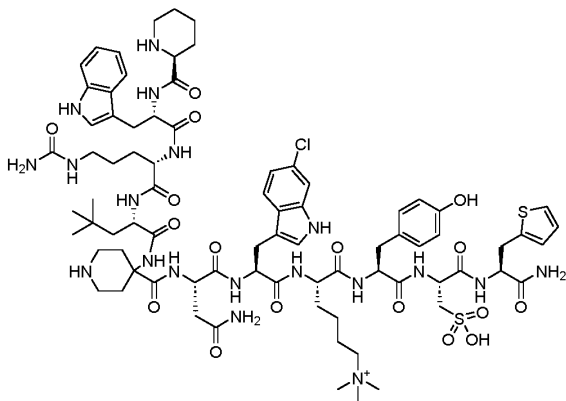
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-My-Cya-Thi-NH₂ (PCAD-114) of the following formula



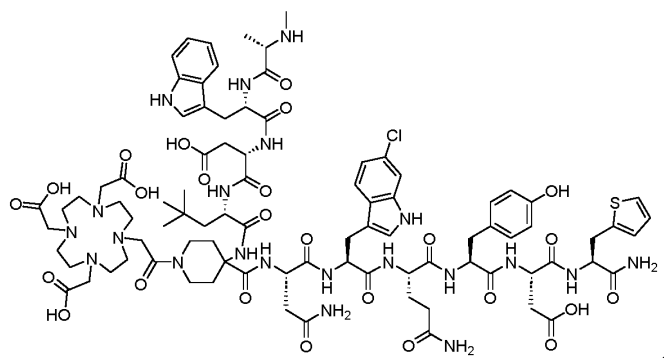
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-Bal-OH (PCAD-115) of the following formula



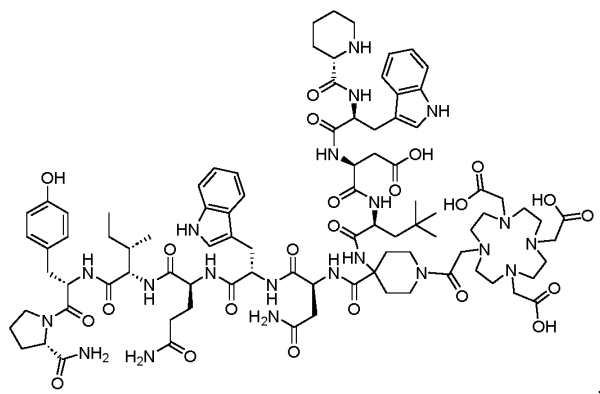
compound H-Pip-Trp-Cit-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-116) of the following formula



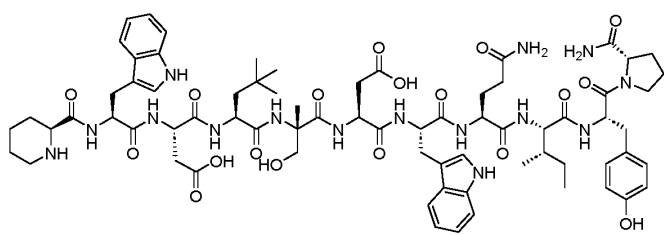
compound H-Nma-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Asp-Thi-NH₂ (PCAD-117) of the following formula



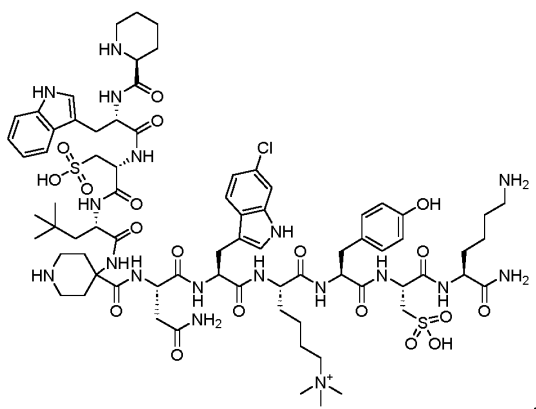
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-119) of the following formula



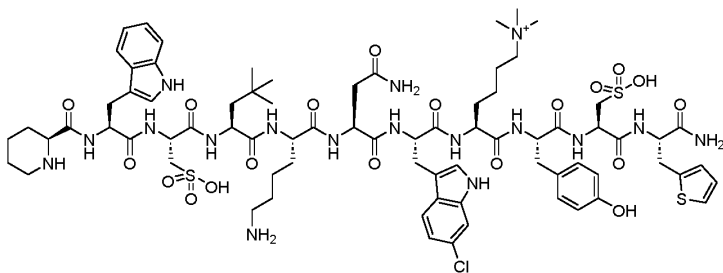
compound H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-120) of the following formula



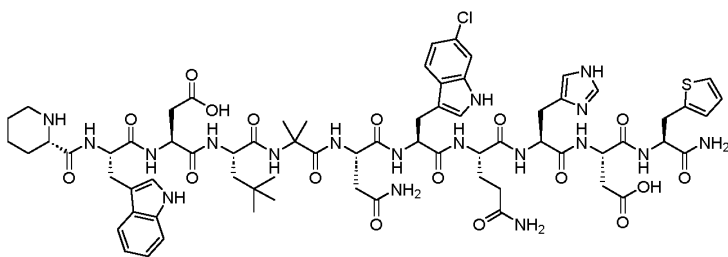
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Lys-NH₂ (PCAD-122) of the following formula



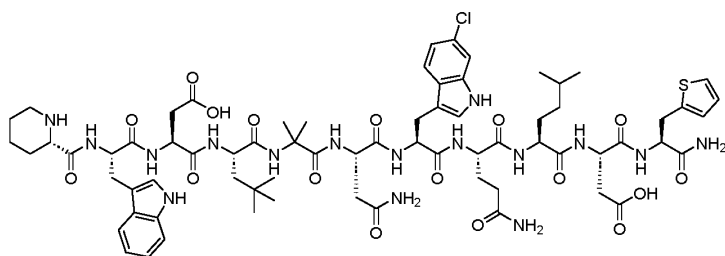
5 compound H-Pip-Trp-Cya-Npg-Lys-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-123) of the following formula



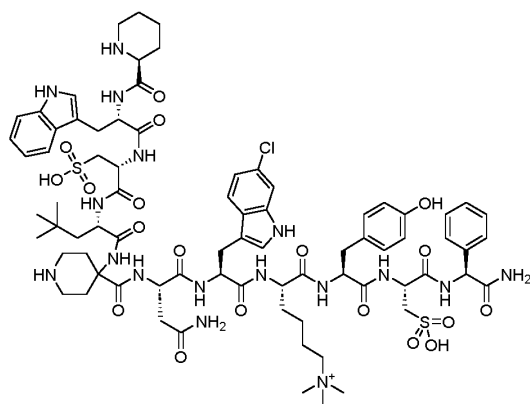
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-His-Asp-Thi-NH₂ (PCAD-124) of the following formula



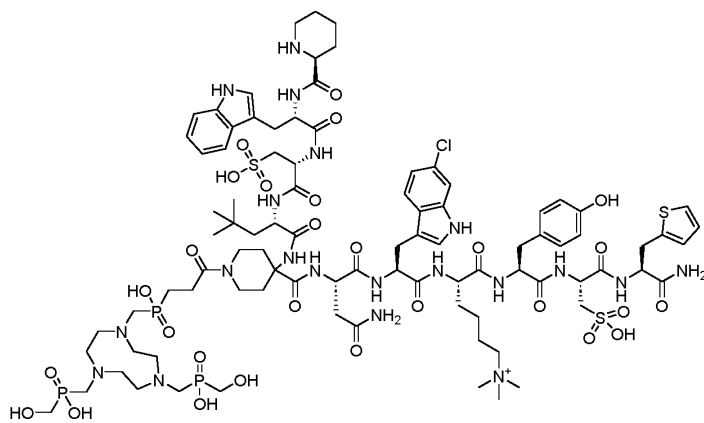
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Hle-Asp-Thi-NH₂ (PCAD-125) of the following formula



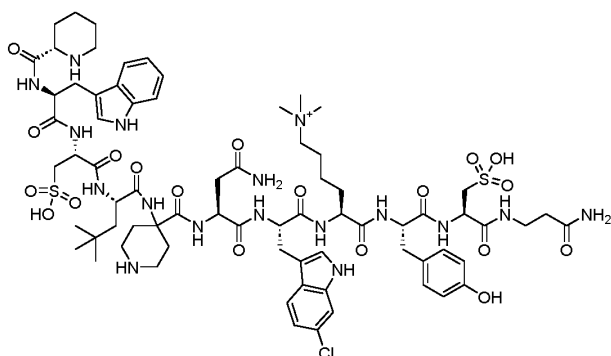
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe₃-Tyr-Cya-Phg-NH₂ (PCAD-126) of the following formula



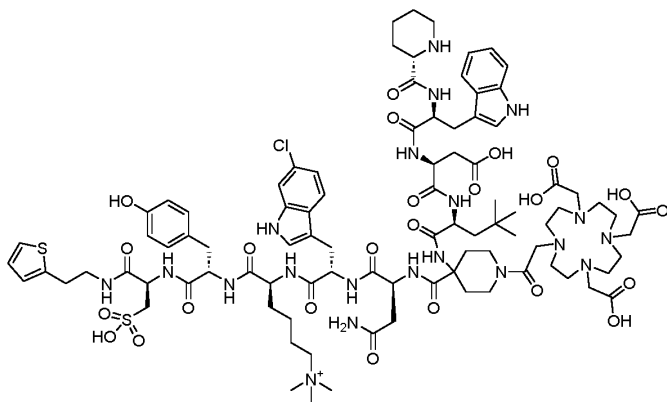
compound H-Pip-Trp-Cya-Npg-Apc(NOPO)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-127) of the following formula



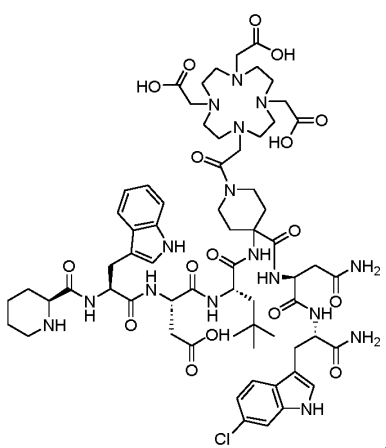
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Bal-NH₂ (PCAD-128) of the following formula



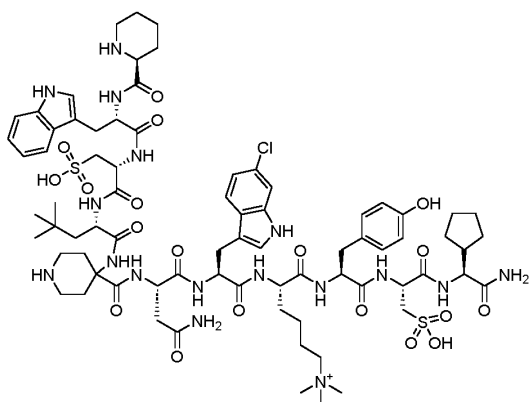
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NHEtTh (PCAD-129) of the following formula



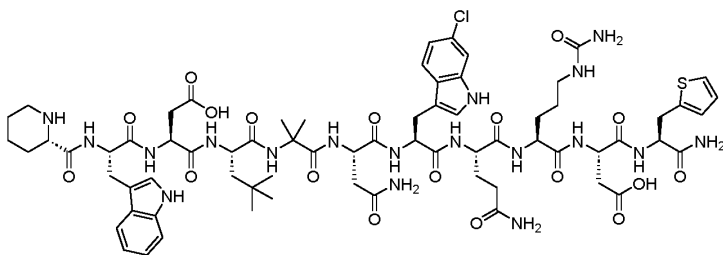
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-NH₂ (PCAD-130) of the following formula



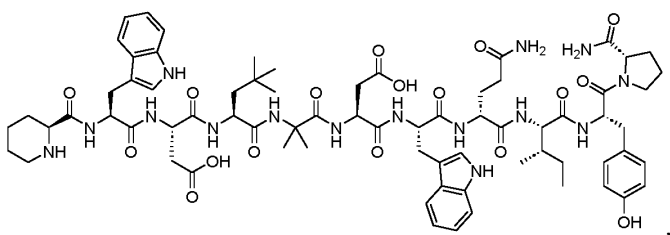
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Cpg-NH₂ (PCAD-131) of the following formula



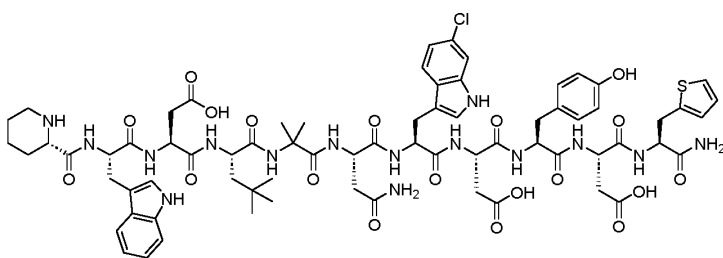
5 compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Cit-Asp-Thi-NH₂ (PCAD-132) of the following formula



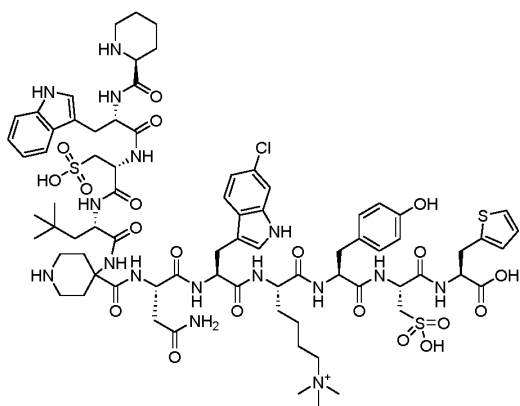
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-gln-Ile-Tyr-Pro-NH₂ (PCAD-133) of the following formula



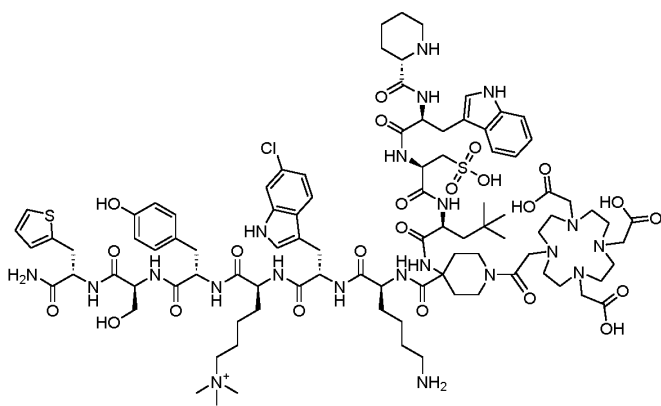
10 compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Asp-Tyr-Asp-Thi-NH₂ (PCAD-135) of the following formula



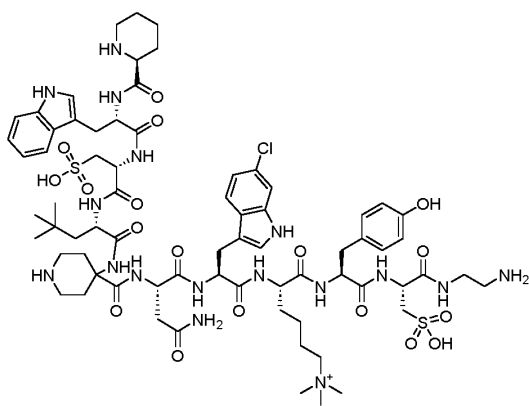
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-OH (PCAD-136) of the following formula



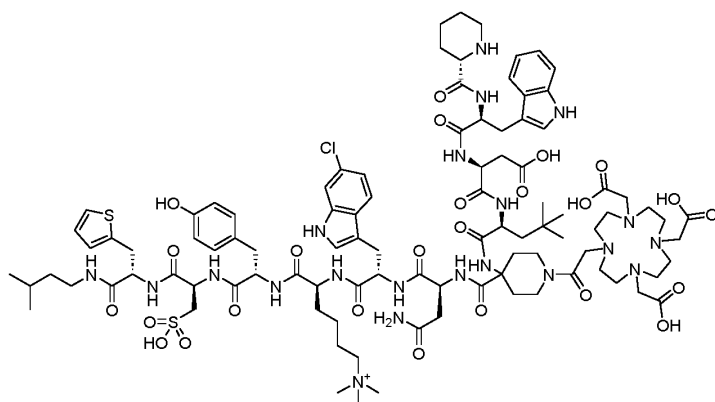
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe3-Tyr-Ser-Thi-NH₂ (PCAD-137) of the following formula



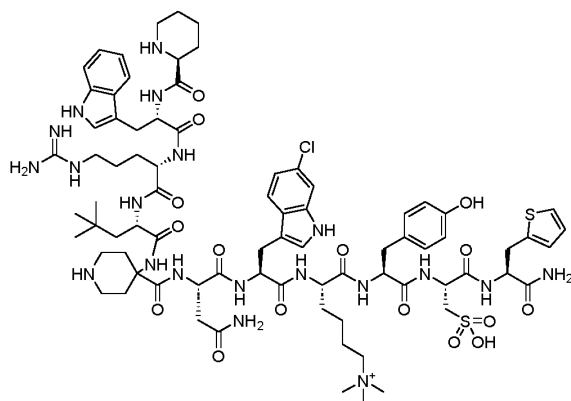
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-en (PCAD-138) of the following formula



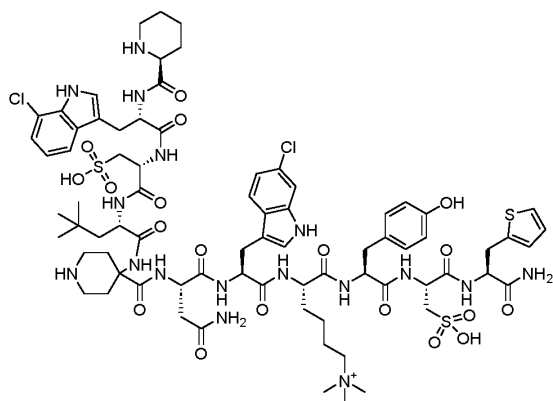
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHiPen
(PCAD-139) of the following formula



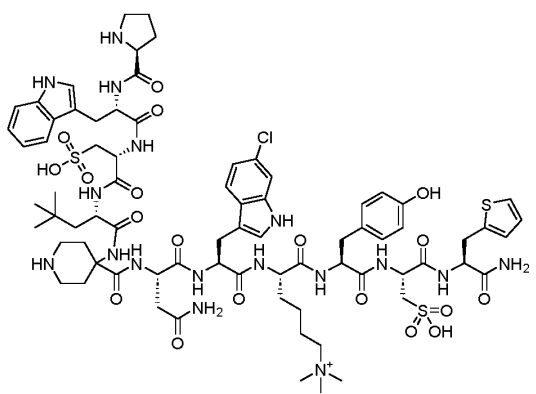
compound H-Pip-Trp-Arg-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-140) of the
5 following formula



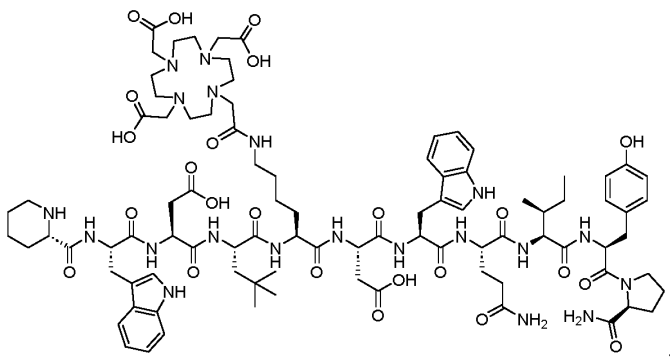
compound H-Pip-7Clw-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-141) of
the following formula



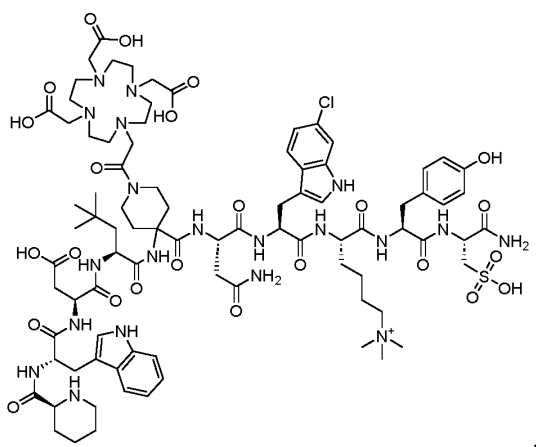
compound H-Pro-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-142) of the following formula



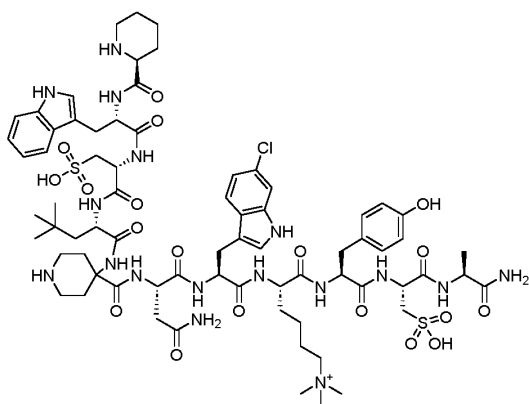
5 compound H-Pip-Trp-Asp-Npg-Lys(DOTA)-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-144) of the following formula



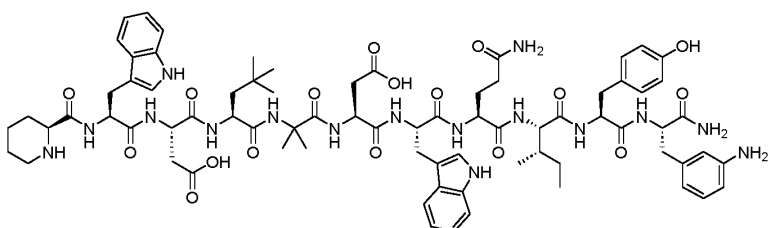
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NH₂ (PCAD-145) of the following formula



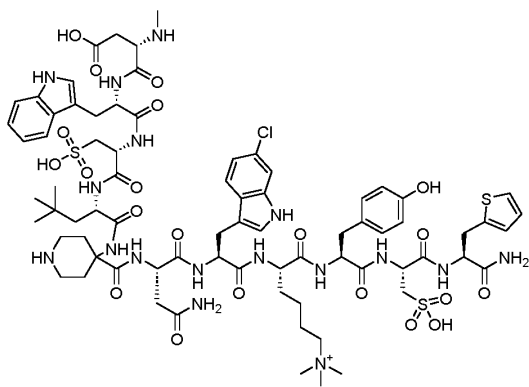
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Ala-NH₂ (PCAD-146) of the following formula



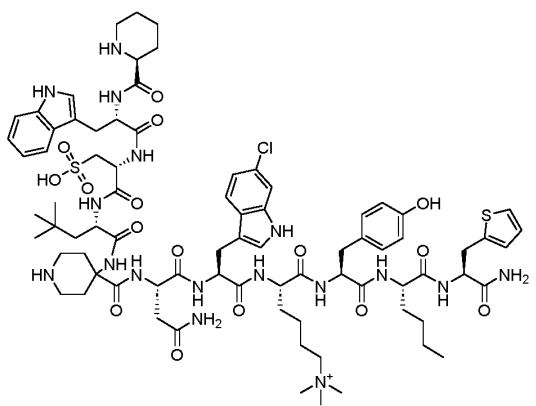
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Af3-NH₂ (PCAD-147) of the
5 following formula



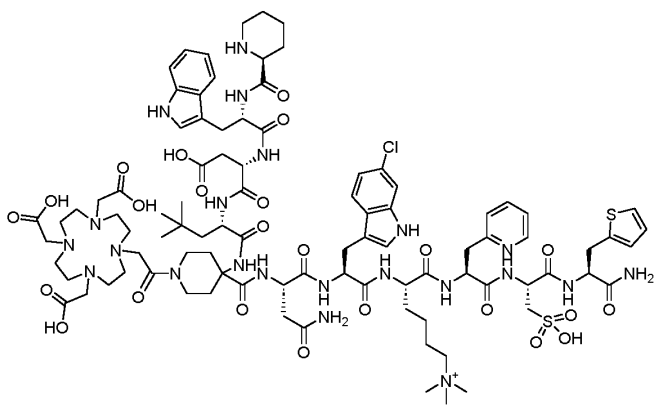
compound H-Nmd-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-148) of the following formula



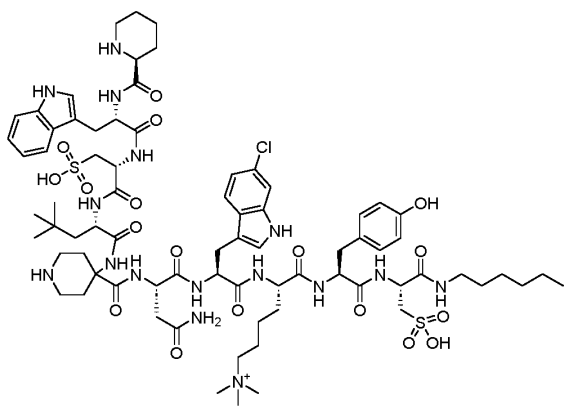
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Nle-Thi-NH₂ (PCAD-149) of the following formula



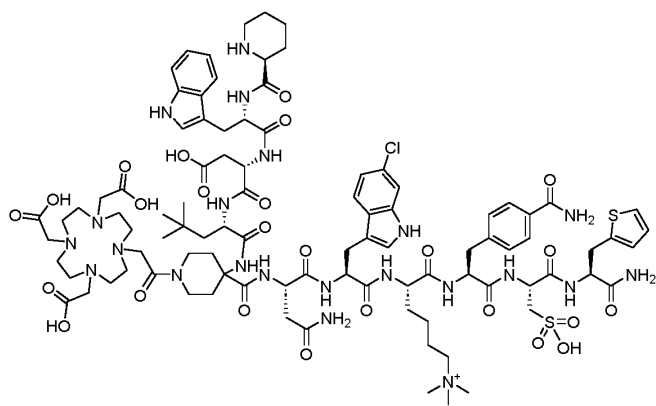
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Opa-Cya-Thi-NH₂ (PCAD-150) of the following formula



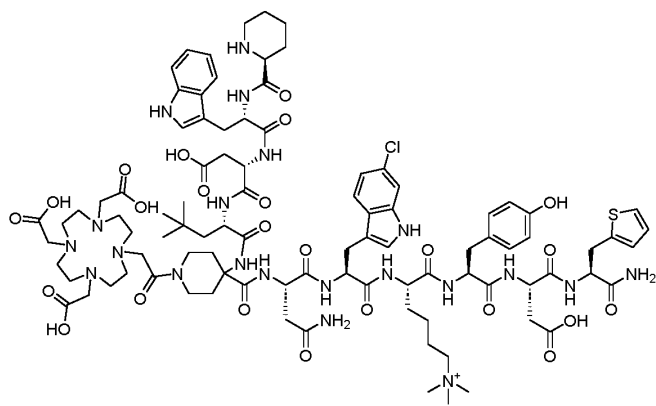
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-NHHex (PCAD-151) of the following formula



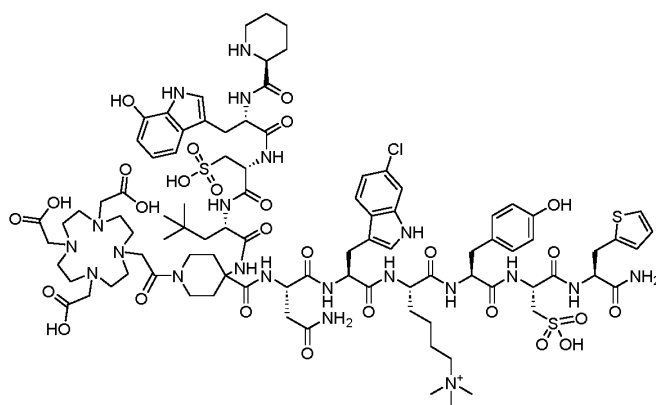
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH₂ (PCAD-152) of the following formula



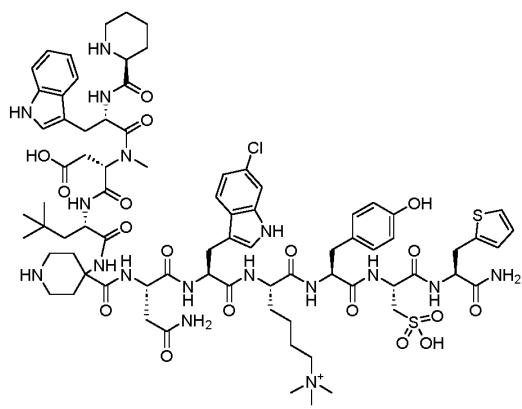
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Asp-Thi-NH₂ (PCAD-153) of the following formula



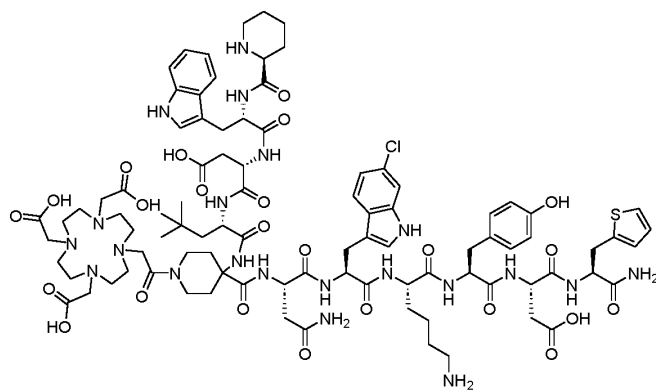
compound H-Pip-Hyw7-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-154) of the following formula



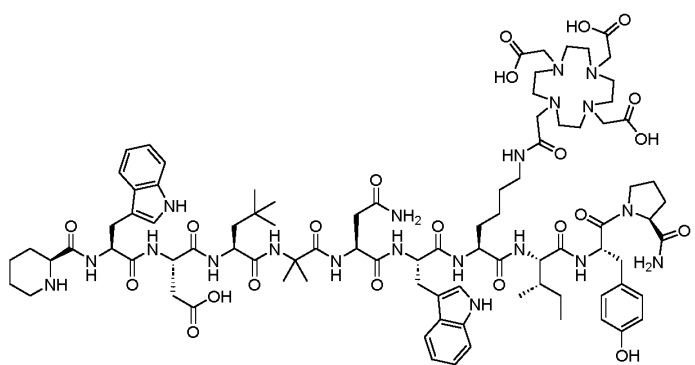
compound H-Pip-Trp-Nmd-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-155) of the following formula



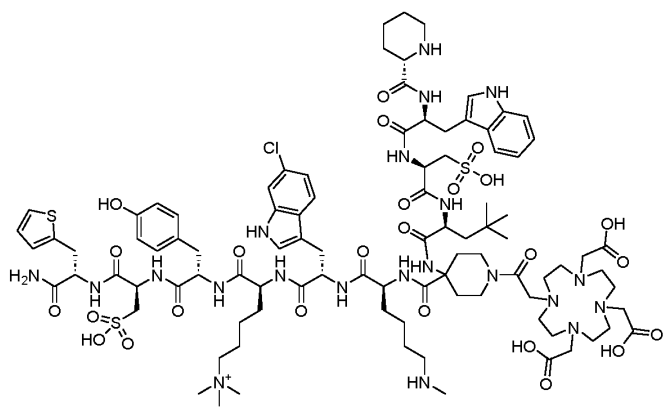
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂ (PCAD-156) of the following formula



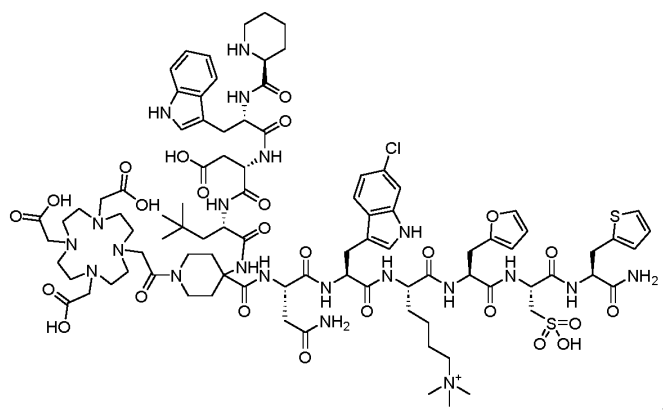
compound H-Pip-Trp-Asp-Npg-Aib-Asn-Trp-Lys(DOTA)-Ile-Tyr-Pro-NH₂ (PCAD-157) of the following formula



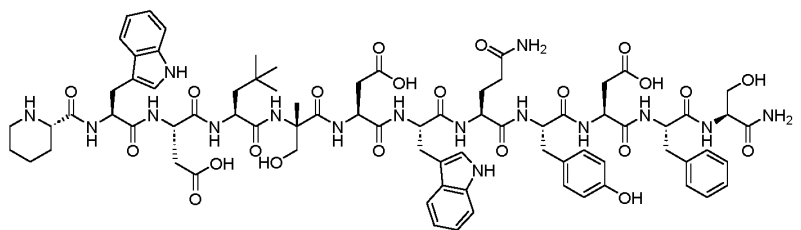
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-161) of the following formula



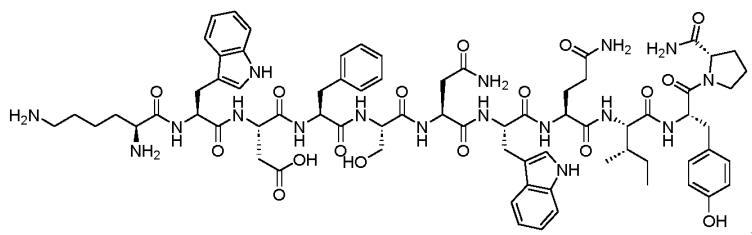
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Fura-Cya-Thi-NH₂ (PCAD-162) of the following formula



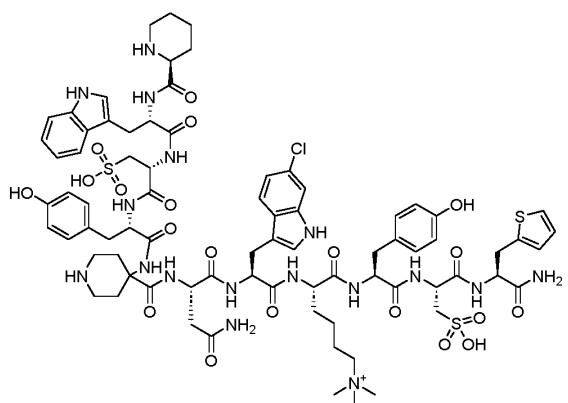
compound H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Tyr-Asp-Phe-Ser-NH₂ (PCAD-164) of the following formula



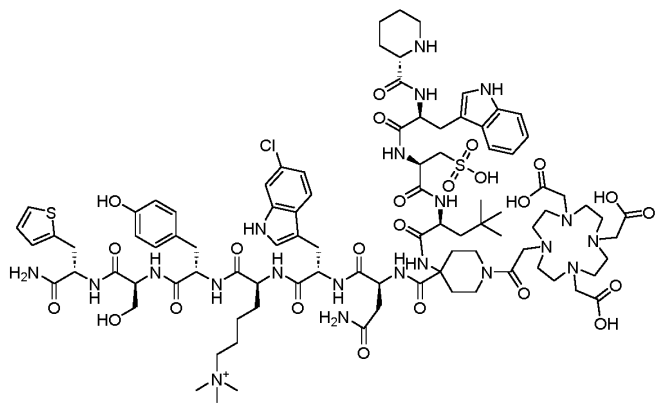
compound H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-165) of the following formula



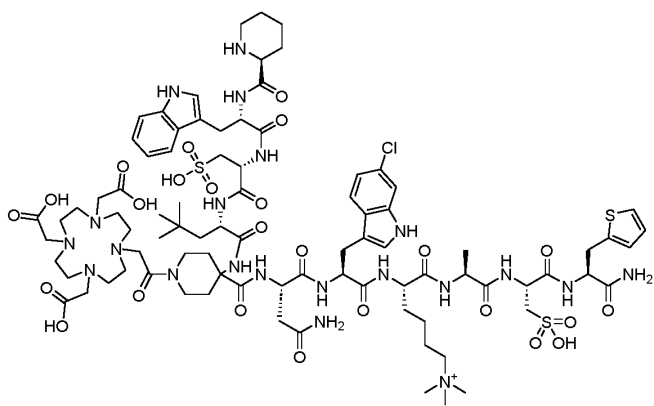
5 compound H-Pip-Trp-Cya-Tyr-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-167) of the following formula



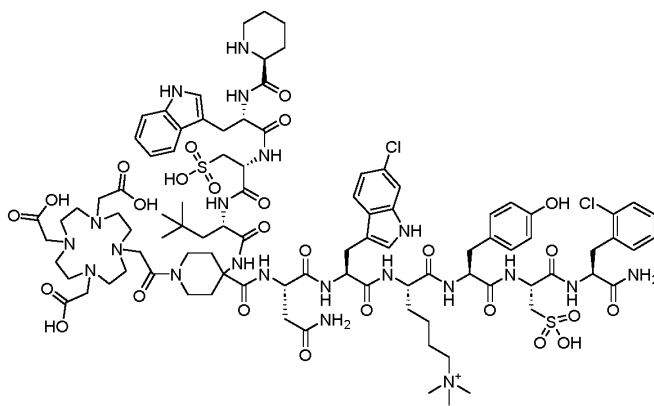
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH₂ (PCAD-168) of the following formula



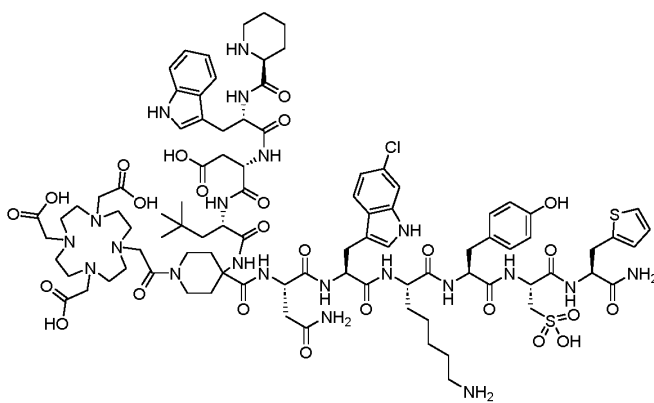
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ala-Cya-Thi-NH₂ (PCAD-169) of the following formula



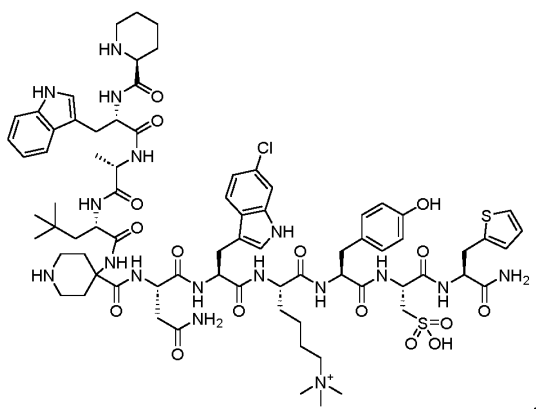
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH₂ (PCAD-170) of the following formula



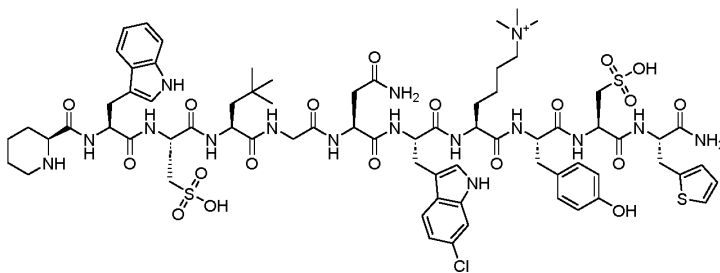
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Hly-Tyr-Cya-Thi-NH₂ (PCAD-172) of the following formula



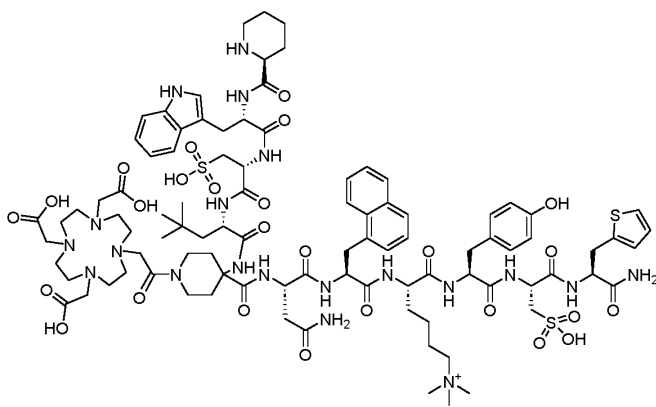
compound H-Pip-Trp-Ala-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-173) of the following formula



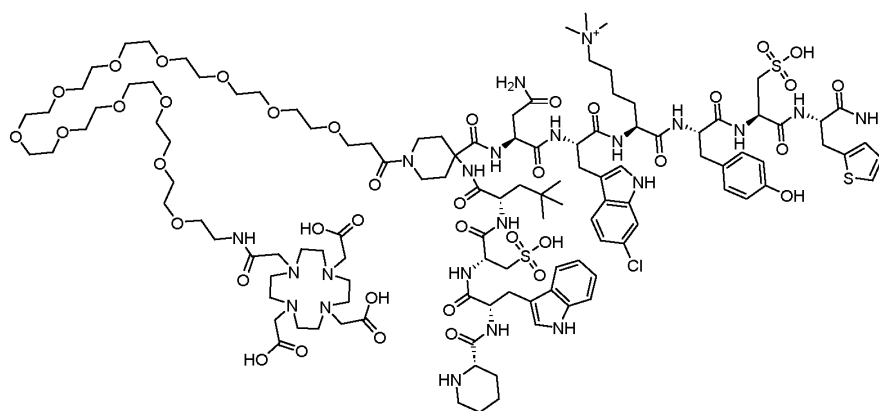
5 compound H-Pip-Trp-Cya-Npg-Gly-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-174) of the following formula



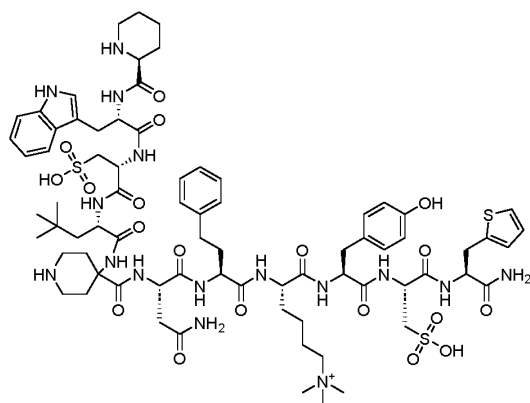
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-1Ni-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-175) of the following formula



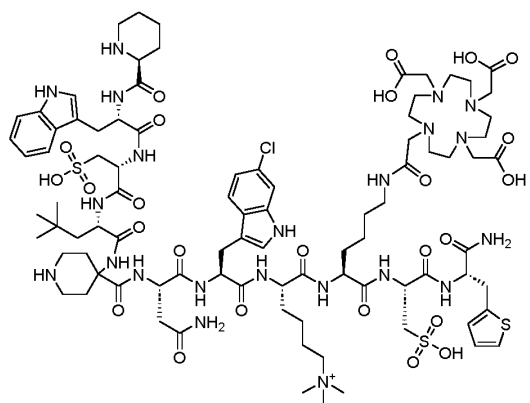
compound H-Pip-Trp-Cya-Npg-Apc(DOTA-PEG12)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-177) of the following formula



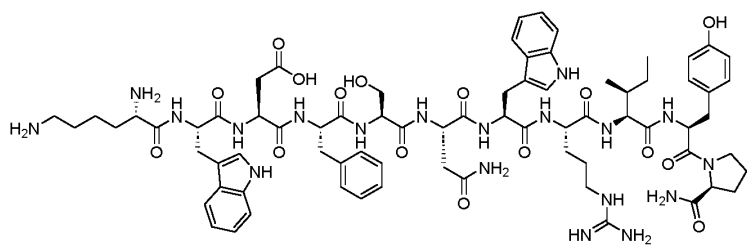
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-Hfe-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-178) of the following formula



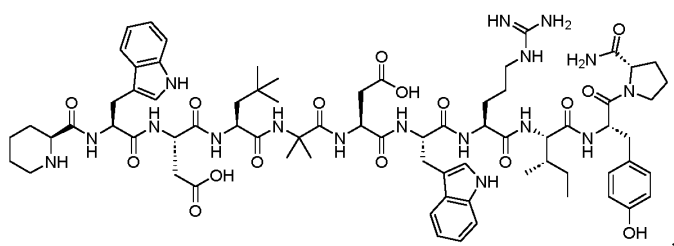
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Lys(DOTA)-Cya-Thi-NH₂ (PCAD-179) of the following formula



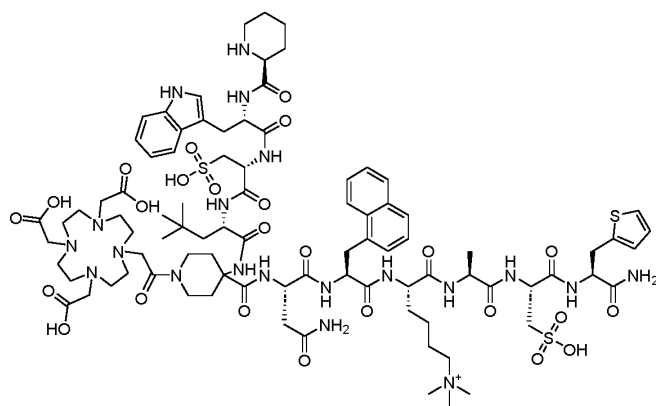
compound H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Arg-Ile-Tyr-Pro-NH₂ (PCAD-181) of the following formula



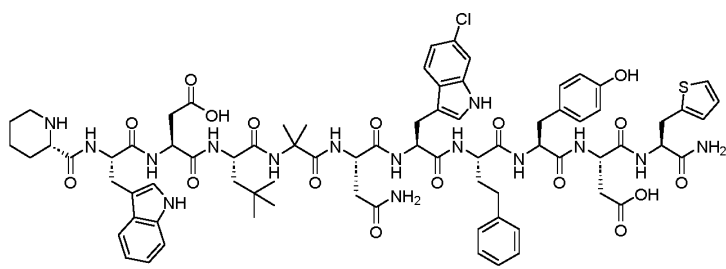
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Arg-Ile-Tyr-Pro-NH₂ (PCAD-183) of the following formula



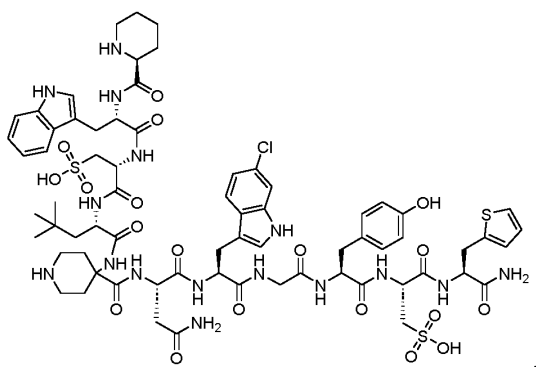
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-1Ni-KMe3-Ala-Cya-Thi-NH₂ (PCAD-184) of the following formula



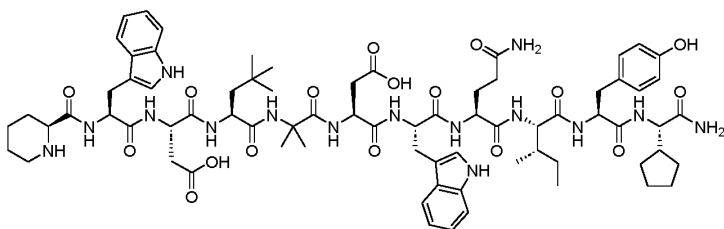
10 compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Hfe-Tyr-Asp-Thi-NH₂ (PCAD-185) of the following formula



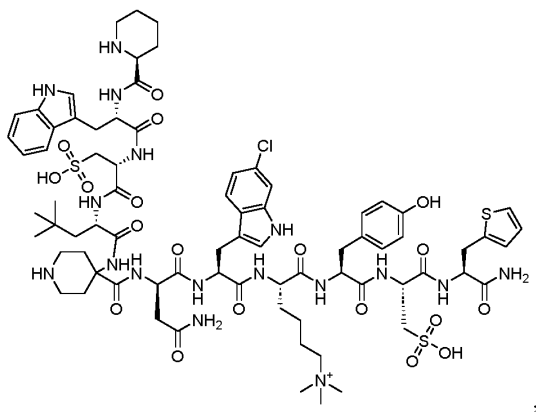
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Gly-Tyr-Cya-Thi-NH₂ (PCAD-186) of the following formula



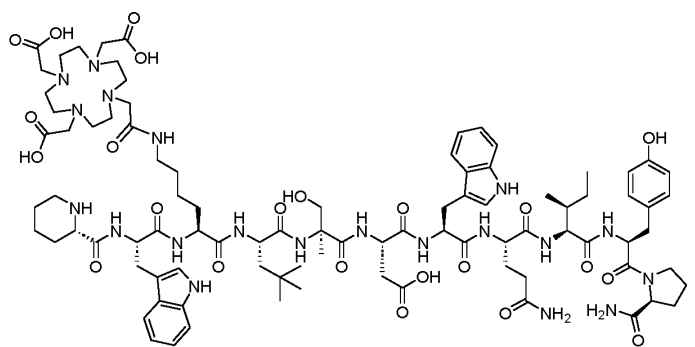
- 5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Cpg-NH₂ (PCAD-189) of the following formula



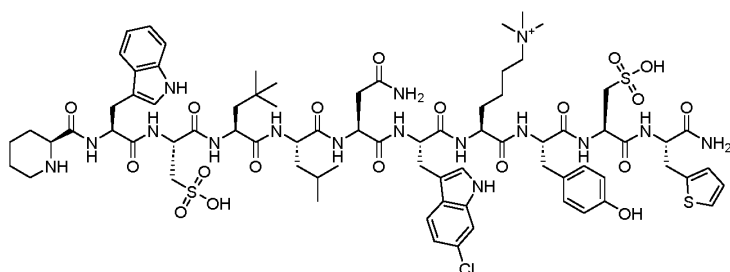
compound H-Pip-Trp-Cya-Npg-Apc-asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-190) of the following formula



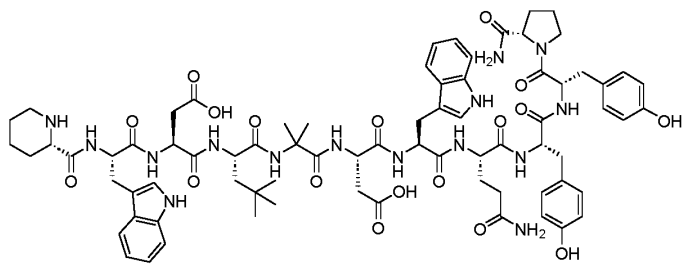
compound H-Pip-Trp-Lys(DOTA)-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-191) of the following formula



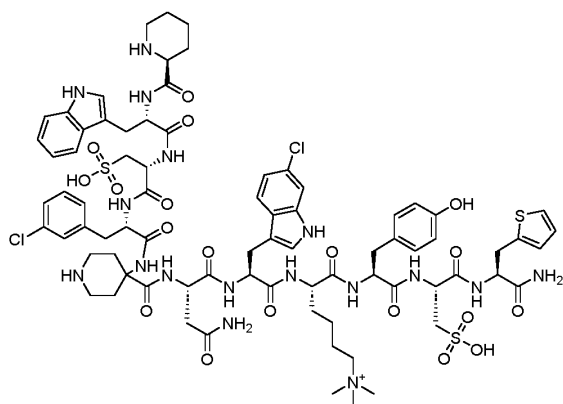
5 compound H-Pip-Trp-Cya-Npg-Leu-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-192) of the following formula



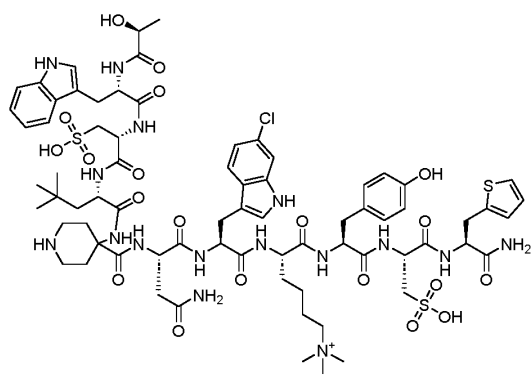
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Tyr-Tyr-Pro-NH₂ (PCAD-193) of the following formula



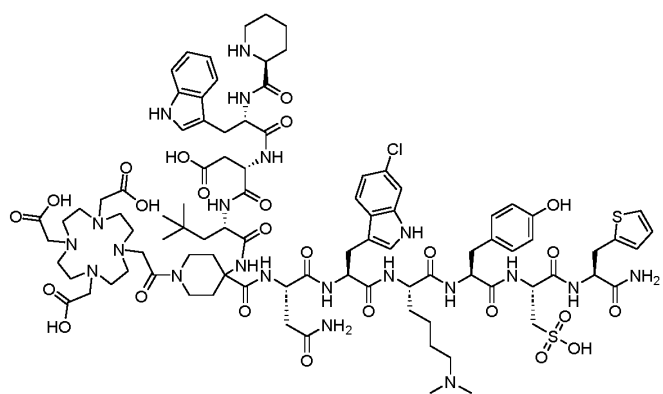
compound H-Pip-Trp-Cya-Mcf-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-194) of the following formula



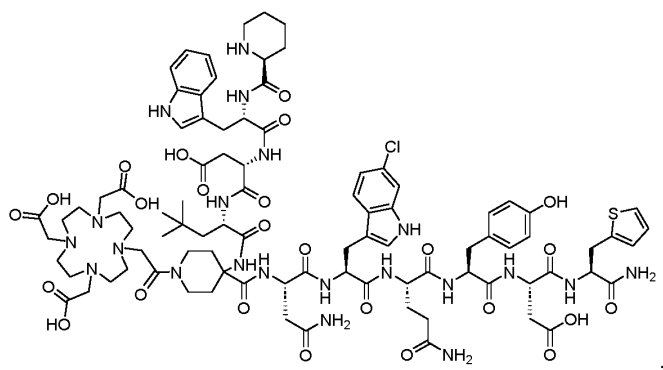
5 compound H-Lac-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-195) of the following formula



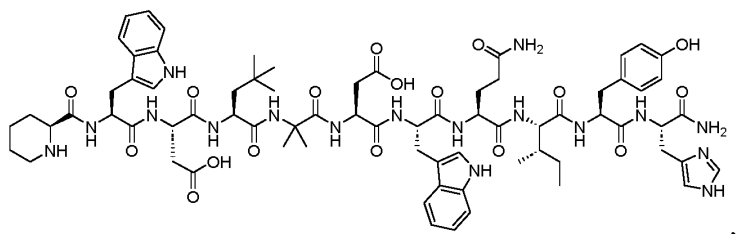
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe2-Tyr-Cya-Thi-NH₂ (PCAD-196) of the following formula



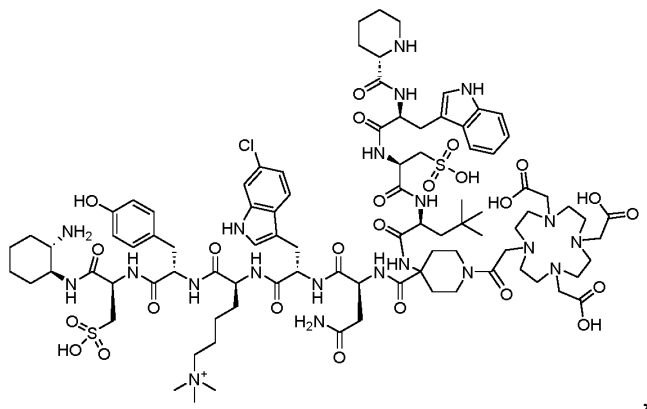
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Asp-Thi-NH₂ (PCAD-197) of the following formula



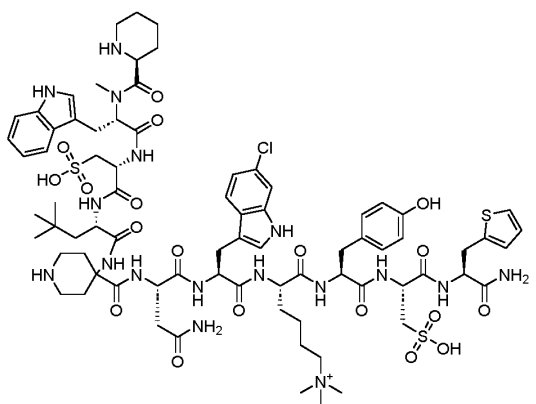
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-His-NH₂ (PCAD-198) of the following formula



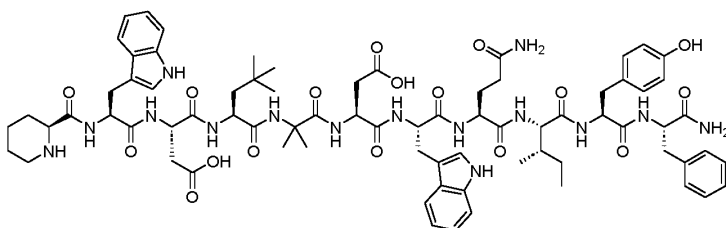
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-DachSS (PCAD-199) of the following formula



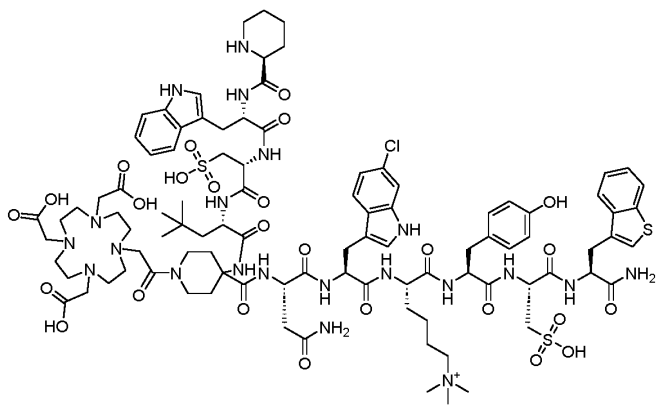
compound H-Pip-Nmw-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-200) of the following formula



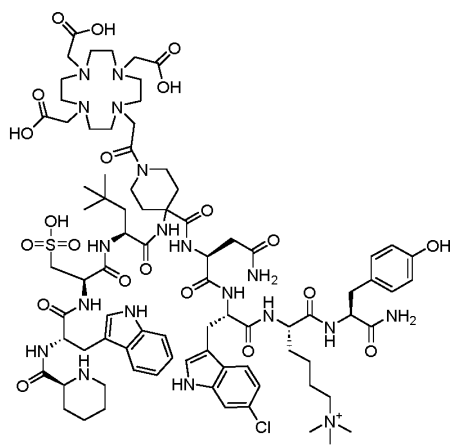
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Phe-NH₂ (PCAD-201) of the following formula



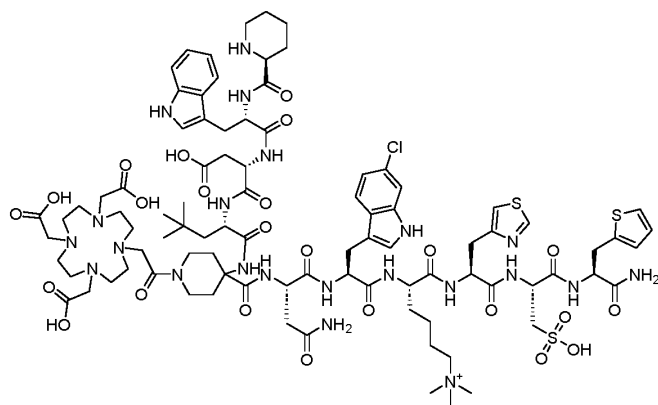
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Bta-NH₂ (PCAD-202) of the following formula



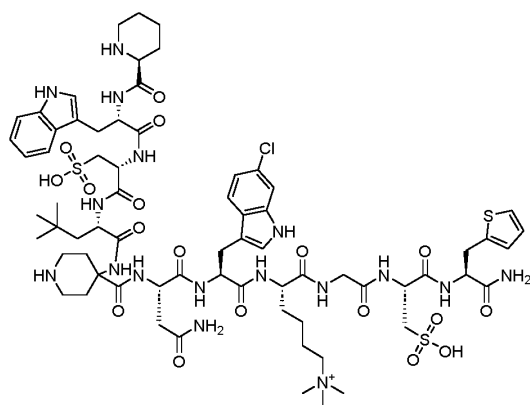
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-NH₂ (PCAD-203) of the following formula



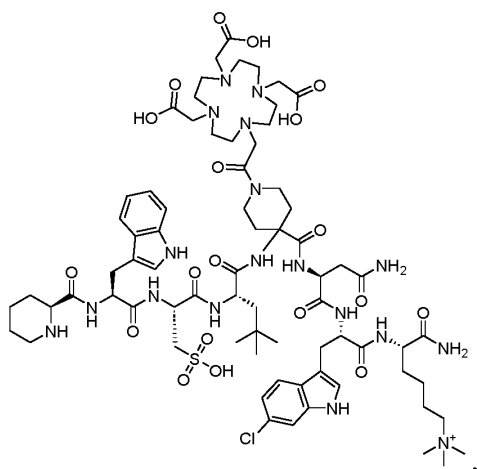
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ead-Cya-Thi-NH₂ (PCAD-204) of the following formula



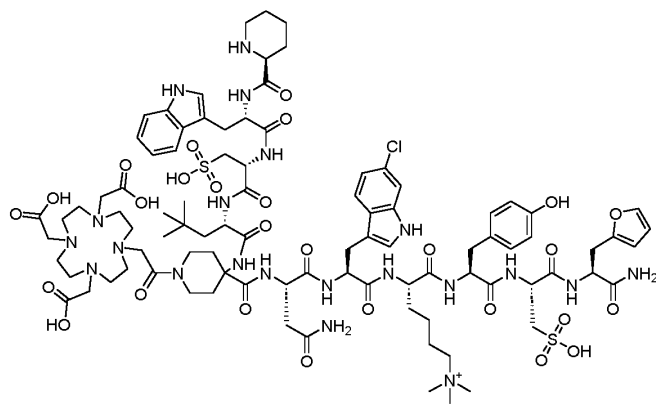
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Gly-Cya-Thi-NH₂ (PCAD-205) of the following formula



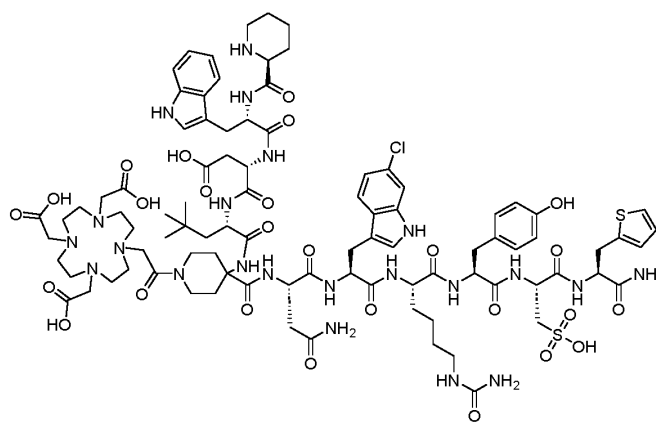
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-NH₂ (PCAD-206) of the following formula



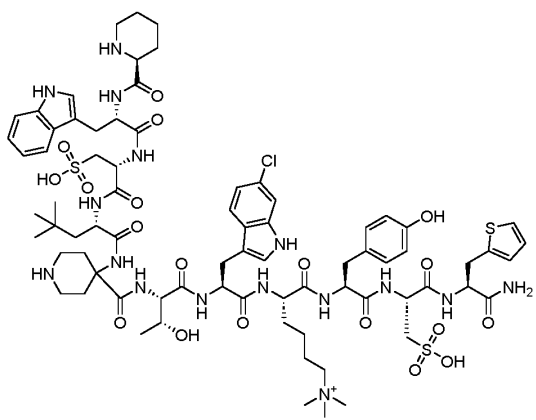
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Fura-NH₂ (PCAD-
5 207) of the following formula



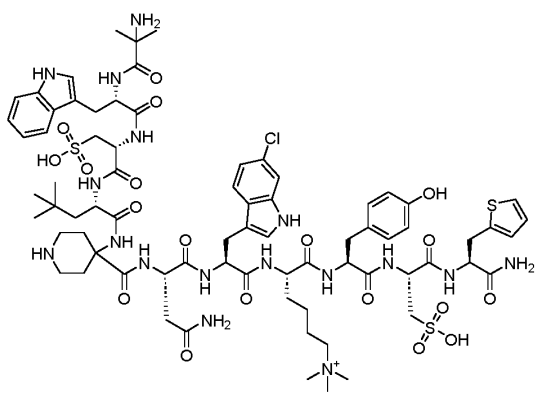
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Hci-Tyr-Cya-Thi-NH₂ (PCAD-208)
of the following formula



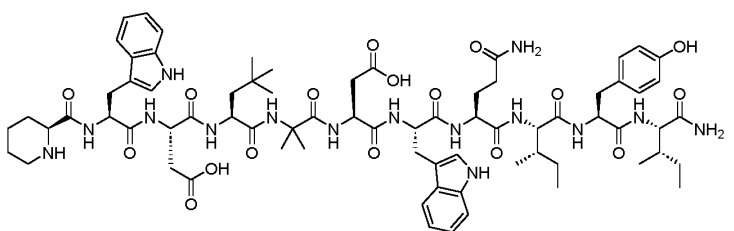
compound H-Pip-Trp-Cya-Npg-Apc-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-212) of the following formula



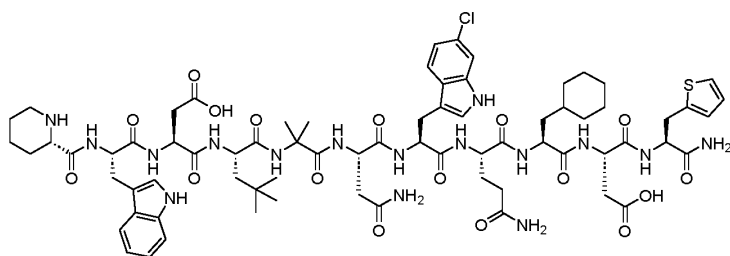
5 compound H-Aib-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-213) of the following formula



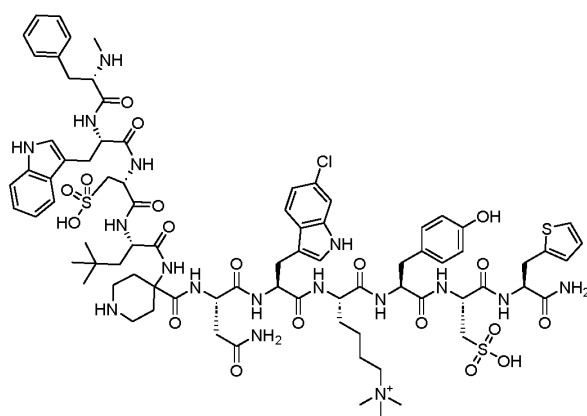
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Ile-NH₂ (PCAD-214) of the following formula



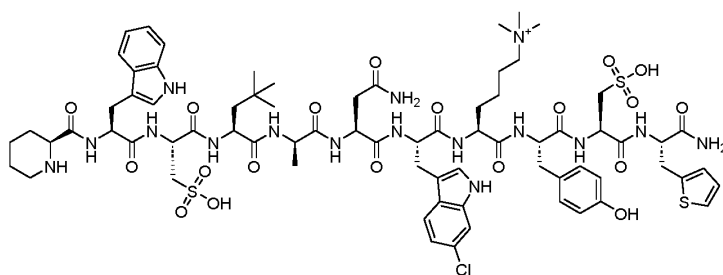
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Cha-Asp-Thi-NH₂ (PCAD-215) of the following formula



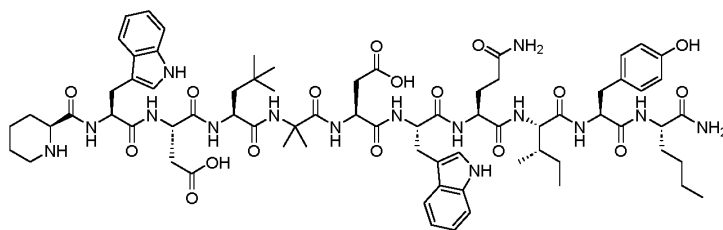
compound H-Nmf-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-216) of the following formula



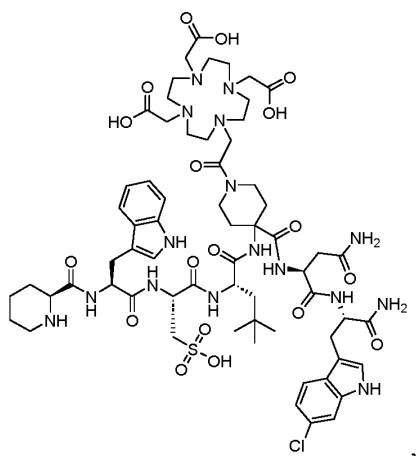
compound H-Pip-Trp-Cya-Npg-ala-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-217) of the following formula



10 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Nle-NH₂ (PCAD-218) of the following formula

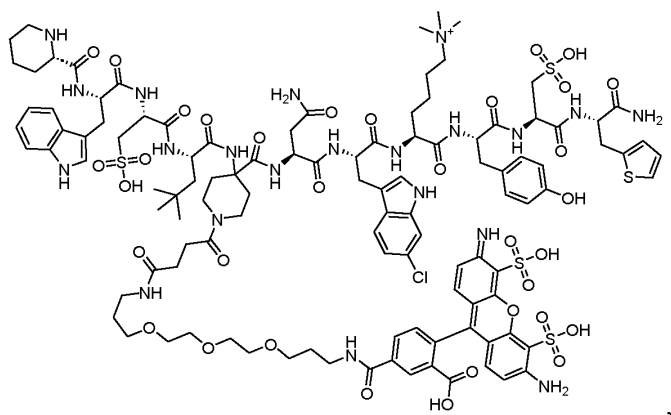


compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-NH₂ (PCAD-219) of the following formula

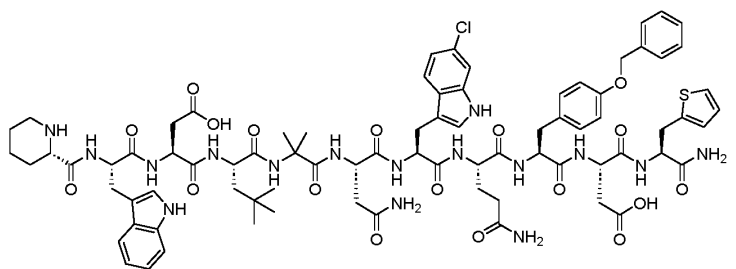


compound H-Pip-Trp-Cya-Npg-Apc(AF488-Ttds)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-221) of the following formula

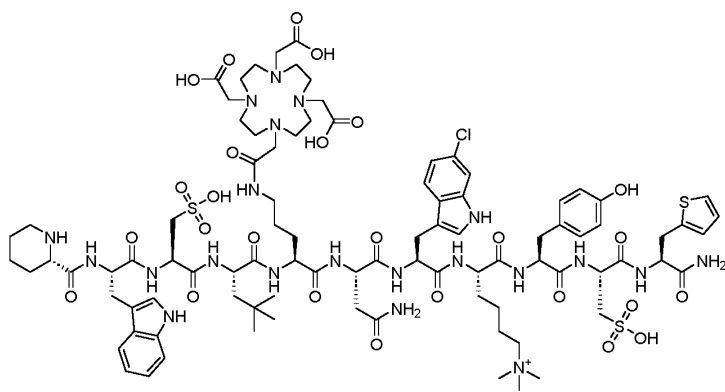
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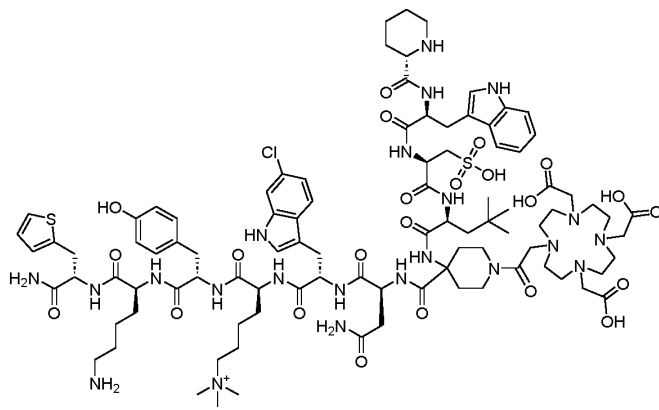
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr(Bzl)-Asp-Thi-NH₂ (PCAD-222) of the following formula



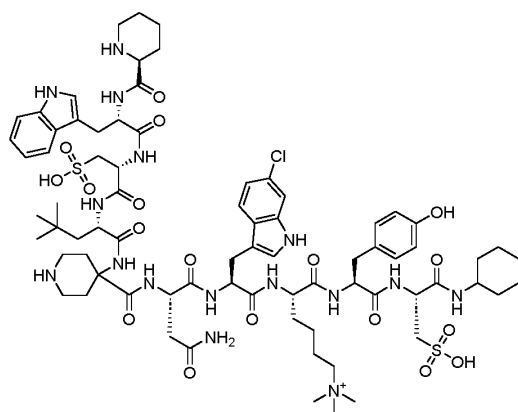
compound H-Pip-Trp-Cya-Npg-Orn(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-223) of the following formula



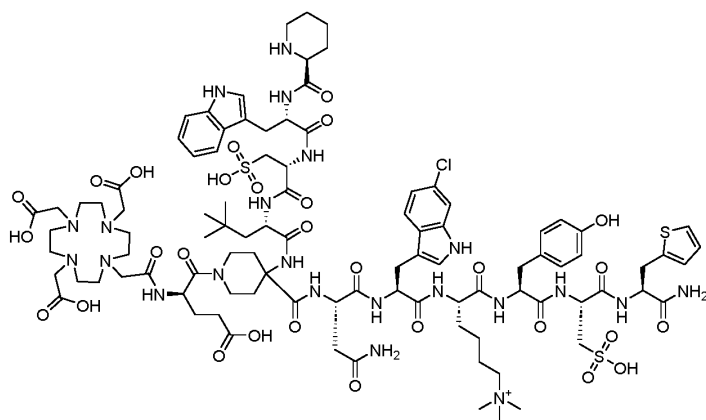
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Lys-Thi-NH₂ (PCAD-224) of the following formula



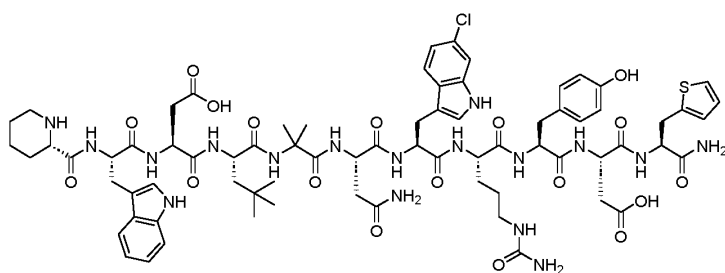
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-NHcHex (PCAD-225) of the following formula



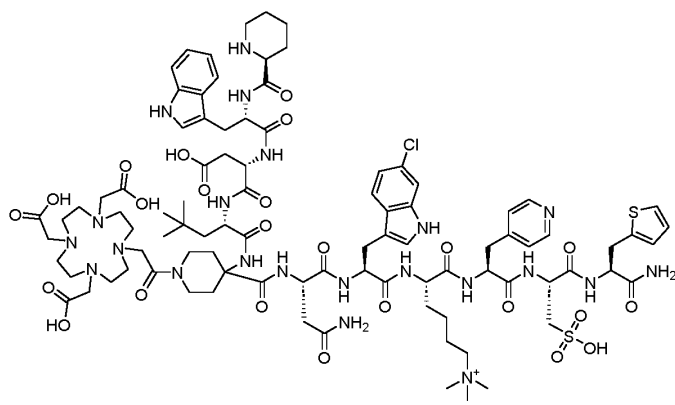
compound H-Pip-Trp-Cya-Npg-Apc(DOTA-glu)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-228) of the following formula



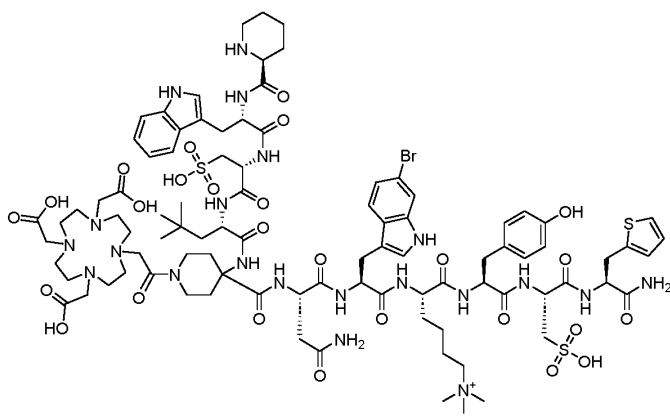
5 compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Cit-Tyr-Asp-Thi-NH₂ (PCAD-229) of the following formula



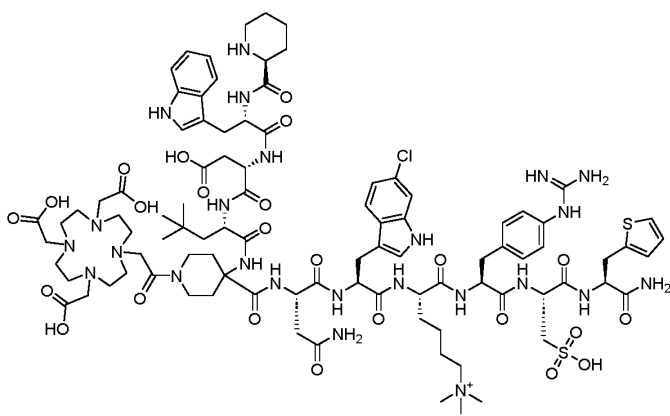
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ppa-Cya-Thi-NH₂ (PCAD-231) of the following formula



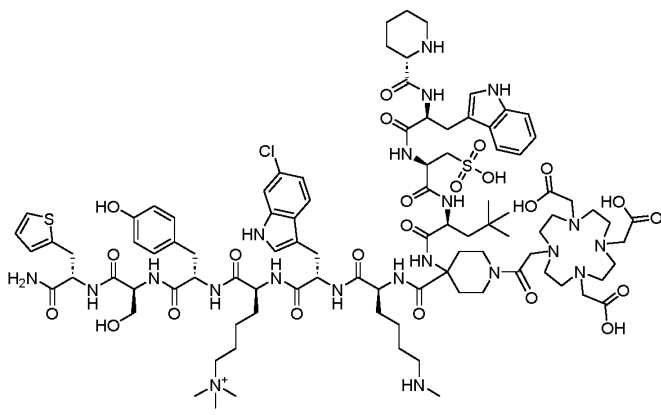
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-232) of the following formula



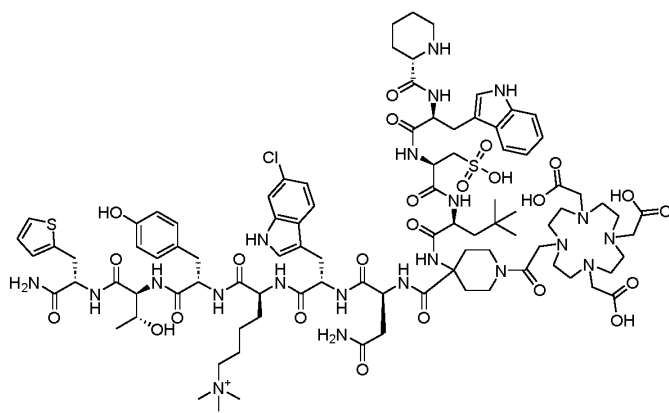
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Guf-Cya-Thi-NH₂ (PCAD-233) of the following formula



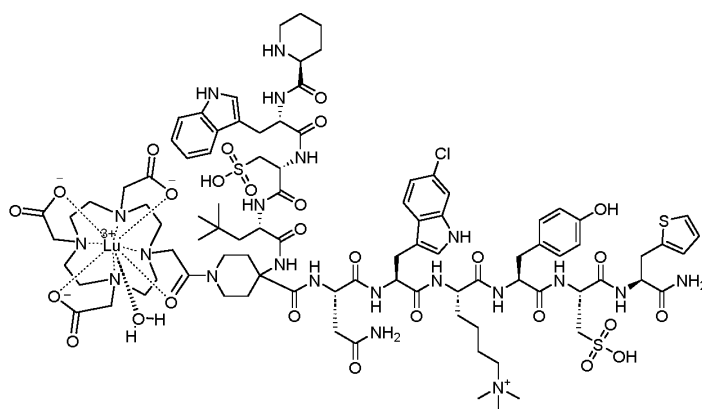
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe3-Tyr-Ser-Thi-NH₂ (PCAD-234) of the following formula



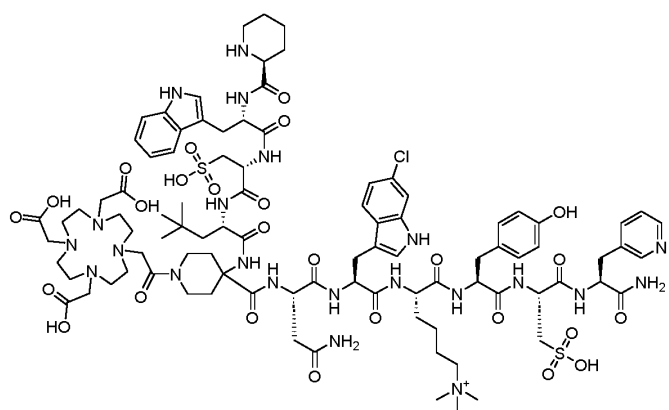
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Thr-Thi-NH₂ (PCAD-236) of the following formula



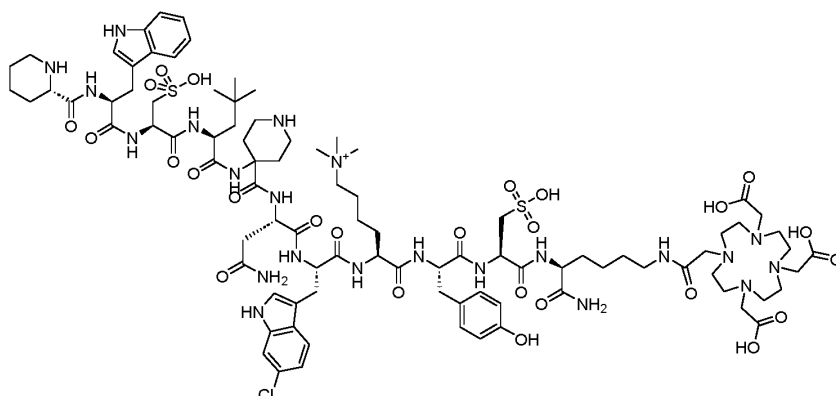
5 compound H-Pip-Trp-Cya-Npg-Apc(LuDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-237) of the following formula



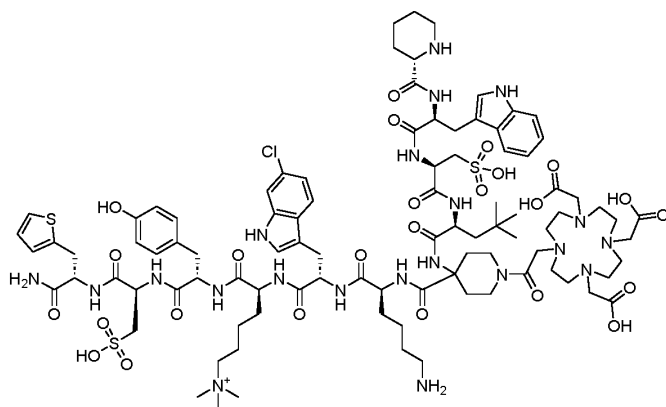
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mpa-NH₂ (PCAD-238) of the following formula



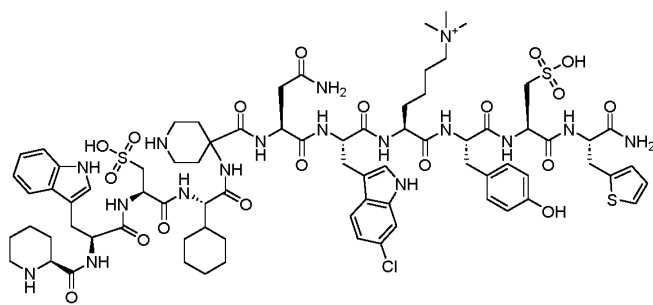
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Lys(DOTA)-NH₂ (PCAD-239) of the following formula



compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-243) of the following formula

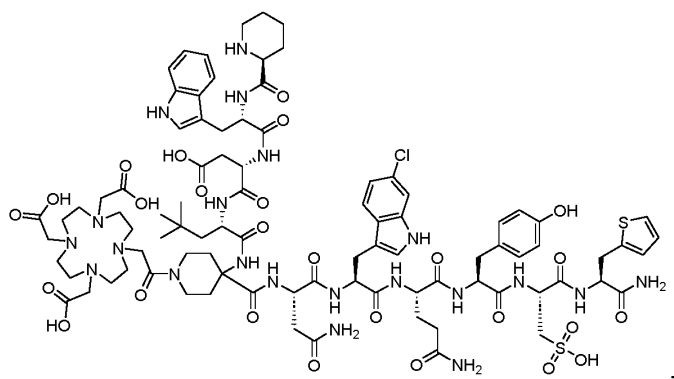


compound H-Pip-Trp-Cya-Chg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-244) of the following formula

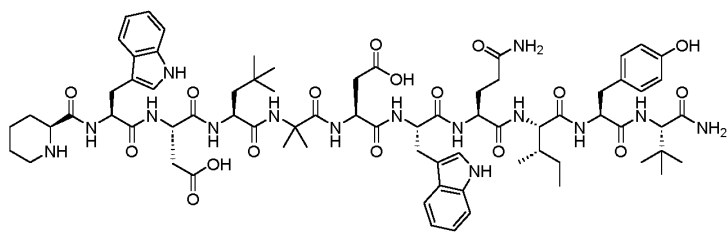


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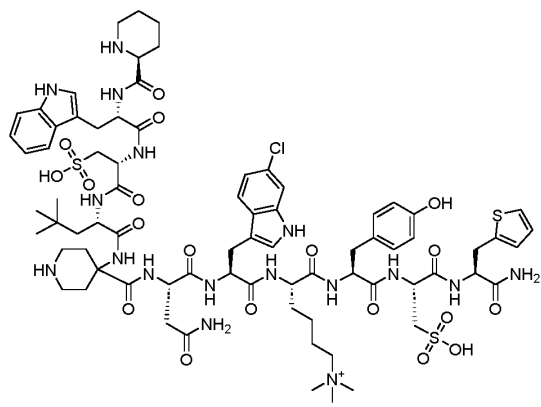
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Cya-Thi-NH₂ (PCAD-250) of the following formula



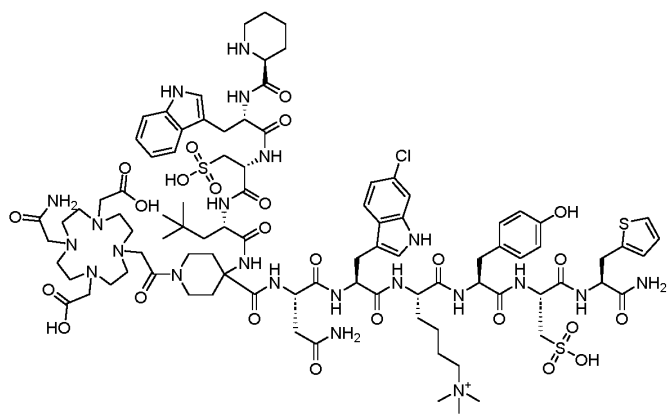
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Tle-NH₂ (PCAD-251) of the following formula



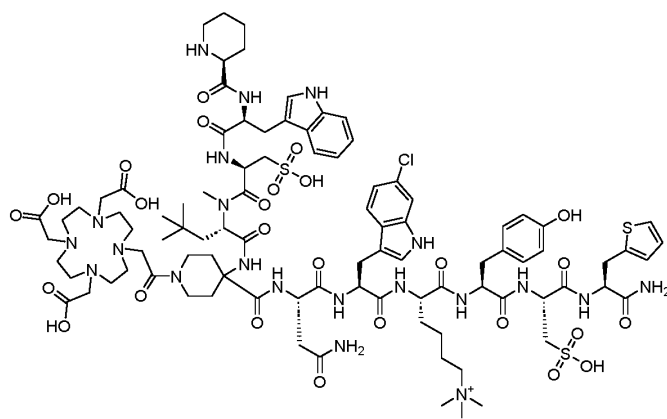
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-252) of the following formula



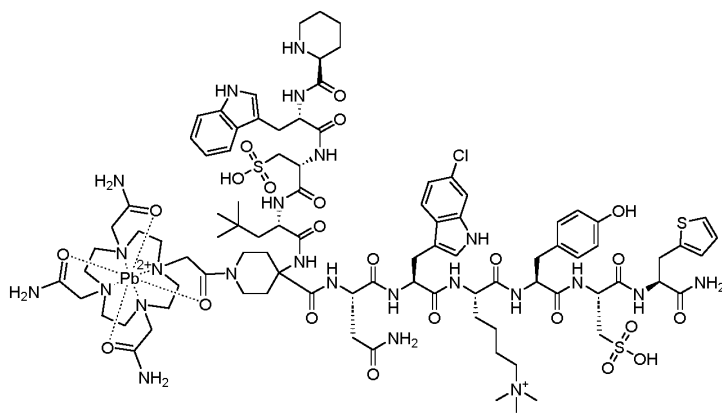
compound H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-253)
of the following formula



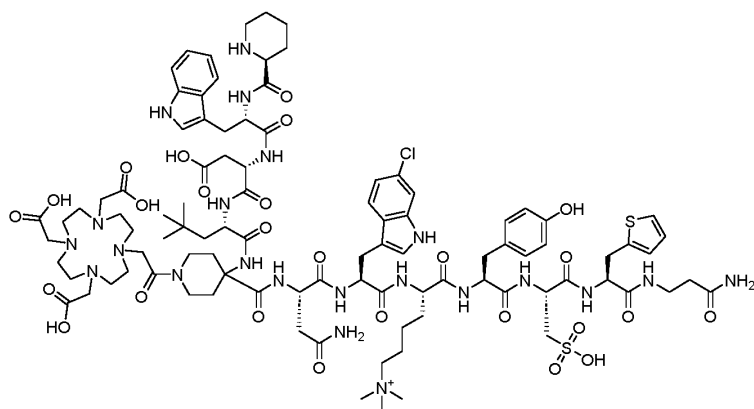
compound H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-
5 255) of the following formula



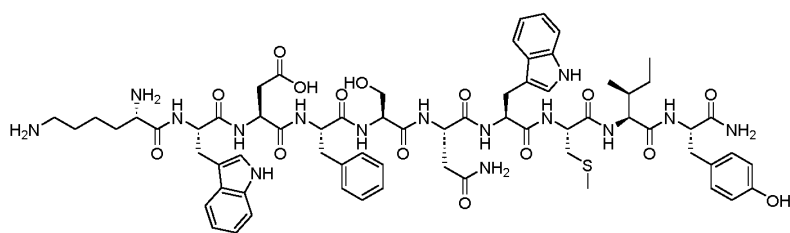
compound H-Pip-Trp-Cya-Npg-Apc(PbDOTAM)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
(PCAD-256) of the following formula



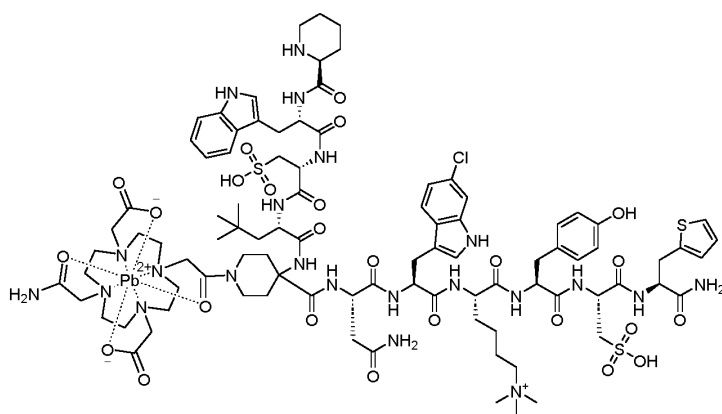
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-Bal-NH₂ (PCAD-257) of the following formula



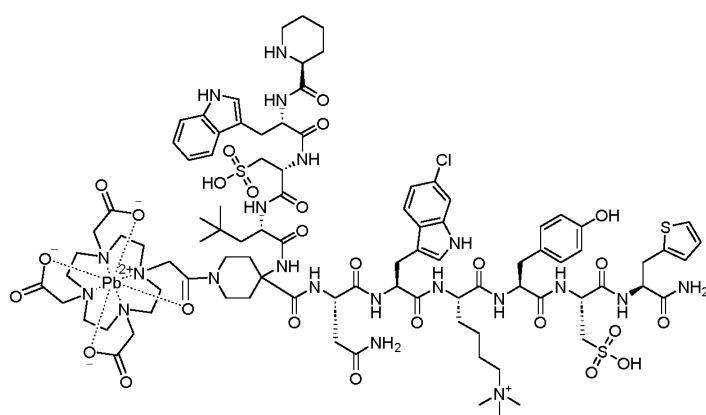
5 compound H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Smc-Ile-Tyr-NH₂ (PCAD-258) of the following formula



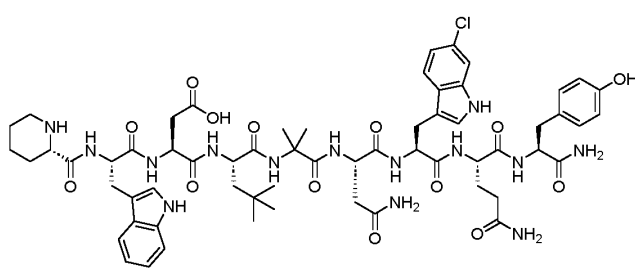
compound H-Pip-Trp-Cya-Npg-Apc(PbPSC)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-259) of the following formula



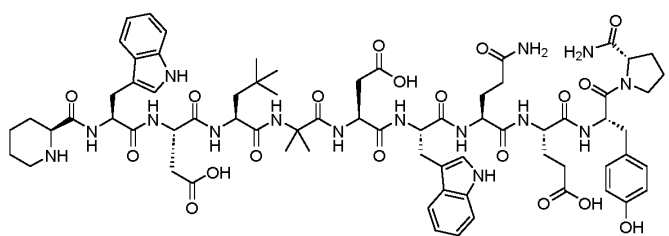
10 compound H-Pip-Trp-Cya-Npg-Apc(PbDOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-260) of the following formula



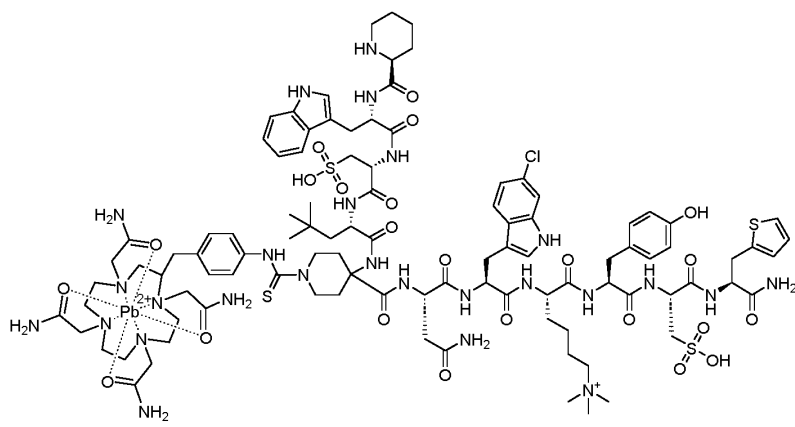
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NH₂ (PCAD-261) of the following formula



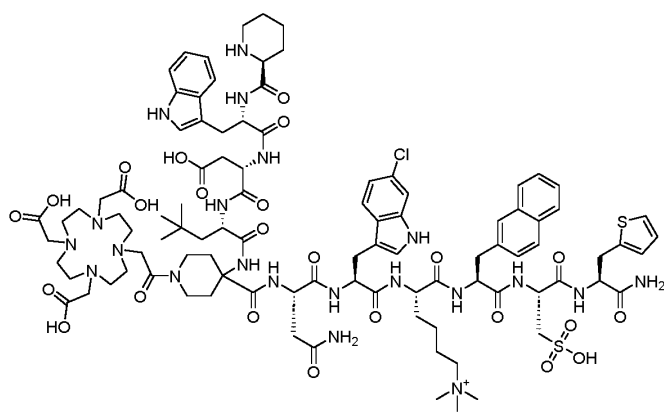
- 5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Glu-Tyr-Pro-NH₂ (PCAD-262) of the following formula



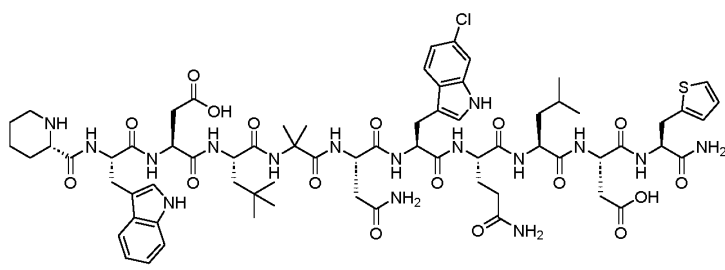
compound H-Pip-Trp-Cya-Npg-Apc(PbBnTCMC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
(PCAD-263) of the following formula



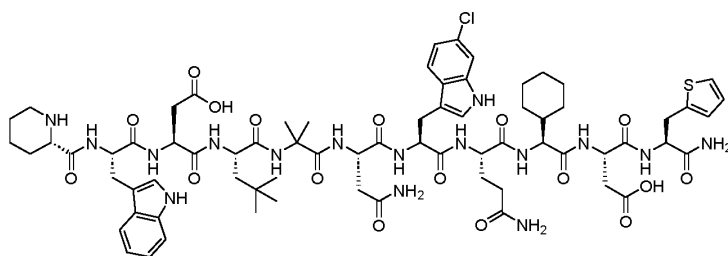
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-2Ni-Cya-Thi-NH₂ (PCAD-
5 264) of the following formula



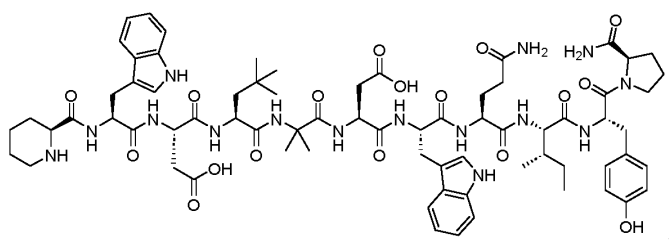
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Leu-Asp-Thi-NH₂ (PCAD-265) of the
following formula



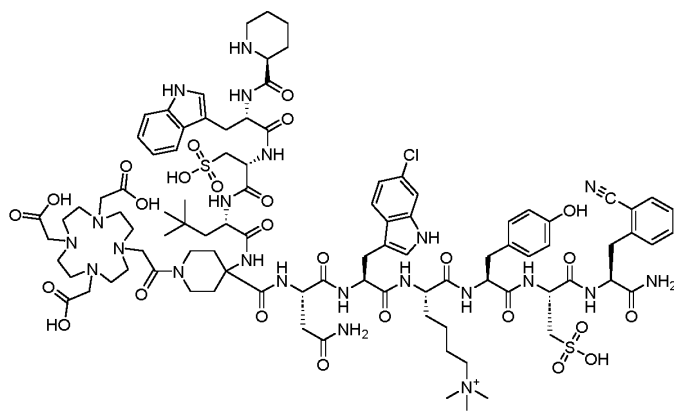
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Chg-Asp-Thi-NH₂ (PCAD-267) of the following formula



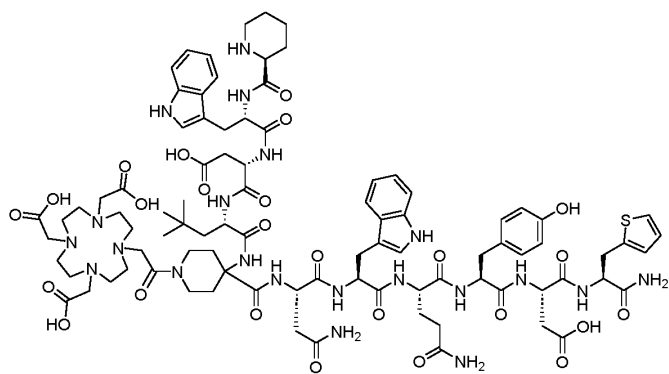
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-pro-NH₂ (PCAD-268) of the following formula



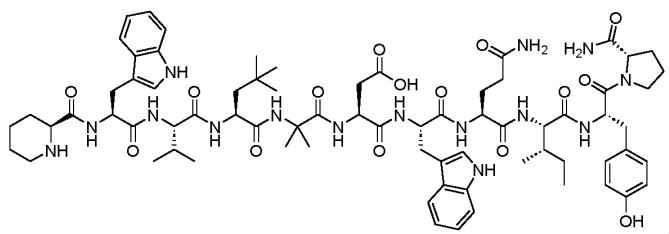
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Onf-NH₂ (PCAD-273) of the following formula



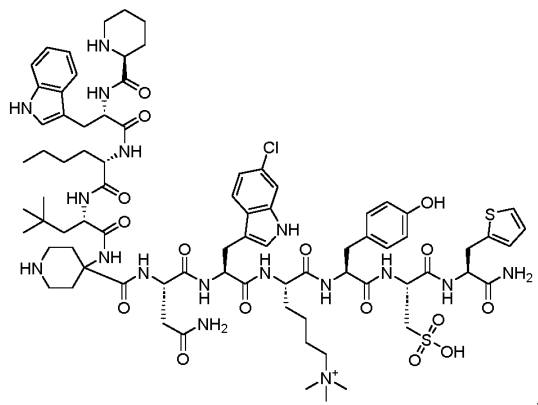
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Thi-NH₂ (PCAD-275) of the following formula



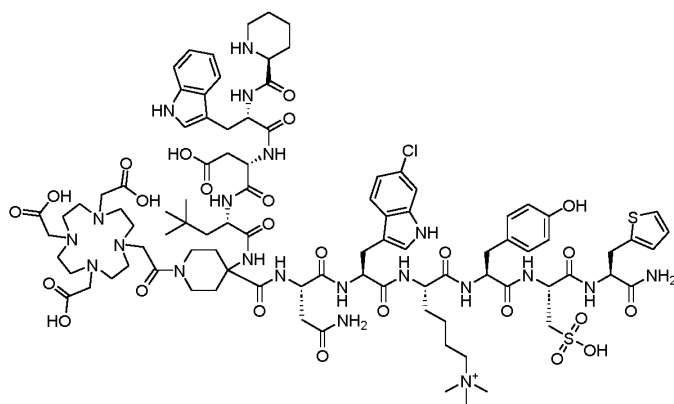
5 compound H-Pip-Trp-Val-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-277) of the following formula



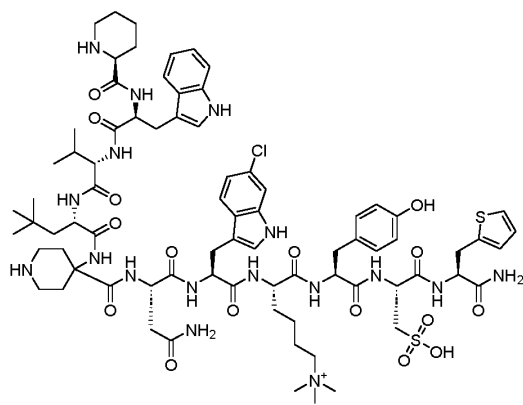
compound H-Pip-Trp-Nle-Npg-Apc-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-278) of the following formula



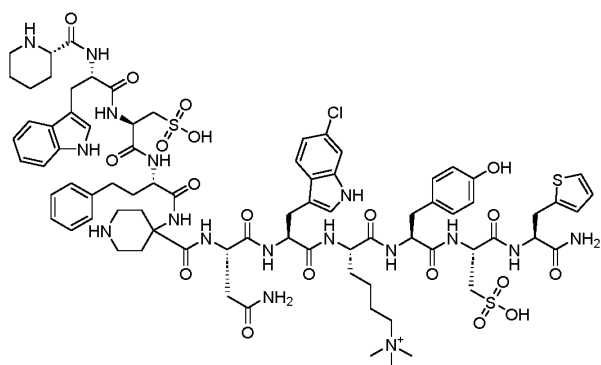
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-279) of the following formula



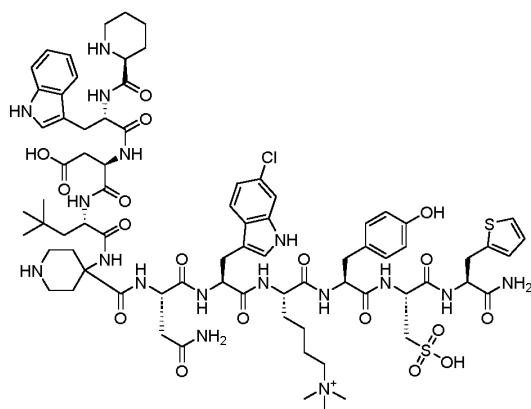
5 compound H-Pip-Trp-Val-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-280) of the following formula



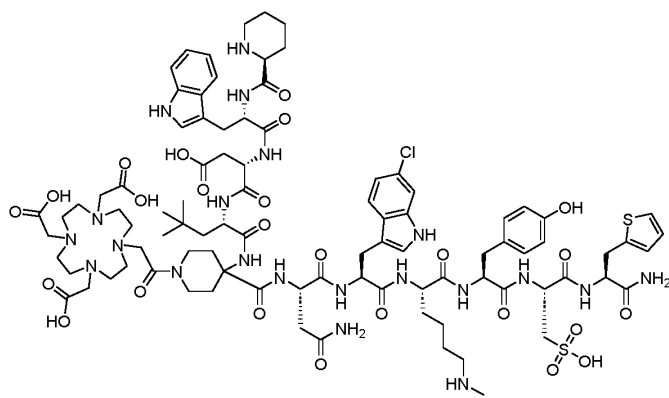
compound H-Pip-Trp-Cya-Hfe-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-281) of the following formula



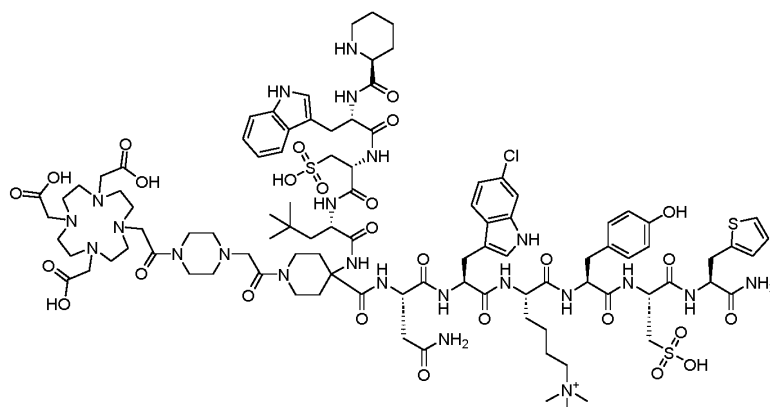
compound H-Pip-Trp-asp-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-282) of the following formula



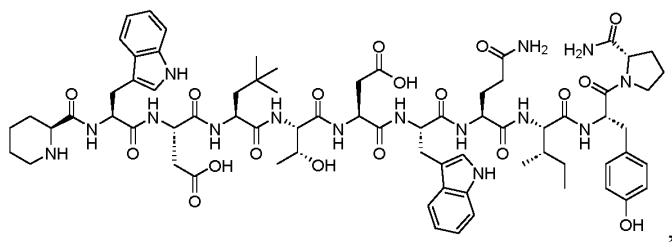
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH₂ (PCAD-283) of the following formula



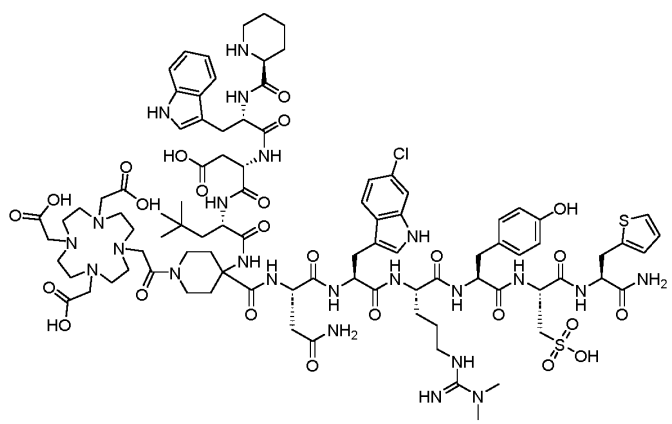
compound H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-284) of the following formula



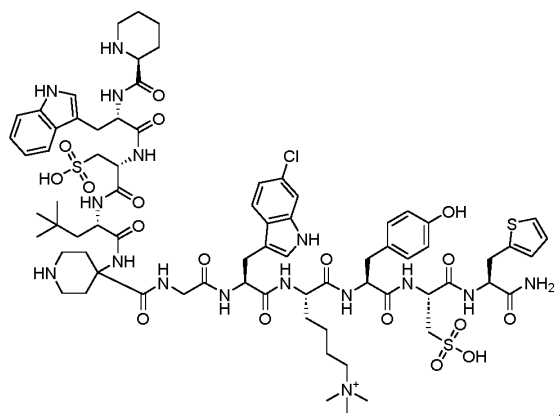
compound H-Pip-Trp-Asp-Npg-Thr-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-288) of the following formula



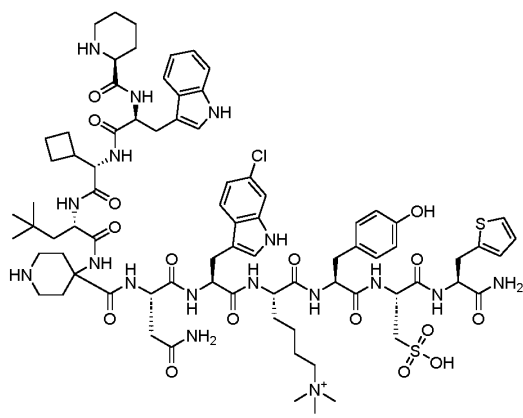
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH₂ (PCAD-
5 289) of the following formula



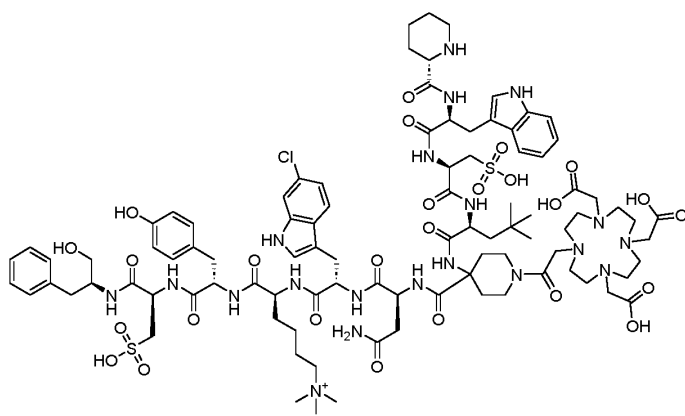
compound H-Pip-Trp-Cya-Npg-Apc-Gly-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-294) of the following formula



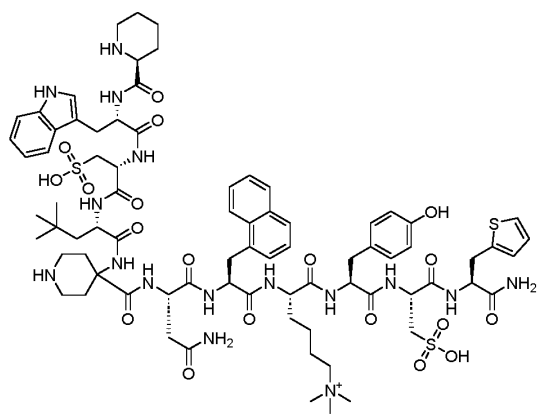
compound H-Pip-Trp-Cbg-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-295) of the following formula



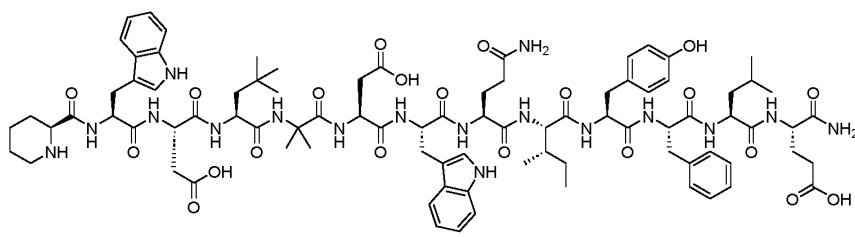
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Pheol-OH (PCAD-296) of the following formula



compound H-Pip-Trp-Cya-Npg-Apc-Asn-1Ni-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-297) of the following formula

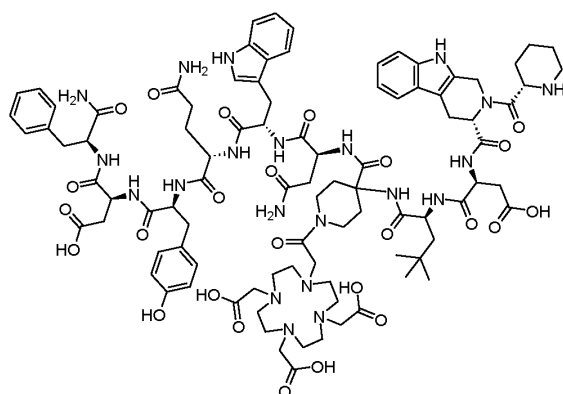


compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Phe-Leu-Glu-NH₂ (PCAD-298) of the following formula

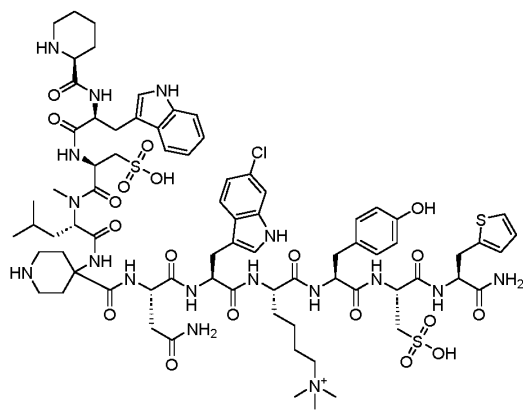


compound H-Pip-Tpi-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH₂ (PCAD-300) of the following formula

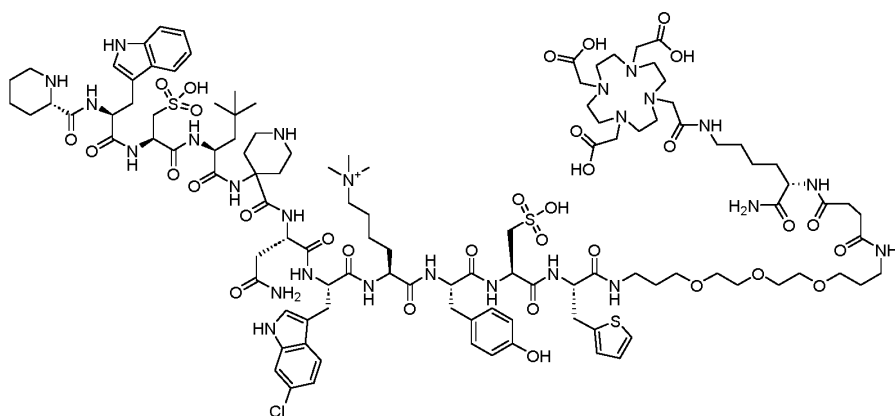
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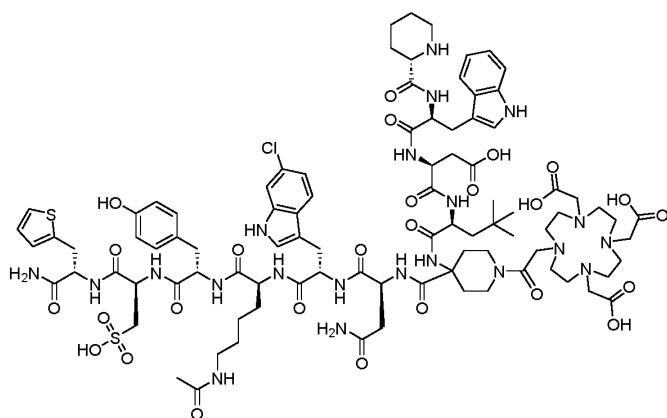
compound H-Pip-Trp-Cya-Nml-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-301) of the following formula



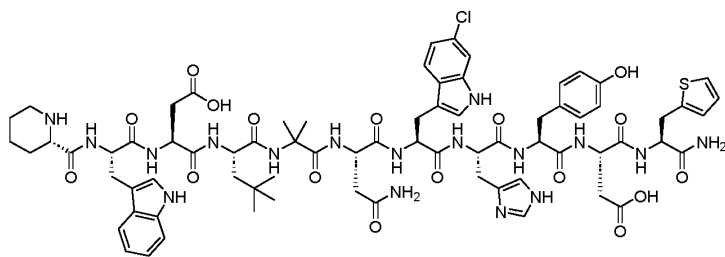
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-Ttds-Lys(DOTA)-NH₂ (PCAD-303) of the following formula



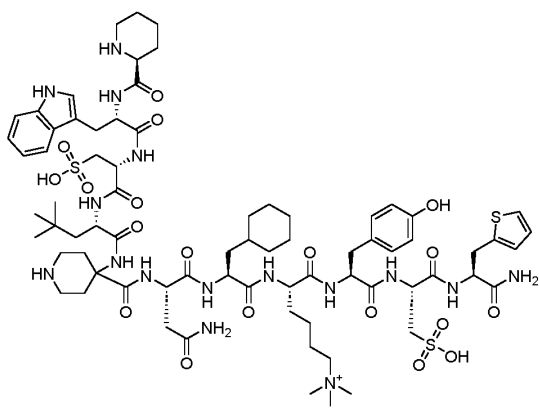
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Ac)-Tyr-Cya-Thi-NH₂ (PCAD-304) of the following formula



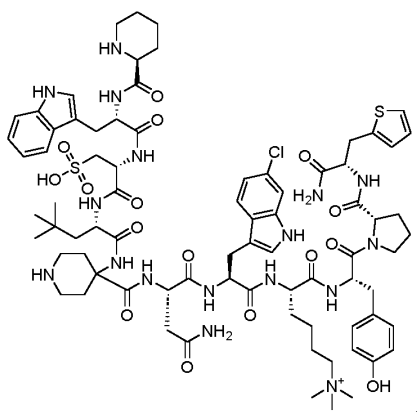
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-His-Tyr-Asp-Thi-NH₂ (PCAD-305) of the following formula



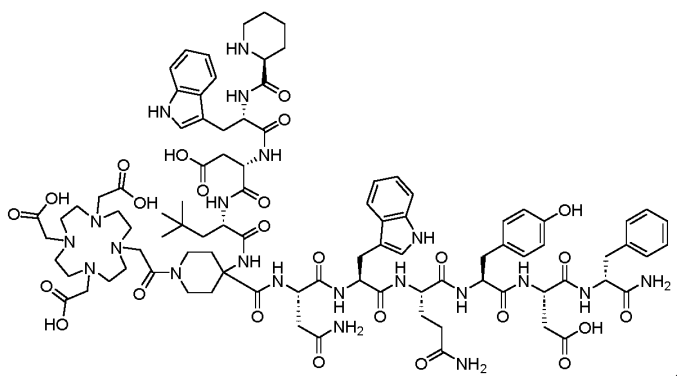
compound H-Pip-Trp-Cya-Npg-Apc-Asn-Cha-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-306) of the following formula



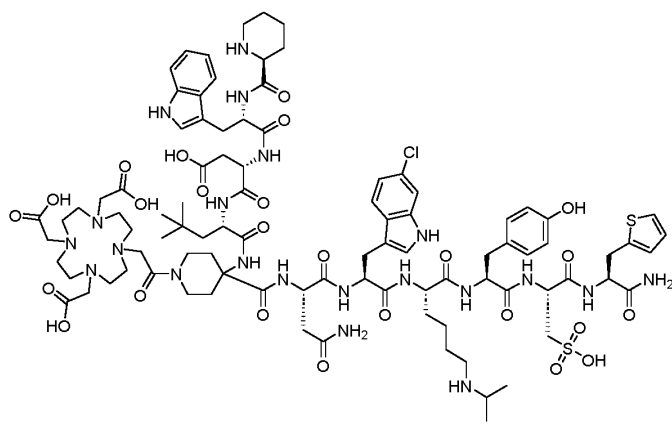
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Pro-Thi-NH₂ (PCAD-307) of the
5 following formula



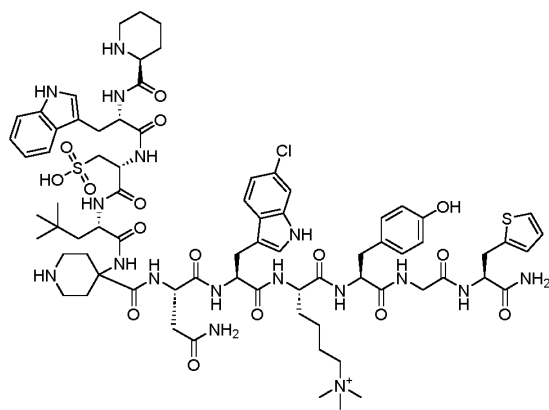
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-phe-NH₂ (PCAD-308) of the following formula



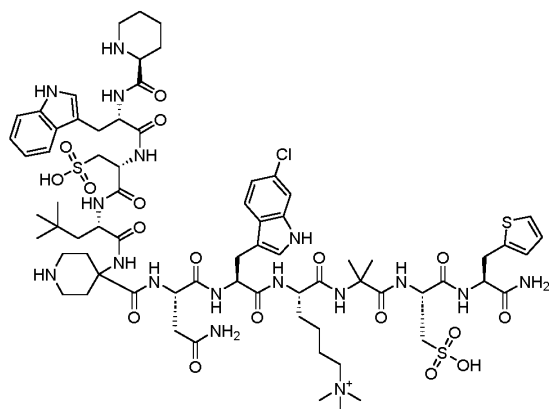
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂ (PCAD-309) of the following formula



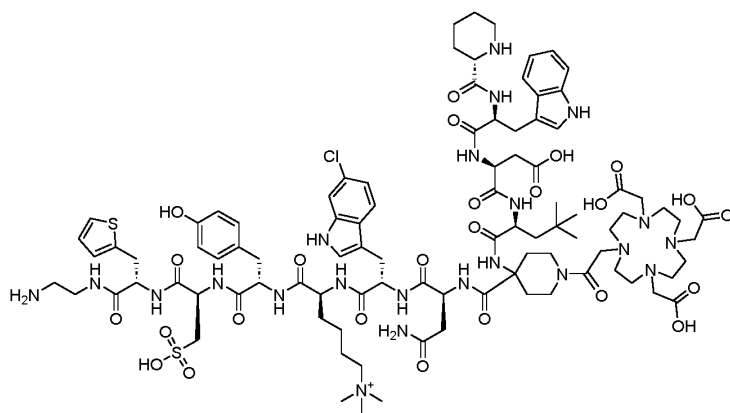
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Gly-Thi-NH₂ (PCAD-310) of the following formula



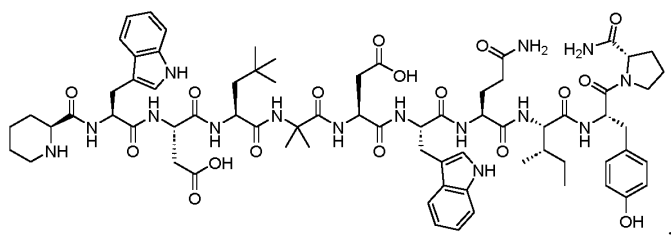
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Aib-Cya-Thi-NH₂ (PCAD-311) of the following formula



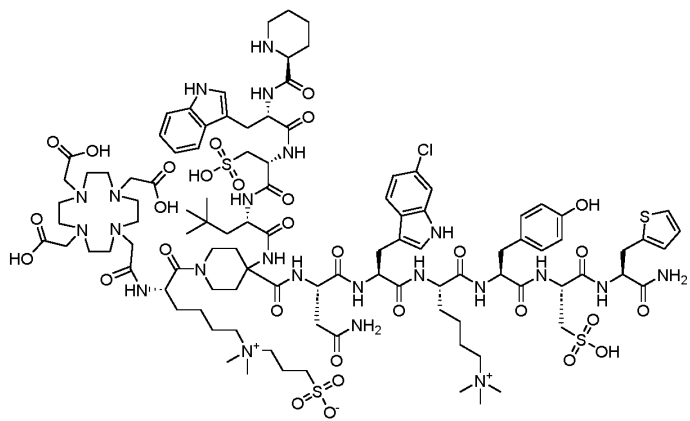
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-en (PCAD-312) of the following formula



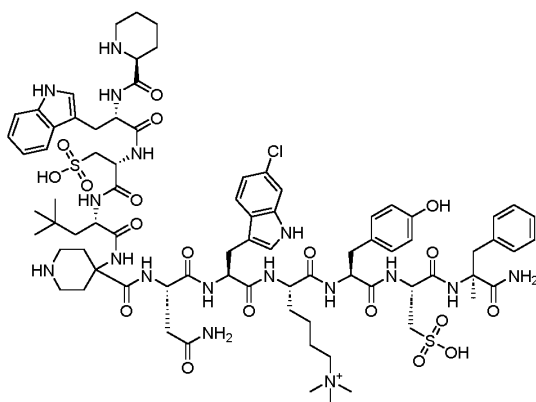
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-313) of the following formula



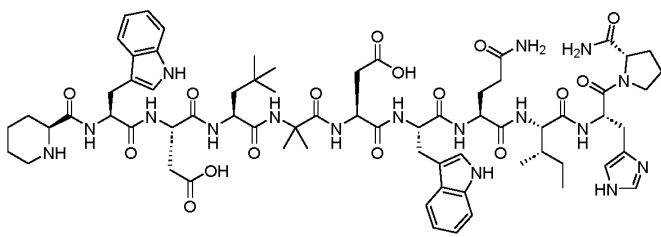
compound H-Pip-Trp-Cya-Npg-Apc(DOTA-Kzw)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-314) of the following formula



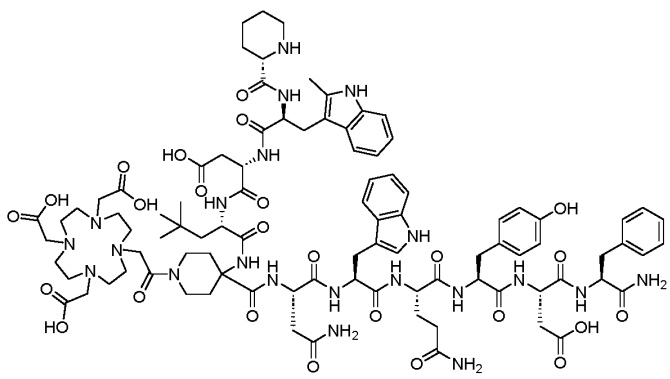
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Amf-NH₂ (PCAD-316) of the following formula



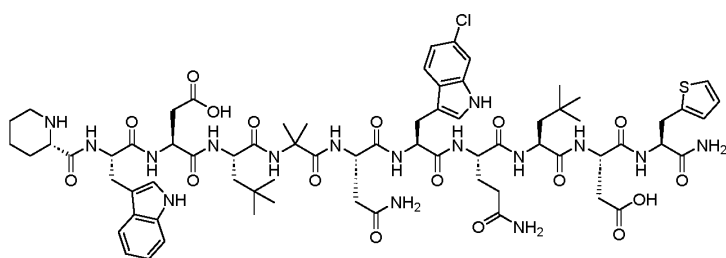
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-His-Pro-NH₂ (PCAD-318) of the following formula



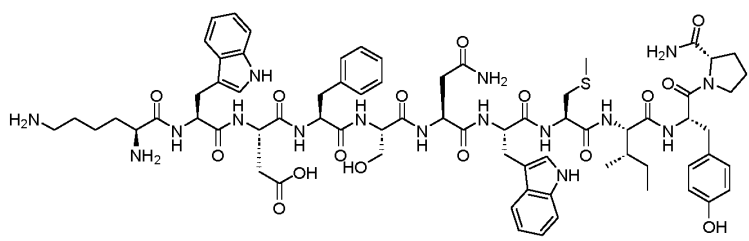
compound H-Pip-Mw2-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH₂ (PCAD-319) of the following formula



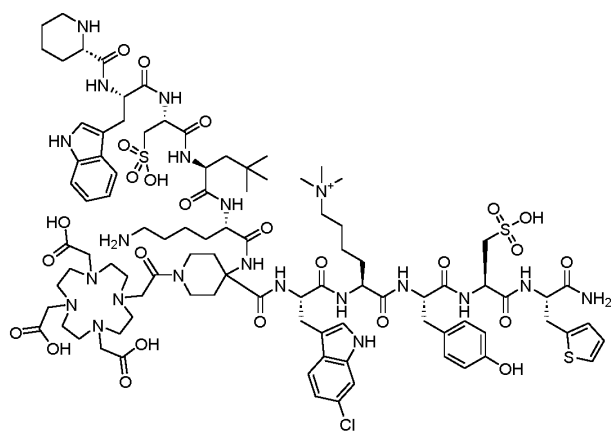
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Npg-Asp-Thi-NH₂ (PCAD-320) of the following formula



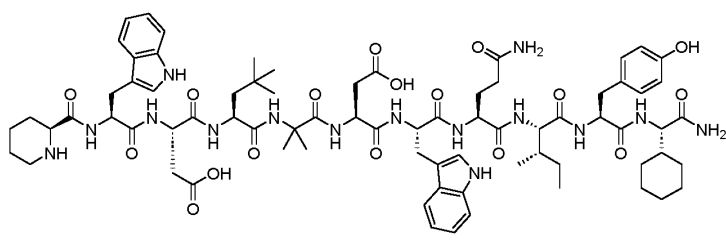
5 compound H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Smc-Ile-Tyr-Pro-NH₂ (PCAD-321) of the following formula



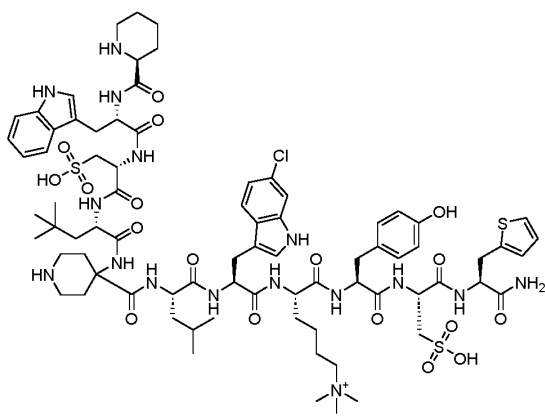
compound H-Pip-Trp-Cya-Npg-Lys-Apc(DOTA)-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-322) of the following formula



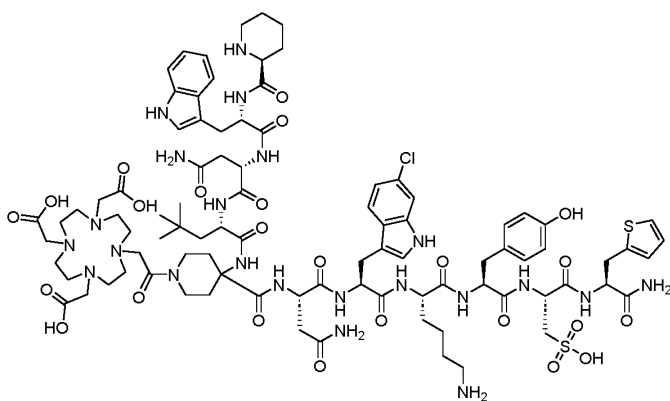
10 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Chg-NH₂ (PCAD-323) of the following formula



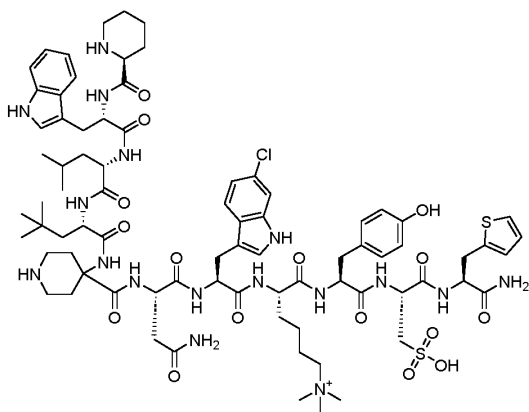
compound H-Pip-Trp-Cya-Npg-Apc-Leu-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-325) of the following formula



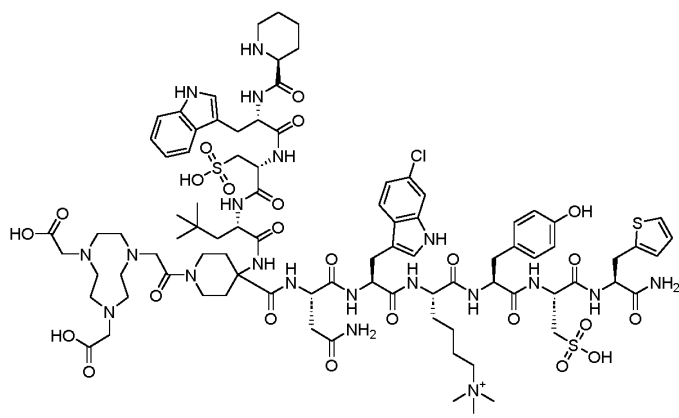
compound H-Pip-Trp-Asn-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂ (PCAD-327)
of the following formula



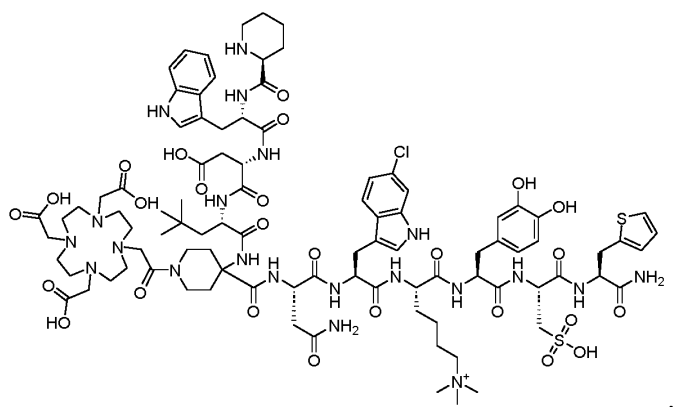
compound H-Pip-Trp-Leu-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-328) of the following formula



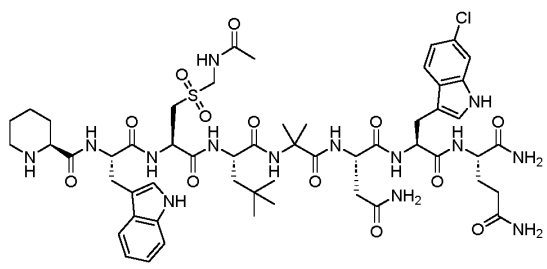
compound H-Pip-Trp-Cya-Npg-Apc(NOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-333) of the following formula



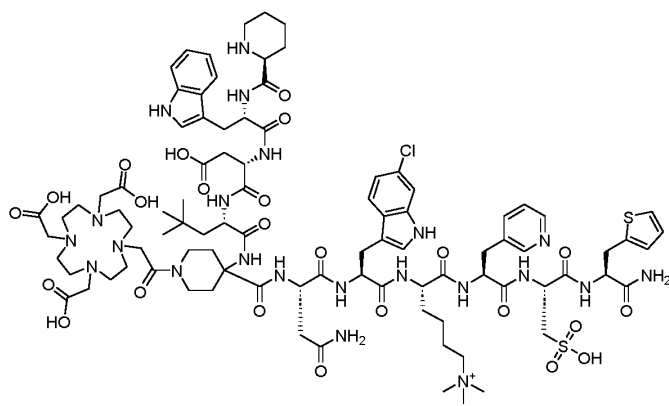
5 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Dopa-Cya-Thi-NH₂ (PCAD-334) of the following formula



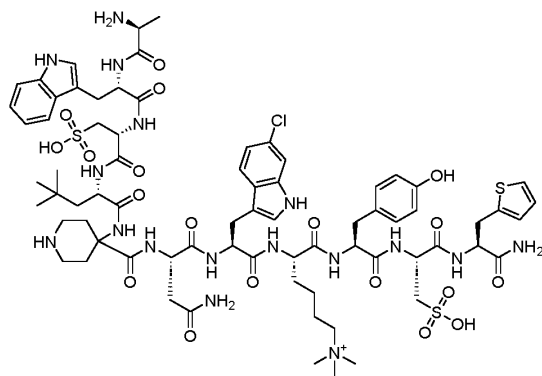
compound H-Pip-Trp-Eep-Npg-Aib-Asn-6Clw-Gln-NH₂ (PCAD-336) of the following formula



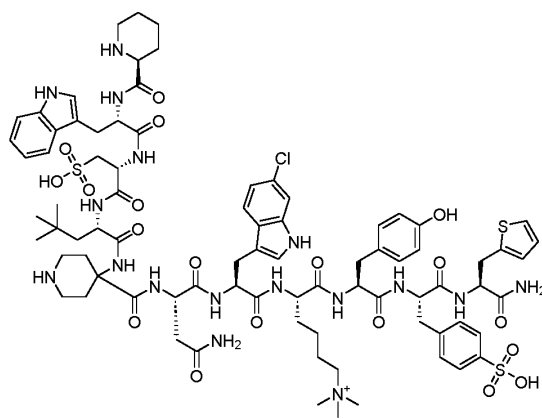
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Mpa-Cya-Thi-NH₂ (PCAD-342) of the following formula



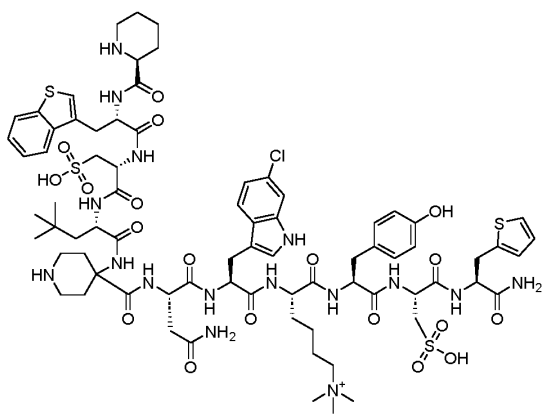
5 compound H-Ala-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-343) of the following formula



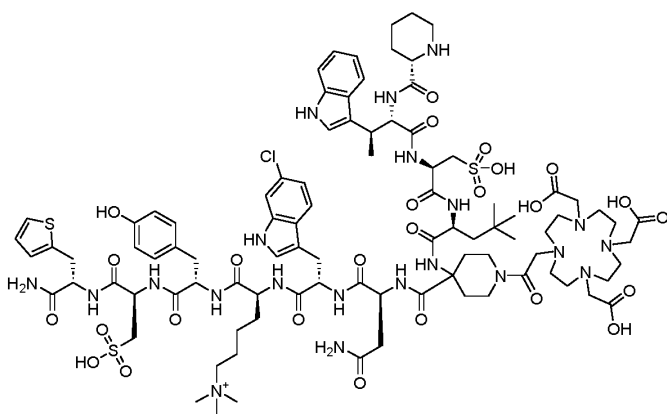
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Fso-Thi-NH₂ (PCAD-344) of the following formula



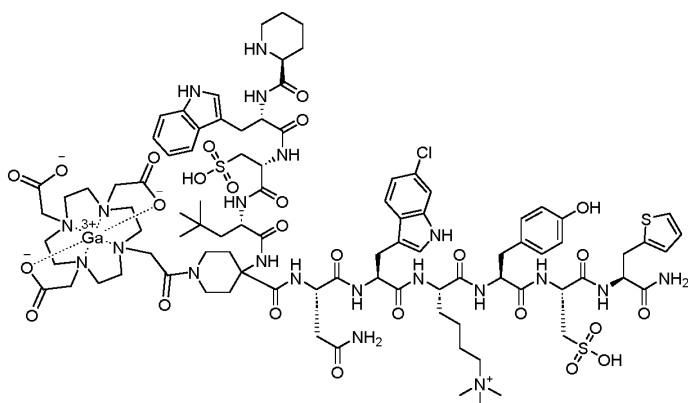
compound H-Pip-Bta-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-347) of the following formula



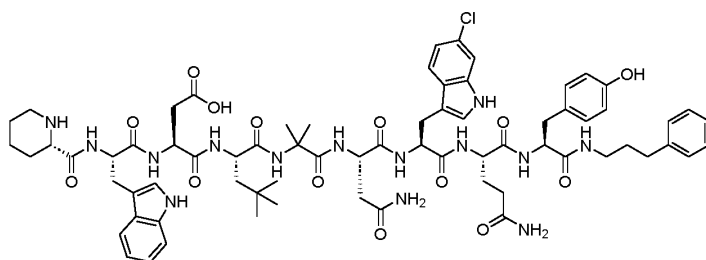
compound H-Pip-Bmw-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-
5 349) of the following formula



compound H-Pip-Trp-Cya-Npg-Apc(GaDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-350) of the following formula

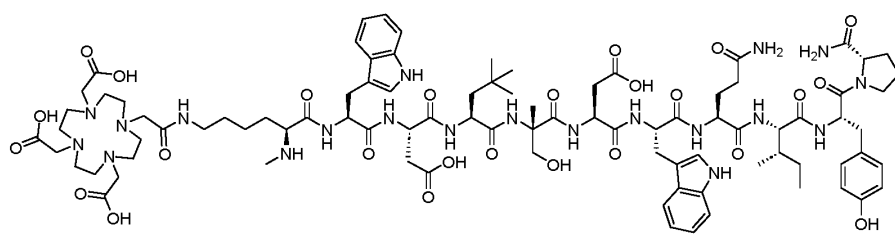


compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NHPrPh (PCAD-351) of the following formula

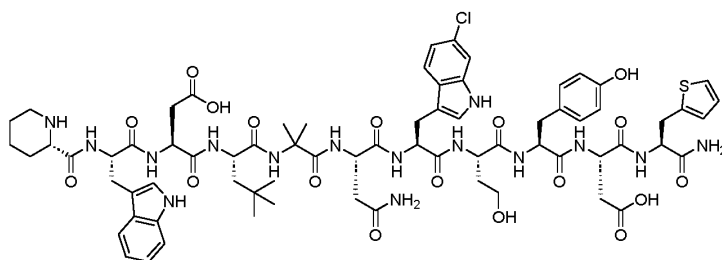


compound H-Nmk(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-353)

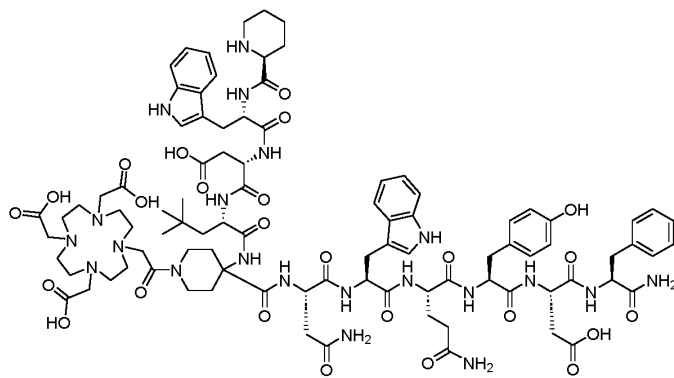
5 of the following formula



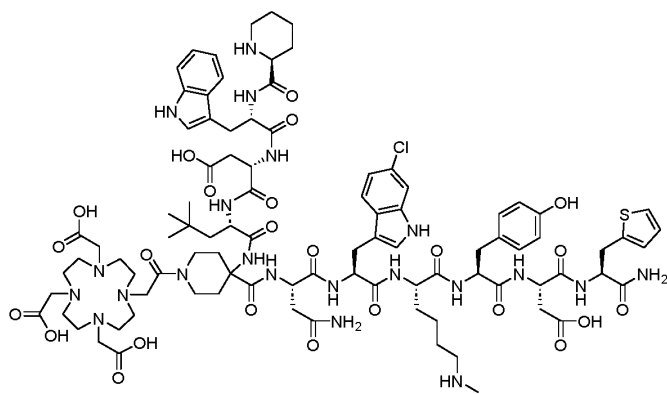
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Hse-Tyr-Asp-Thi-NH₂ (PCAD-355) of the following formula



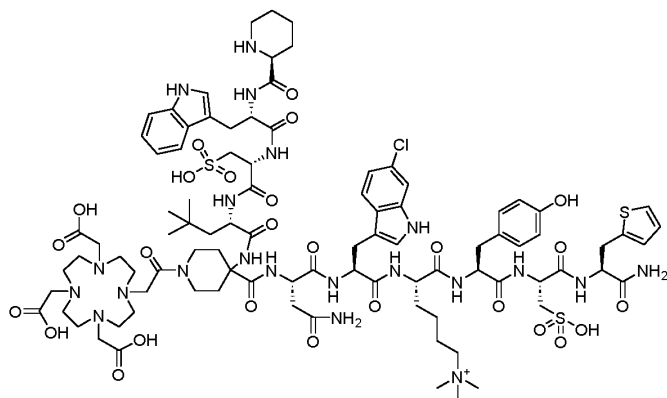
10 compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH₂ (PCAD-356) of the following formula



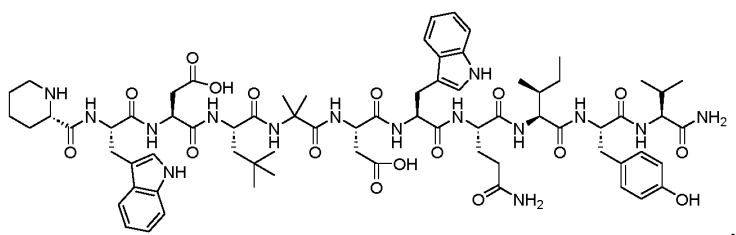
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH₂ (PCAD-357) of the following formula



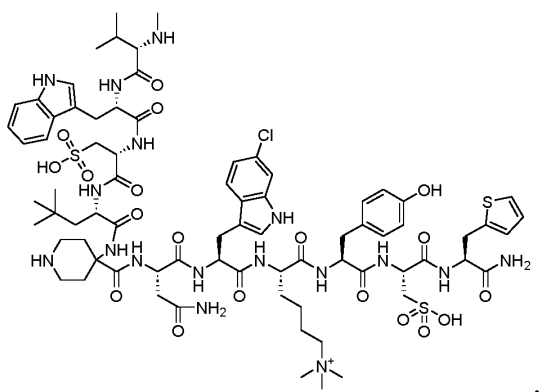
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-359) of the following formula



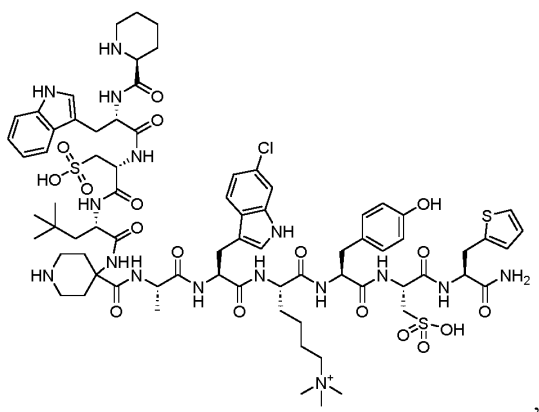
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Val-NH₂ (PCAD-360) of the following formula



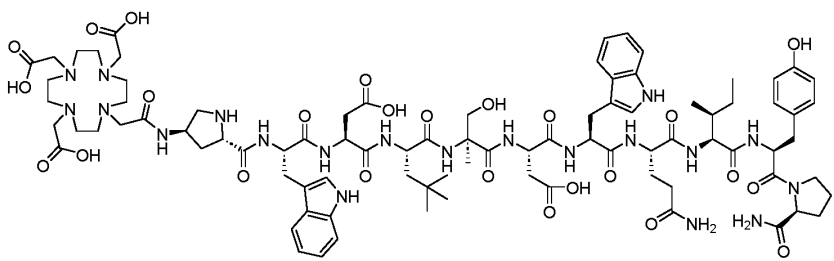
compound H-Nmv-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-362) of the following formula



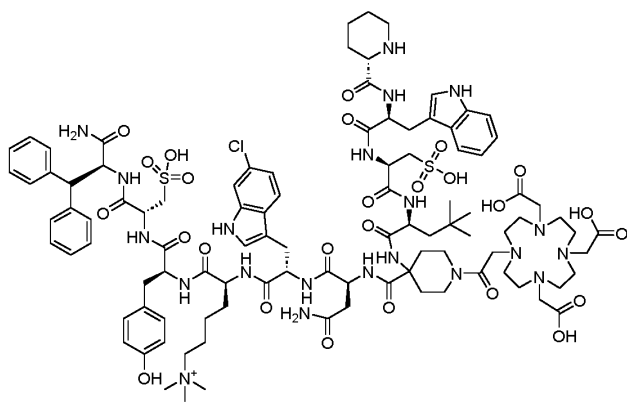
5 compound H-Pip-Trp-Cya-Npg-Apc-Ala-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-364) of the following formula



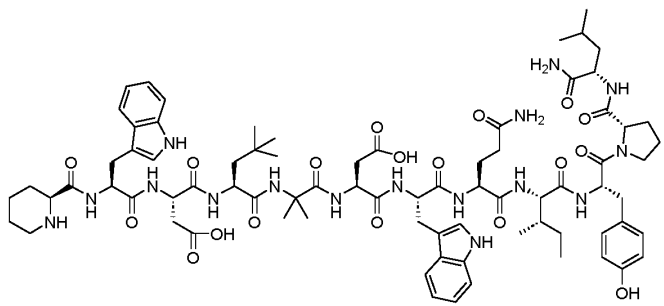
compound H-Tap(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-365) of the following formula



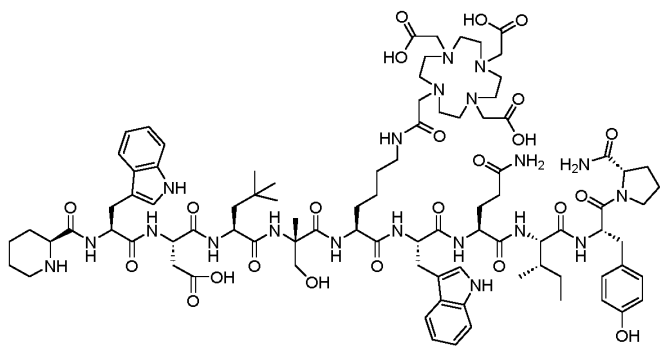
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Dip-NH₂ (PCAD-366) of the following formula



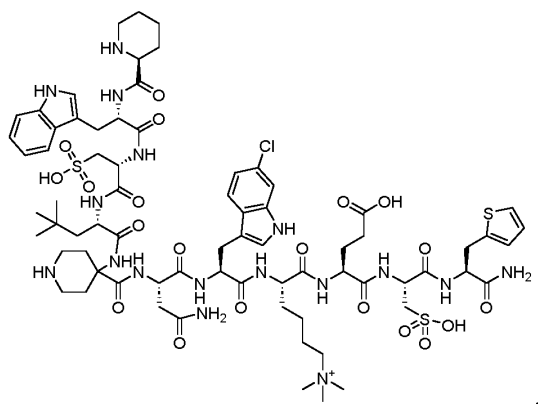
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-Leu-NH₂ (PCAD-367) of the following formula



compound H-Pip-Trp-Asp-Npg-Ams-Lys(DOTA)-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-368) of the following formula

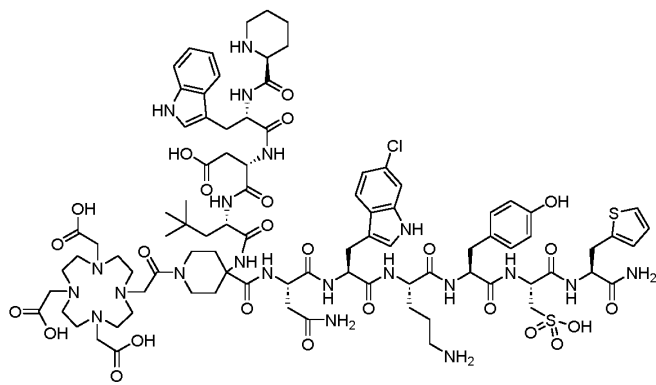


compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Glu-Cya-Thi-NH₂ (PCAD-369) of the following formula

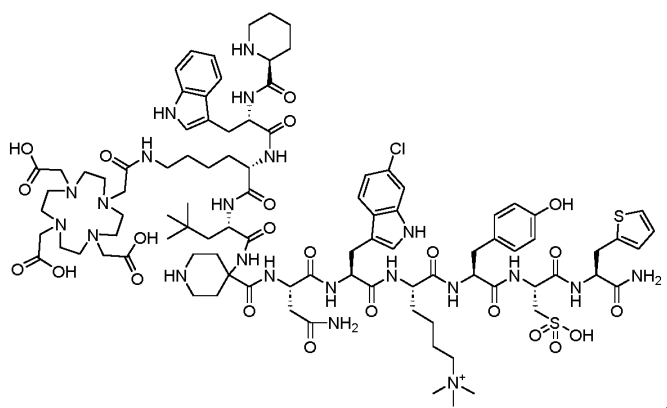


compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂ (PCAD-371)

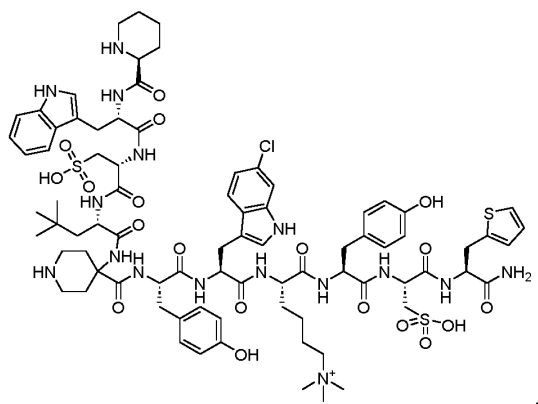
5 of the following formula



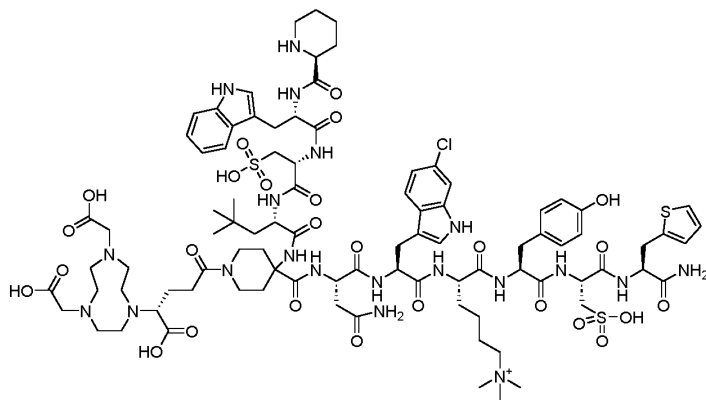
compound H-Pip-Trp-Lys(DOTA)-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-372) of the following formula



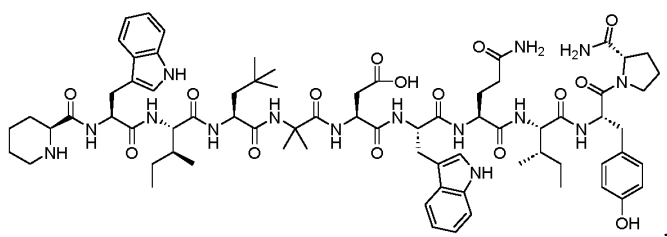
compound H-Pip-Trp-Cya-Npg-Apc-Tyr-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-373) of the following formula



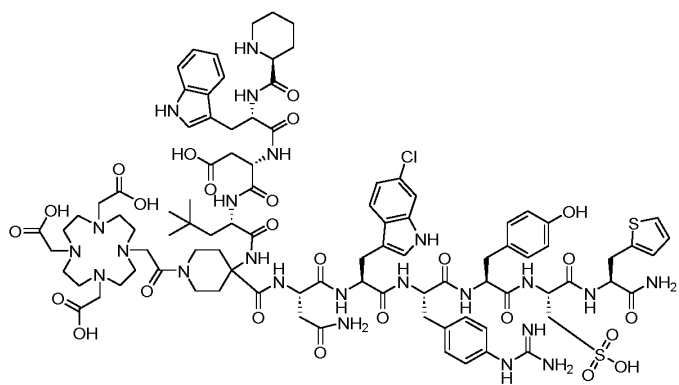
compound H-Pip-Trp-Cya-Npg-Apc(NODAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-375) of the following formula



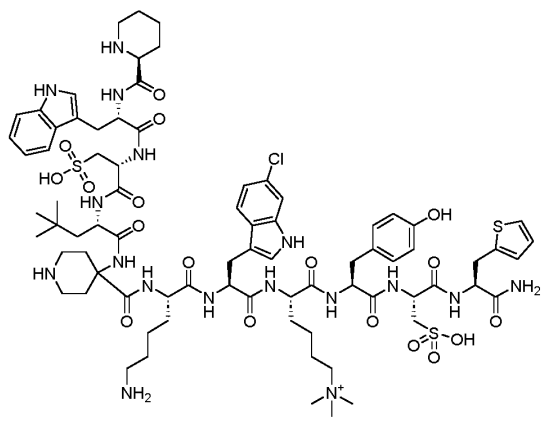
compound H-Pip-Trp-Ile-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-376) of the following formula



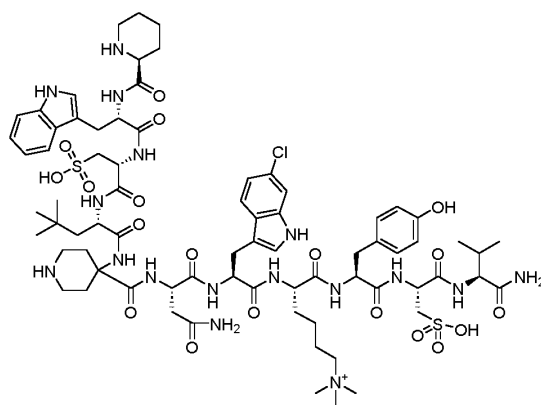
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Guf-Tyr-Cya-Thi-NH₂ (PCAD-378) of the following formula



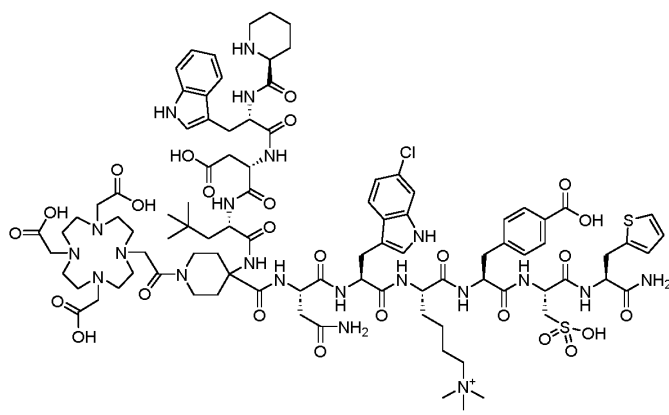
5 compound H-Pip-Trp-Cya-Npg-Apc-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-380) of the following formula



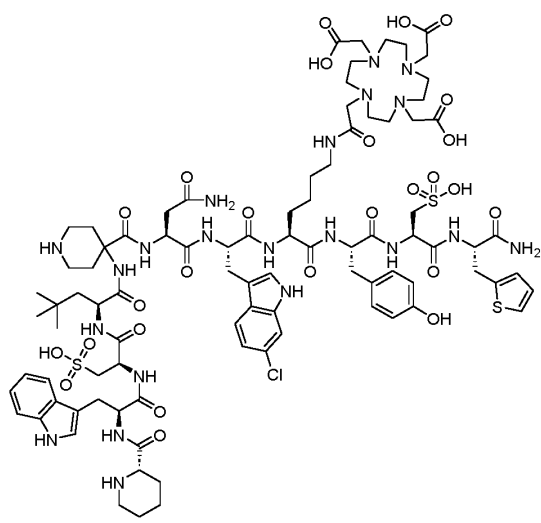
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Val-NH₂ (PCAD-381) of the following formula



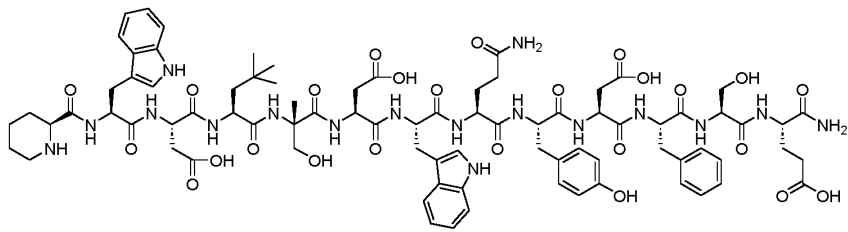
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Pcof-Cya-Thi-NH₂ (PCAD-382) of the following formula



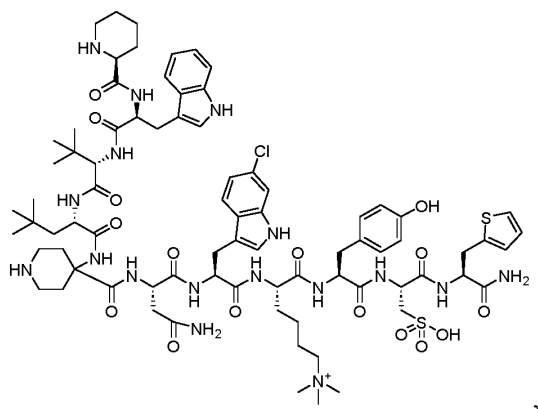
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH₂ (PCAD-383) of the following formula



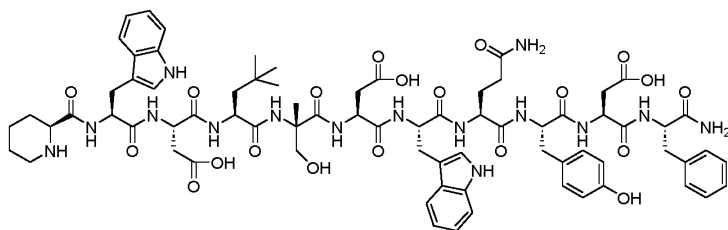
compound H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Tyr-Asp-Phe-Ser-Glu-NH₂ (PCAD-386) of the following formula



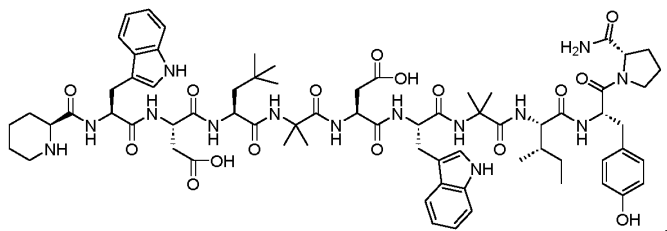
compound H-Pip-Trp-Tle-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-389) of the following formula



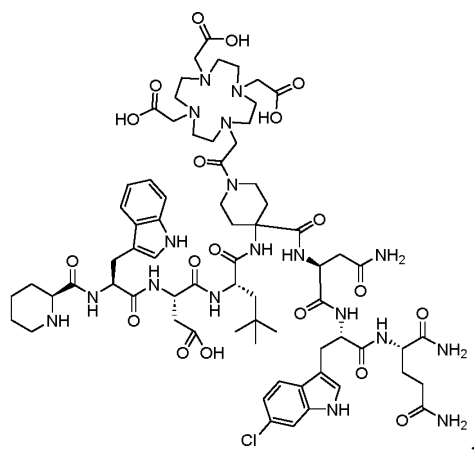
5 compound H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Tyr-Asp-Phe-NH₂ (PCAD-390) of the following formula



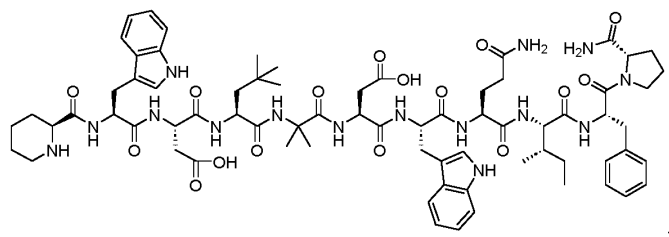
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Aib-Ile-Tyr-Pro-NH₂ (PCAD-391) of the following formula



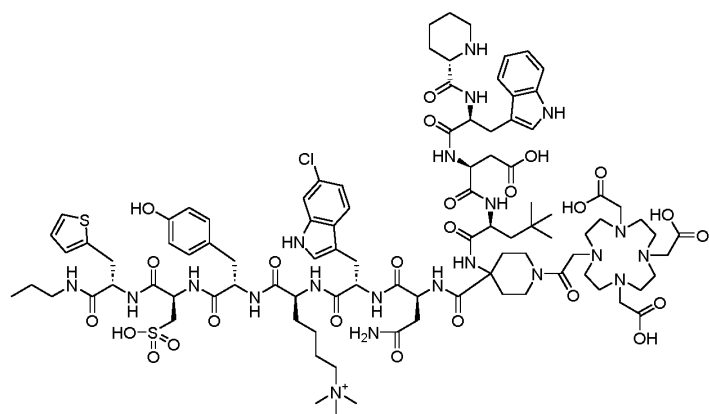
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-NH₂ (PCAD-397) of the following formula



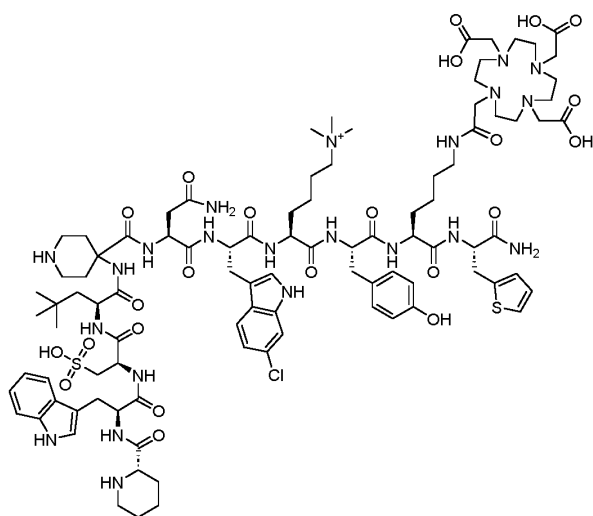
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Phe-Pro-NH₂ (PCAD-399) of the following formula



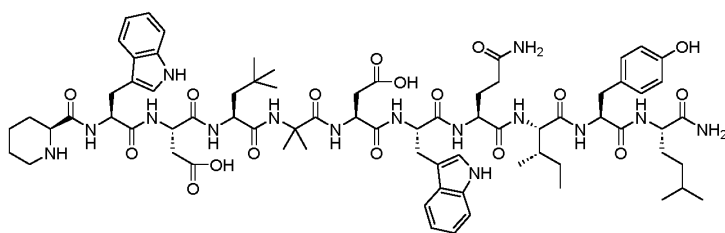
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NHPr (PCAD-401) of the following formula



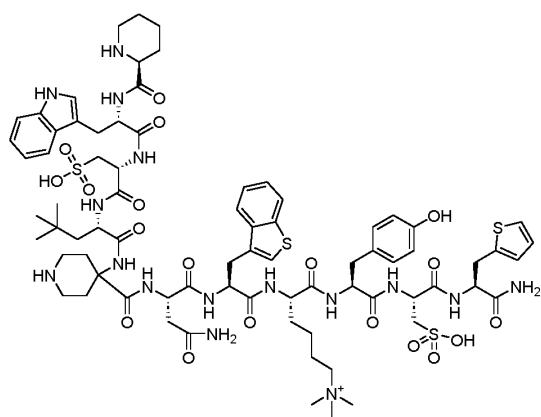
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Lys(DOTA)-Thi-NH₂ (PCAD-402) of the following formula



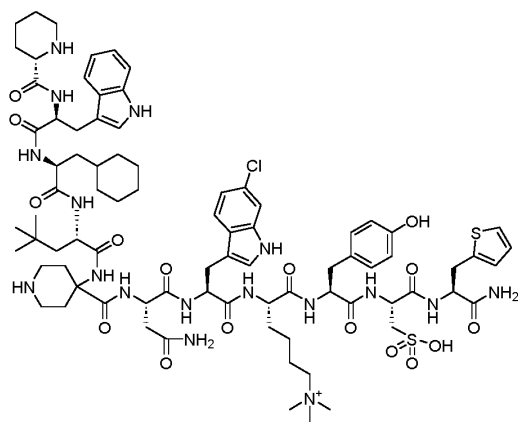
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Hle-NH₂ (PCAD-406) of the following formula



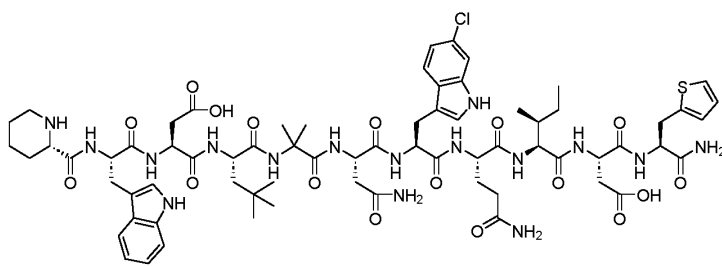
compound H-Pip-Trp-Cya-Npg-Apc-Asn-Bta-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-407) of the following formula



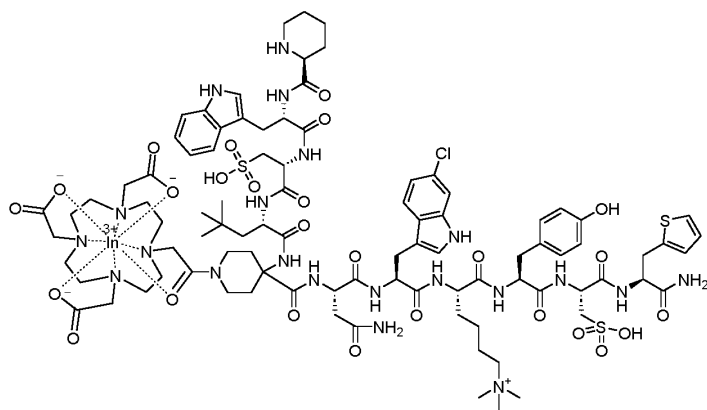
compound H-Pip-Trp-Cha-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-411) of the following formula



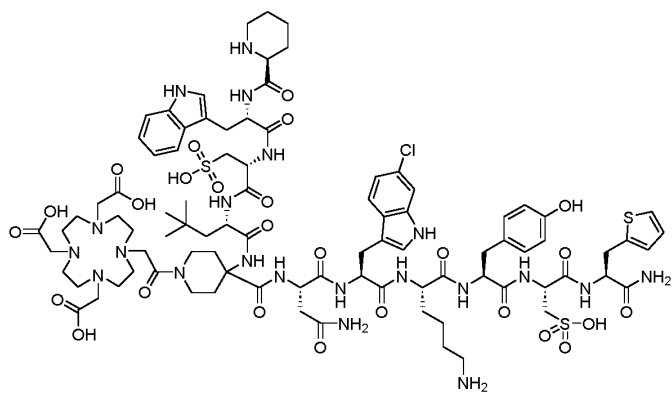
5 compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Ile-Asp-Thi-NH₂ (PCAD-412) of the following formula



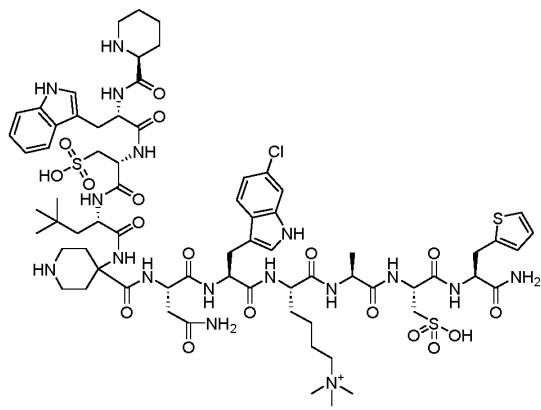
compound H-Pip-Trp-Cya-Npg-Apc(InDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-413) of the following formula



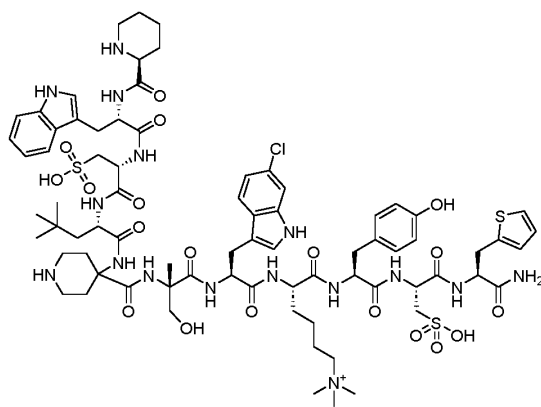
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂ (PCAD-414) of the following formula



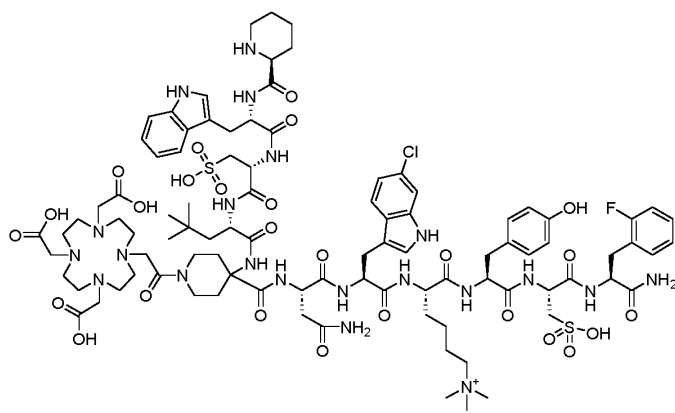
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Ala-Cya-Thi-NH₂ (PCAD-415) of the following formula



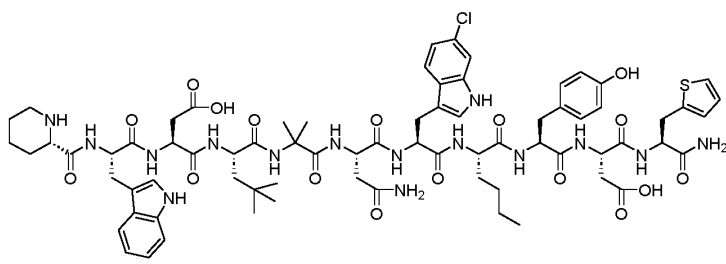
compound H-Pip-Trp-Cya-Npg-Apc-Ams-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-416) of the following formula



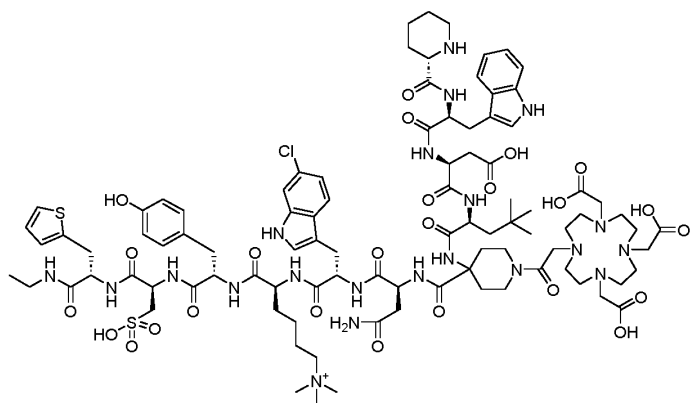
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Off-NH₂ (PCAD-417) of the following formula



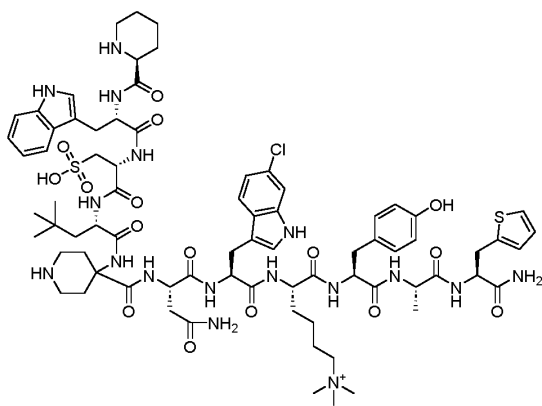
5 compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Nle-Tyr-Asp-Thi-NH₂ (PCAD-419) of the following formula



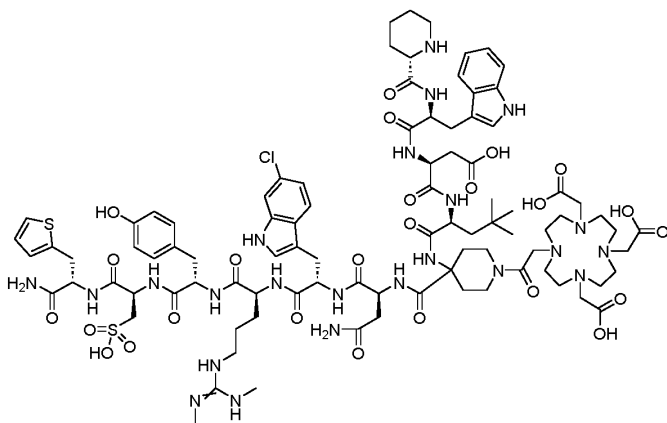
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHEt (PCAD-420) of the following formula



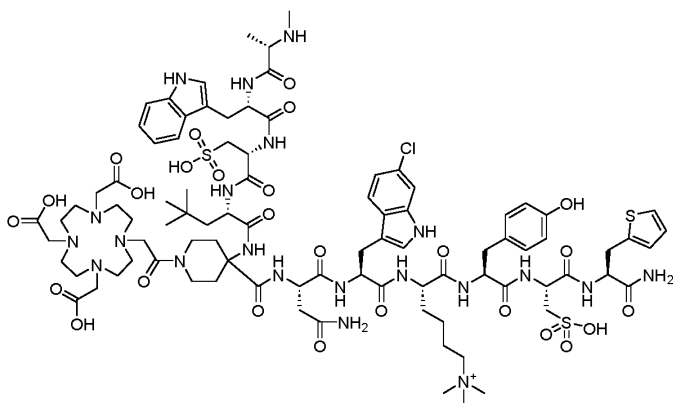
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Ala-Thi-NH₂ (PCAD-421) of the following formula



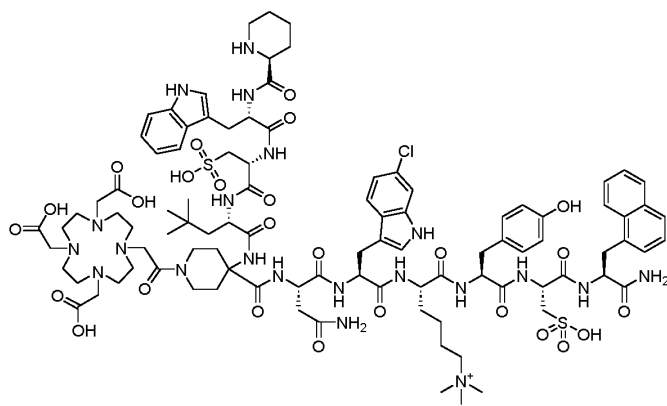
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH₂ (PCAD-423)
5 of the following formula



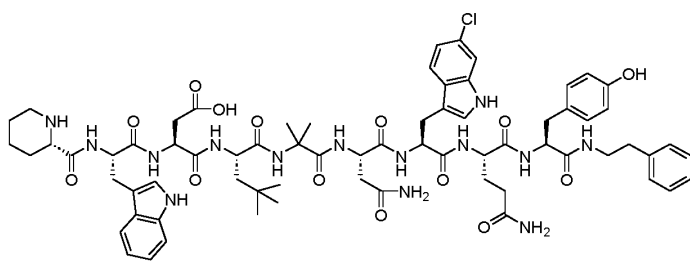
compound H-Nma-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-424) of the following formula



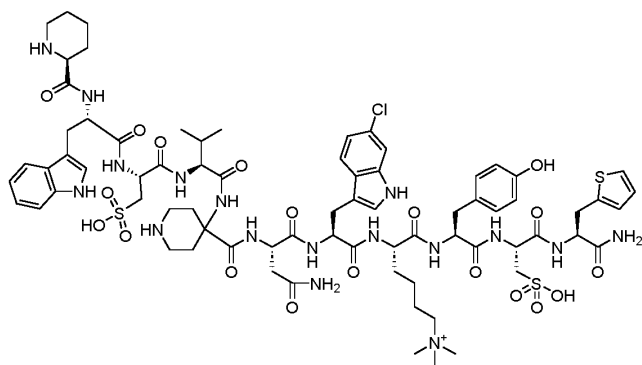
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-1Ni-NH₂ (PCAD-425) of the following formula



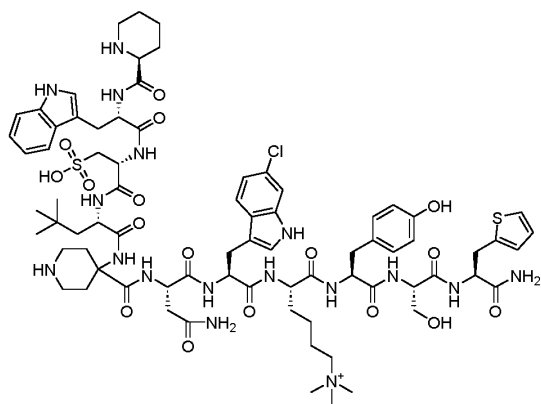
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NHEtPh (PCAD-426) of the
5 following formula



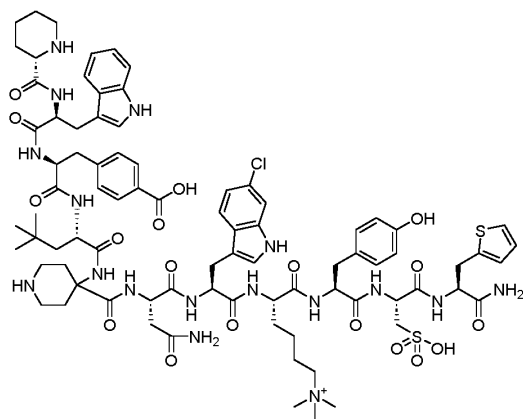
compound H-Pip-Trp-Cya-Val-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-427) of the
following formula



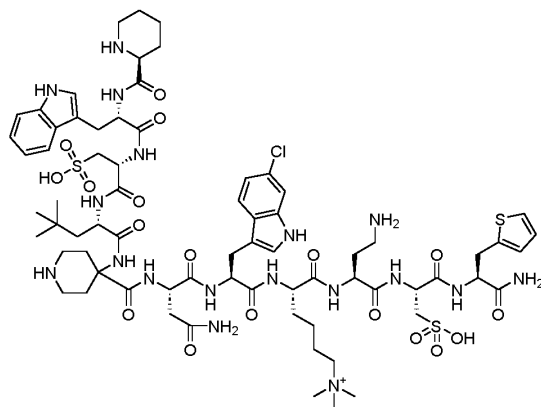
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH₂ (PCAD-428) of the following formula



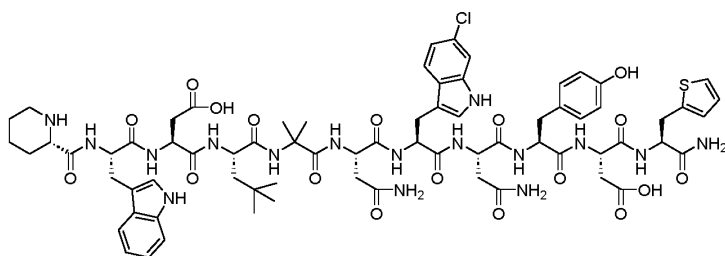
5 compound H-Pip-Trp-Pcof-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-429) of the following formula



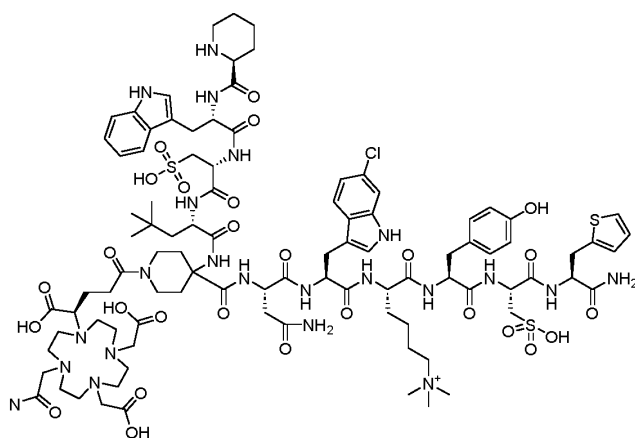
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Dab-Cya-Thi-NH₂ (PCAD-430) of the following formula



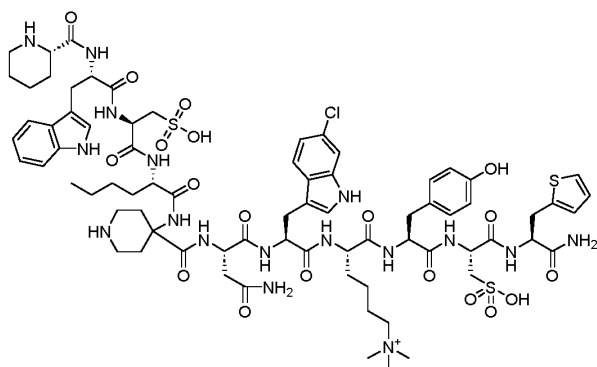
compound H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Asn-Tyr-Asp-Thi-NH₂ (PCAD-432) of the following formula



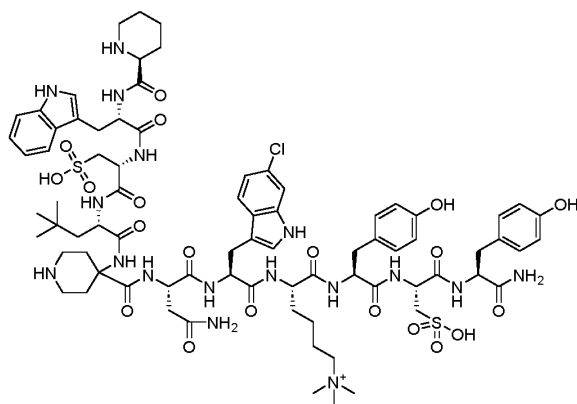
compound H-Pip-Trp-Cya-Npg-Apc(DOTAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-434) of the following formula



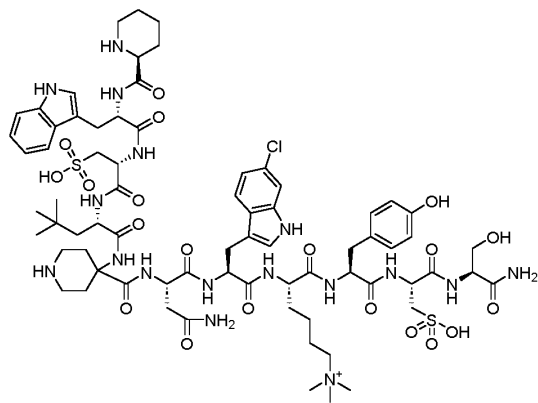
compound H-Pip-Trp-Cya-Nle-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-437) of the following formula



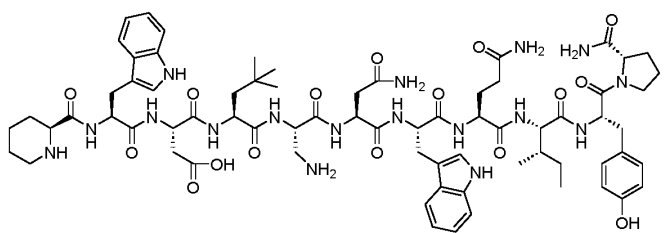
compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Tyr-NH₂ (PCAD-438) of the following formula



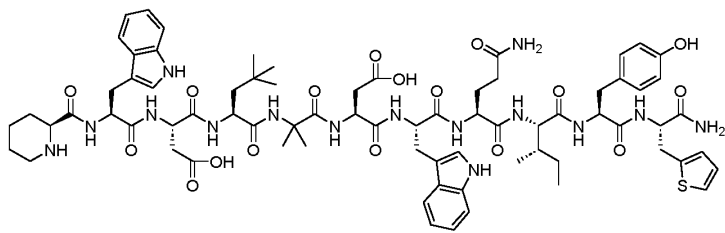
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Ser-NH₂ (PCAD-440) of the following formula



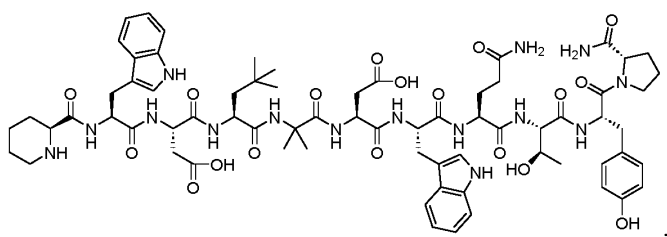
compound H-Pip-Trp-Asp-Npg-Dap-Asn-Trp-Gln-Ile-Tyr-Pro-NH₂ (PCAD-442) of the following formula



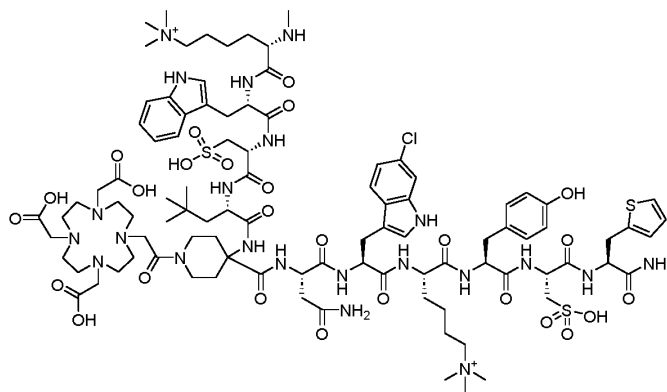
compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Thi-NH₂ (PCAD-443) of the following formula



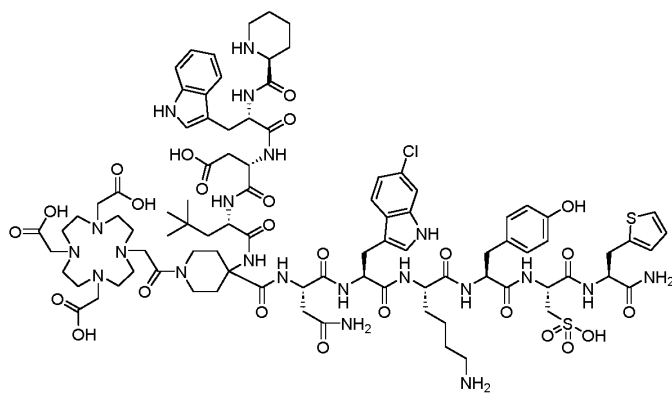
5 compound H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Thr-Tyr-Pro-NH₂ (PCAD-445) of the following formula



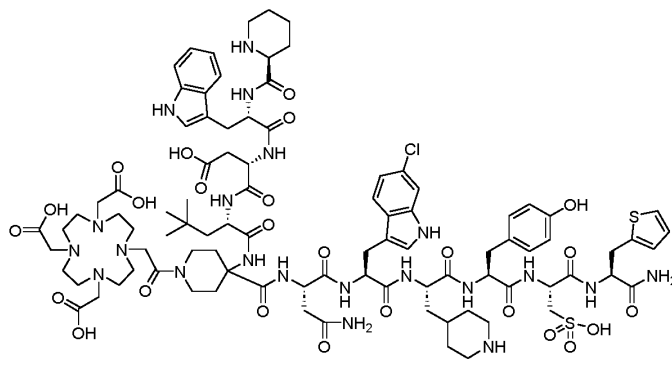
compound H-KMe4-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-448) of the following formula



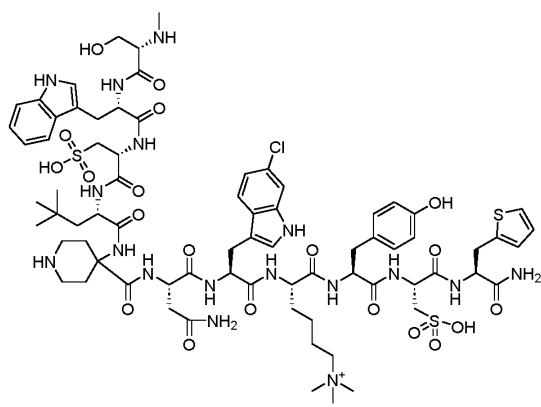
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂ (PCAD-449)
of the following formula



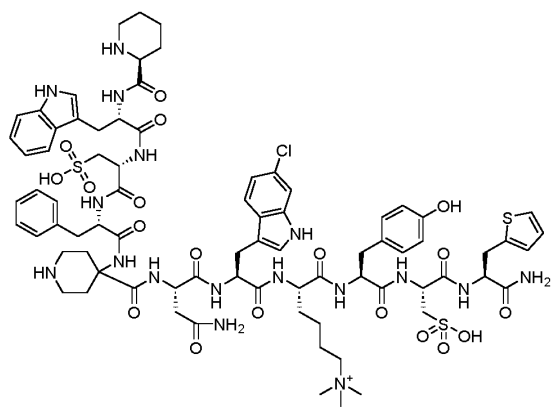
compound H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egg-Tyr-Cya-Thi-NH₂ (PCAD-452)
of the following formula



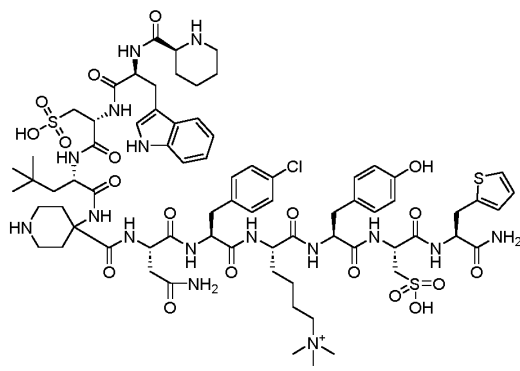
compound H-Nms-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-453) of
the following formula



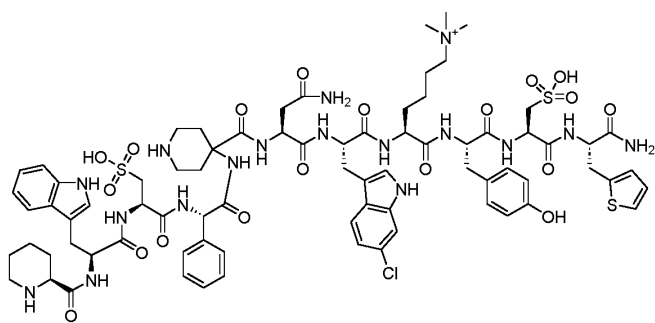
compound H-Pip-Trp-Cya-Phe-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-454) of the following formula



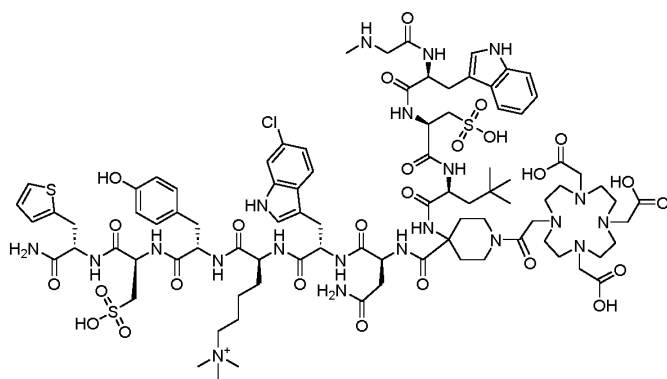
5 compound H-Pip-Trp-Cya-Npg-Apc-Asn-Pcf-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-456) of the following formula



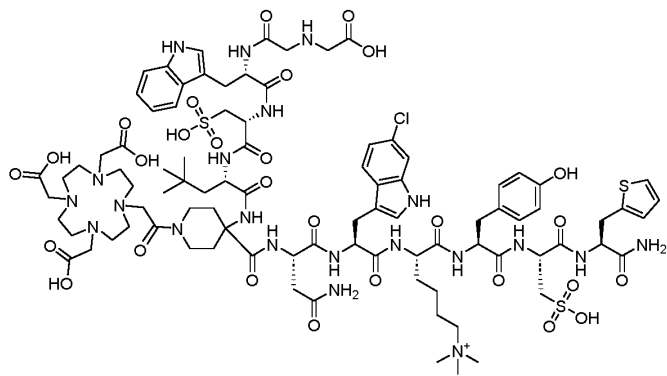
compound H-Pip-Trp-Cya-Phg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-459) of the following formula



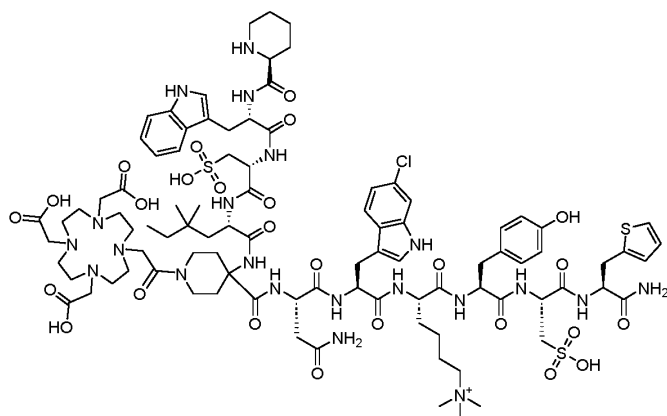
compound H-Nmg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-460) of the following formula



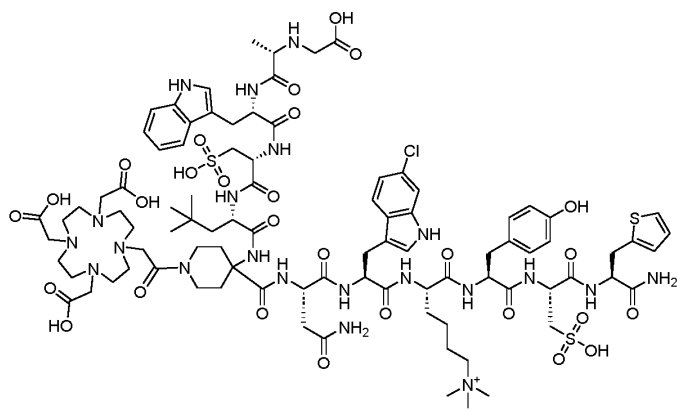
compound H-Ida-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-
5 461) of the following formula



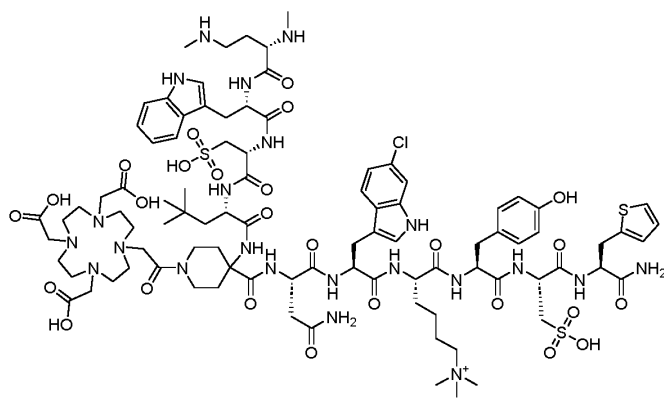
compound H-Pip-Trp-Cya-Gel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-462) of the following formula



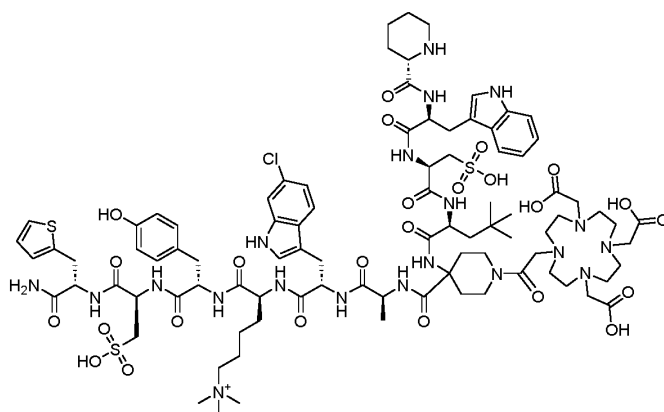
compound H-Mida-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-463) of the following formula



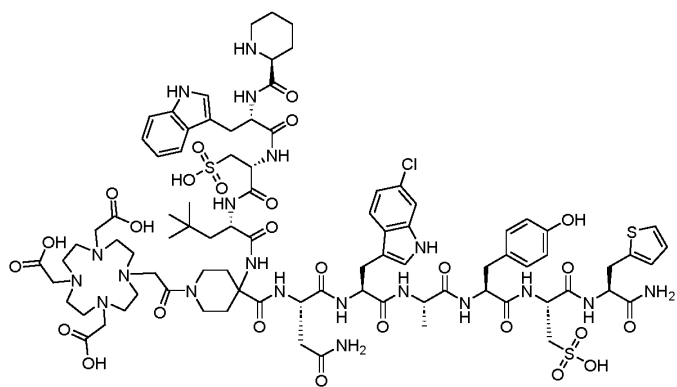
compound H-Mdab(Me)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-464) of the following formula



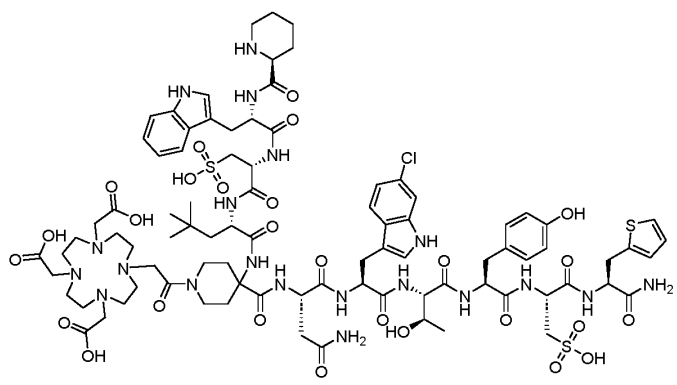
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Ala-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-465) of the following formula



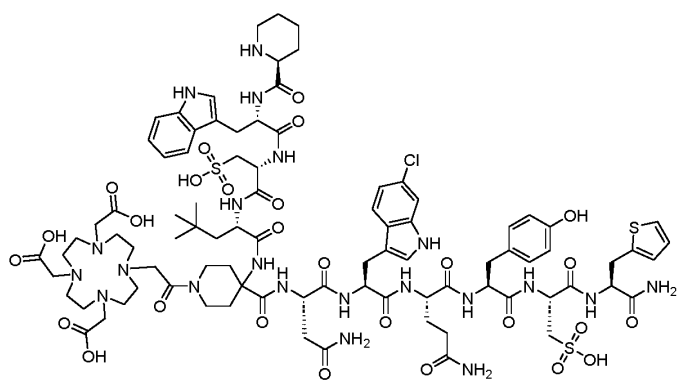
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Ala-Tyr-Cya-Thi-NH₂ (PCAD-470)
of the following formula



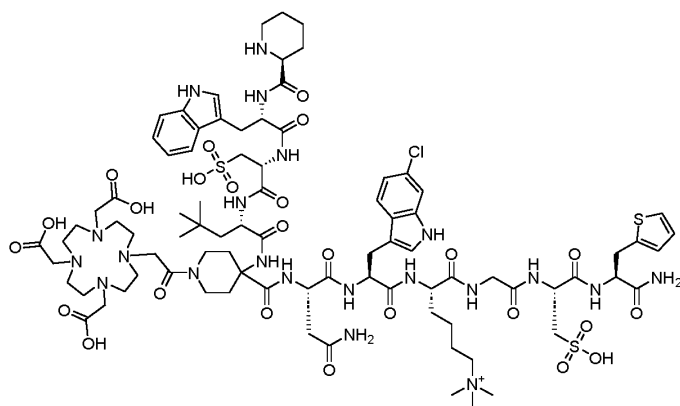
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Thr-Tyr-Cya-Thi-NH₂ (PCAD-471)
5 of the following formula



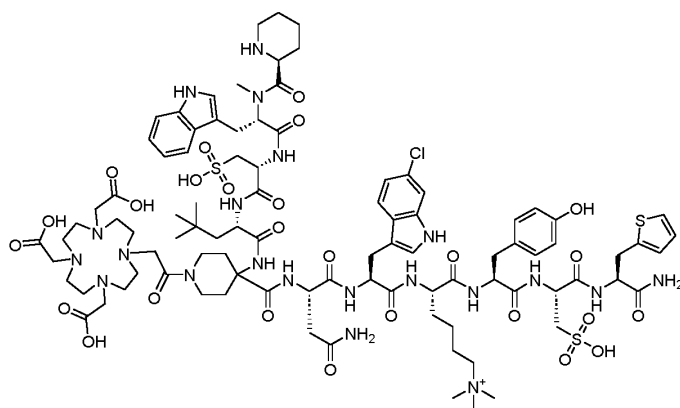
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Cya-Thi-NH₂ (PCAD-472)
of the following formula



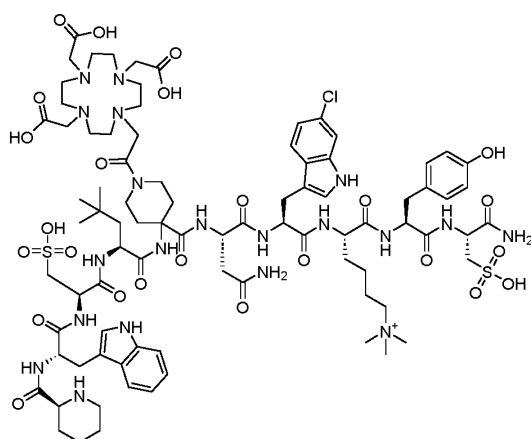
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Gly-Cya-Thi-NH₂ (PCAD-474) of the following formula



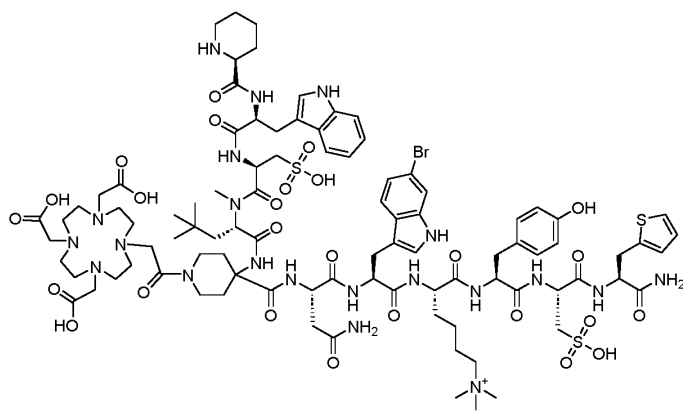
compound H-Pip-Nmw-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-476) of the following formula



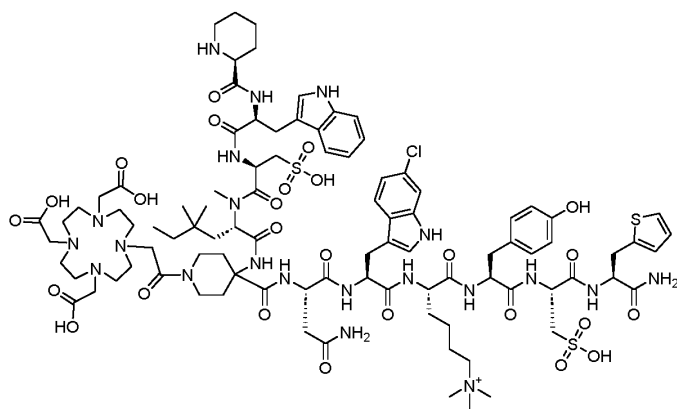
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NH₂ (PCAD-478) of the following formula



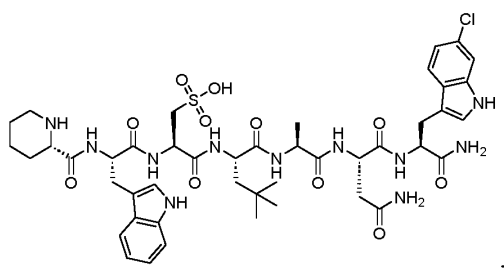
compound H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-479) of the following formula



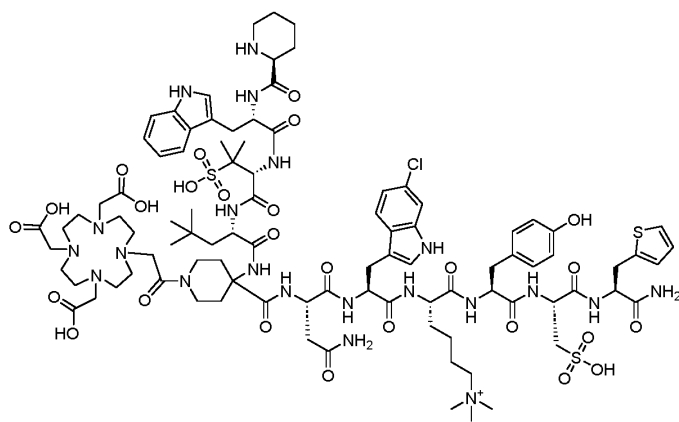
compound H-Pip-Trp-Cya-Mgel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-480) of the following formula



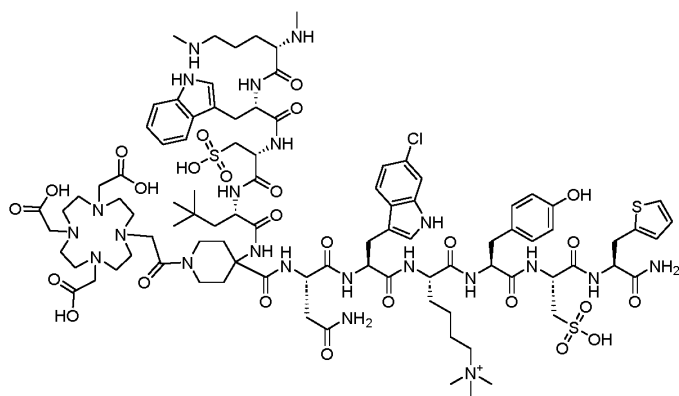
compound H-Pip-Trp-Cya-Npg-Ala-Asn-6Clw-NH₂ (PCAD-481) of the following formula



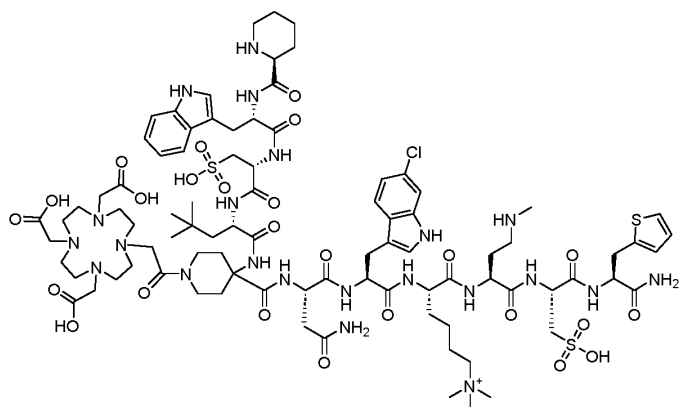
compound H-Pip-Trp-Penox-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-489) of the following formula



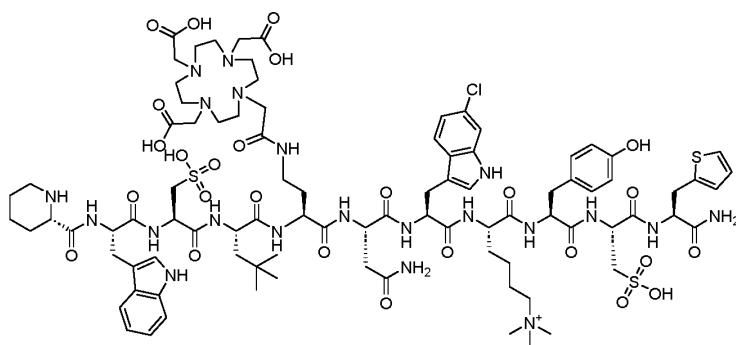
compound H-Nmo(Me)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-491) of the following formula



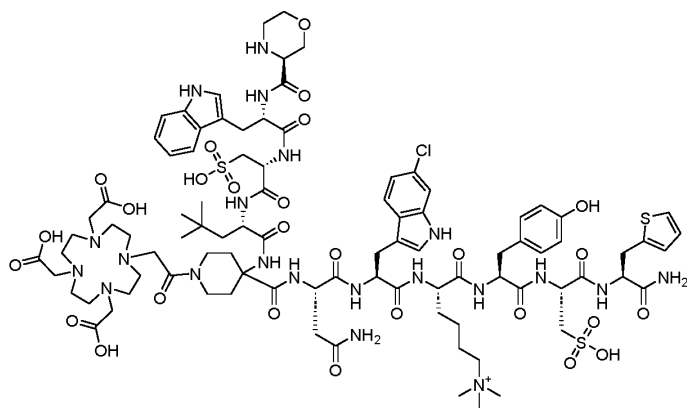
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Dab(Me)-Cya-Thi-NH₂ (PCAD-492) of the following formula



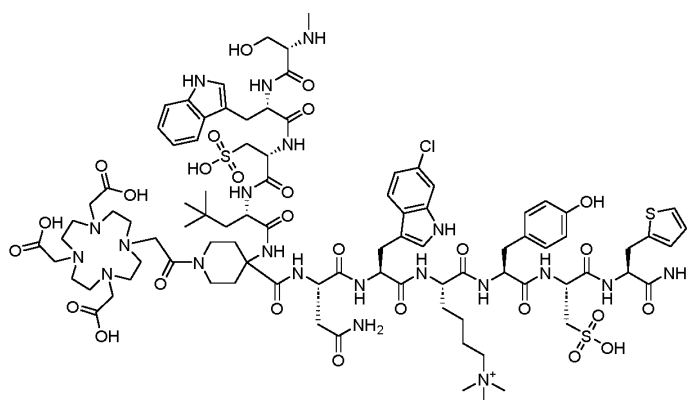
compound H-Pip-Trp-Cya-Npg-Dab(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-529) of the following formula



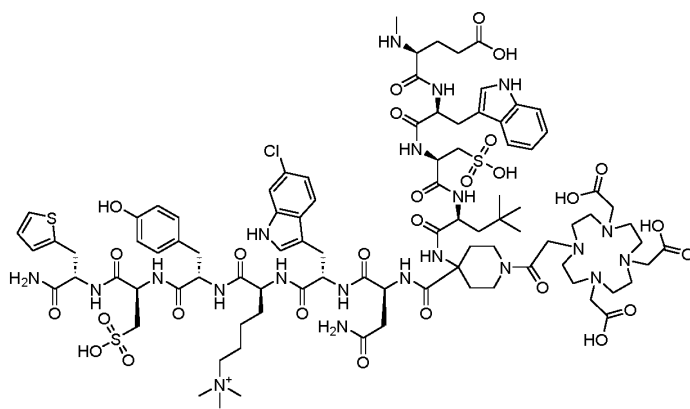
5 compound H-Mor-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-530) of the following formula



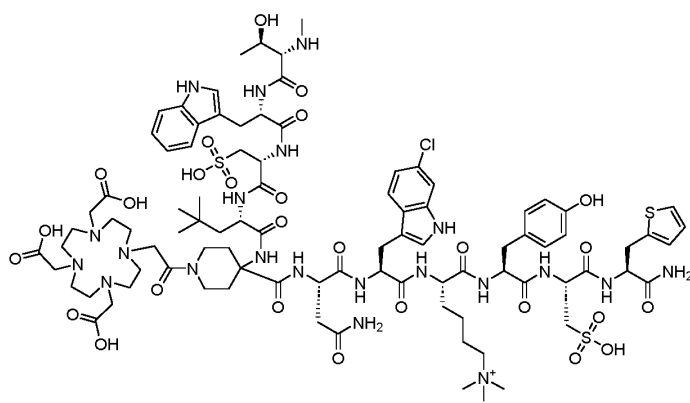
compound H-Nms-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂ (PCAD-532) of the following formula



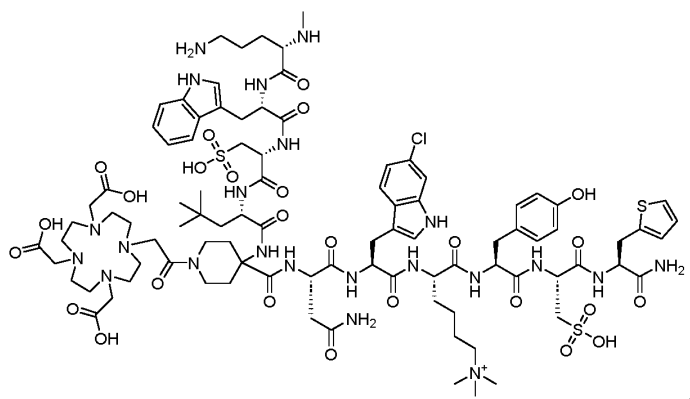
compound H-Nme-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-534) of the following formula



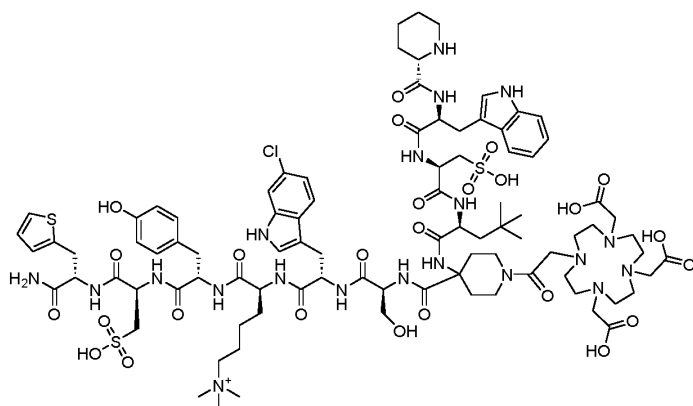
5 compound H-Nmt-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-536) of the following formula



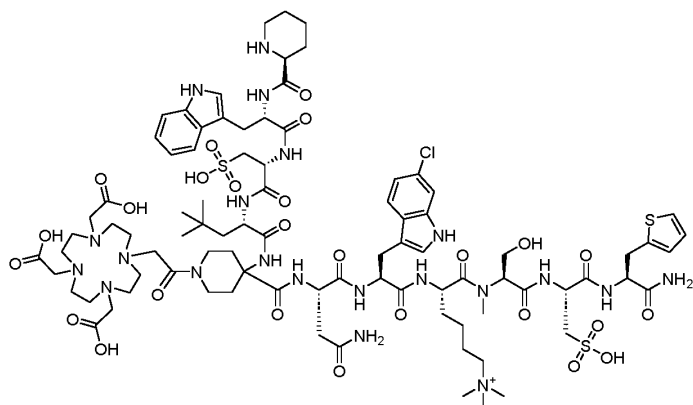
compound H-Nmo-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-537) of the following formula



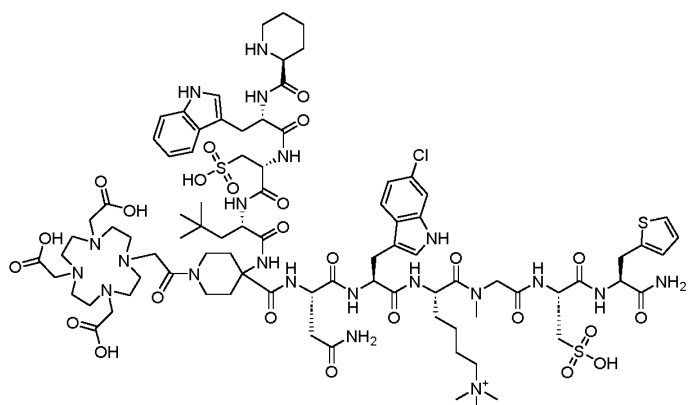
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-542) of the following formula



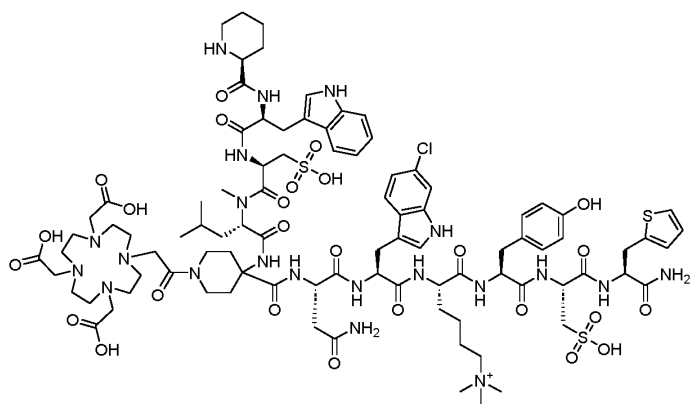
5 compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Nms-Cya-Thi-NH₂ (PCAD-543) of the following formula



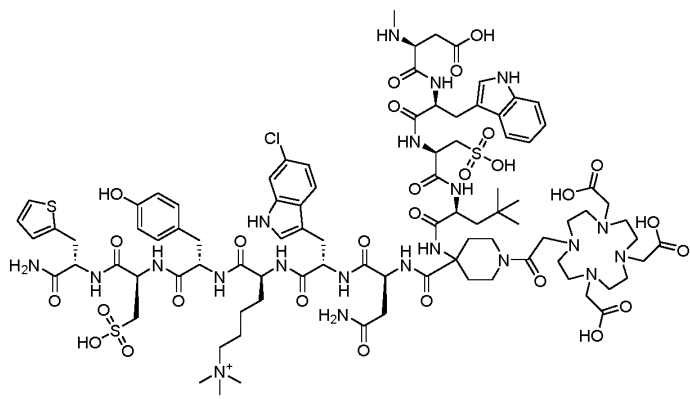
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Nmg-Cya-Thi-NH₂ (PCAD-544) of the following formula



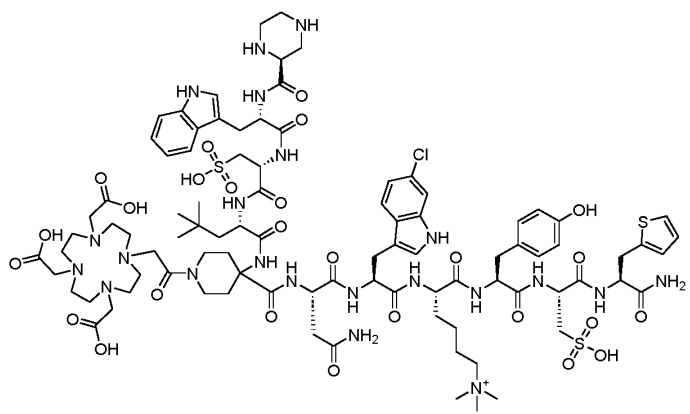
compound H-Pip-Trp-Cya-Nml-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-547) of the following formula



compound H-Nmd-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-549) of the following formula



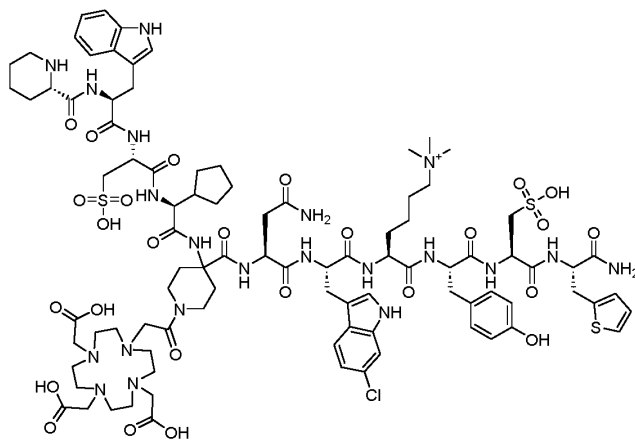
compound H-Ppaz-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-551) of the following formula



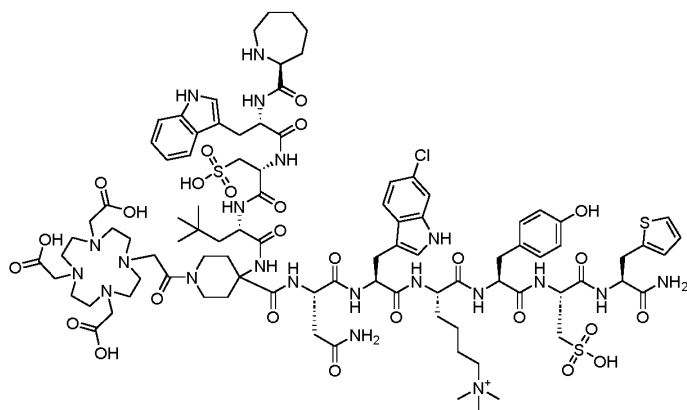
The chemical structure is a complex molecule, likely a peptide derivative, featuring various functional groups and a quaternary ammonium salt. The structure includes a thienyl group, a sulfonamide group, a quaternary ammonium salt, and a complex polycyclic system with multiple amide and sulfonamide linkages. The molecule is shown in a 2D representation with stereochemistry indicated by wedges and dashes.

C[N+](C)(C)CCCC[C@@H](NC(=O)N[C@@H](Cc1c[nH]c2ccccc12)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](C1CCNCC1)C(=O)N[C@@H](Cc2c[nH]c3ccccc23)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc4c[nH]c5ccccc45)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc6c[nH]c7ccccc67)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc8c[nH]c9ccccc89)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc10c[nH]c11ccccc1011)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc12c[nH]c13ccccc1213)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc14c[nH]c15ccccc1415)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc16c[nH]c17ccccc1617)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc18c[nH]c19ccccc1819)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc20c[nH]c21ccccc2021)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc22c[nH]c23ccccc2223)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc24c[nH]c25ccccc2425)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc26c[nH]c27ccccc2627)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc28c[nH]c29ccccc2829)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc30c[nH]c31ccccc3031)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc32c[nH]c33ccccc3233)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc34c[nH]c35ccccc3435)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc36c[nH]c37ccccc3637)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc38c[nH]c39ccccc3839)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc40c[nH]c41ccccc4041)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc42c[nH]c43ccccc4243)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc44c[nH]c45ccccc4445)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc46c[nH]c47ccccc4647)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc48c[nH]c49ccccc4849)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc50c[nH]c51ccccc5051)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc52c[nH]c53ccccc5253)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc54c[nH]c55ccccc5455)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc56c[nH]c57ccccc5657)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc58c[nH]c59ccccc5859)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc60c[nH]c61ccccc6061)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc62c[nH]c63ccccc6263)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc64c[nH]c65ccccc6465)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc66c[nH]c67ccccc6667)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc68c[nH]c69ccccc6869)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc70c[nH]c71ccccc7071)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc72c[nH]c73ccccc7273)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc74c[nH]c75ccccc7475)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc76c[nH]c77ccccc7677)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc78c[nH]c79ccccc7879)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc80c[nH]c81ccccc8081)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc82c[nH]c83ccccc8283)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc84c[nH]c85ccccc8485)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc86c[nH]c87ccccc8687)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc88c[nH]c89ccccc8889)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc90c[nH]c91ccccc9091)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc92c[nH]c93ccccc9293)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc94c[nH]c95ccccc9495)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc96c[nH]c97ccccc9697)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc98c[nH]c99ccccc9899)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc100c[nH]c101ccccc100101)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc102c[nH]c103ccccc102103)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc104c[nH]c105ccccc104105)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc106c[nH]c107ccccc106107)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc108c[nH]c109ccccc108109)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc110c[nH]c111ccccc110111)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc112c[nH]c113ccccc112113)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc114c[nH]c115ccccc114115)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc116c[nH]c117ccccc116117)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc118c[nH]c119ccccc118119)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc120c[nH]c121ccccc120121)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc122c[nH]c123ccccc122123)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc124c[nH]c125ccccc124125)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc126c[nH]c127ccccc126127)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc128c[nH]c129ccccc128129)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc130c[nH]c131ccccc130131)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc132c[nH]c133ccccc132133)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc134c[nH]c135ccccc134135)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc136c[nH]c137ccccc136137)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc138c[nH]c139ccccc138139)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc140c[nH]c141ccccc140141)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc142c[nH]c143ccccc142143)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc144c[nH]c145ccccc144145)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc146c[nH]c147ccccc146147)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc148c[nH]c149ccccc148149)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc150c[nH]c151ccccc150151)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc152c[nH]c153ccccc152153)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc154c[nH]c155ccccc154155)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc156c[nH]c157ccccc156157)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc158c[nH]c159ccccc158159)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc160c[nH]c161ccccc160161)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc162c[nH]c163ccccc162163)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc164c[nH]c165ccccc164165)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc166c[nH]c167ccccc166167)C(=O)N[C@@H](C(C)(C)C)C(=O)N[C@@H](Cc168c[nH]c169cc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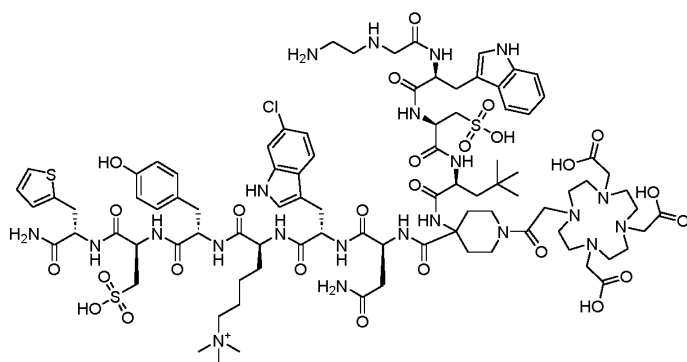
compound H-Pip-Trp-Cya-Cpg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-579) of the following formula



5 compound H-Azp-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-580) of the following formula



compound H-Aeg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-581) of the following formula



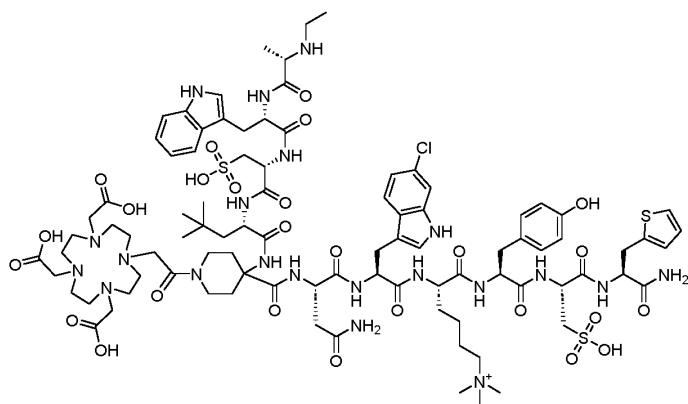
The chemical structure is a complex molecule, likely a peptide or protein derivative, featuring various functional groups and a highly branched backbone. Key features include:

- Carboxylic Acid Groups:** Several carboxylic acid groups are present, including a terminal one on the left and several internal ones, some of which are part of a cyclic structure.
- Amide Bonds:** Multiple amide bonds connect different parts of the molecule, forming a complex network.
- Sulfonamide Group:** A sulfonamide group is visible in the lower right portion of the structure.
- Thiol Group:** A thiol group (SH) is located on the far right side of the molecule.
- Indole Ring:** An indole ring system is present in the upper left portion of the structure.
- Chlorine Substituent:** A chlorine atom is attached to a benzene ring in the upper right portion of the structure.
- Quaternary Ammonium Group:** A quaternary ammonium group (N⁺) is located at the bottom right of the molecule.
- Hydroxyl Groups:** Several hydroxyl groups are scattered throughout the structure, particularly in the lower left and middle right areas.

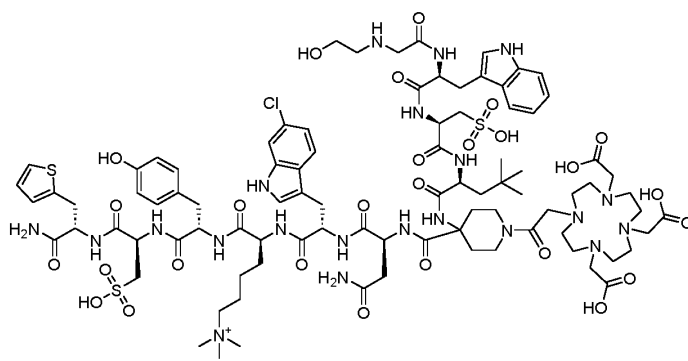
The molecule is highly branched and contains a variety of functional groups, suggesting it may be a complex peptide or a synthetic molecule designed for specific biological or chemical purposes.

CC(C)(C)[C@H](COP(=O)(O)O)C(=O)N[C@@H]1CCN(C1)C(=O)N2CCN(CCN2C(=O)O)C(=O)O

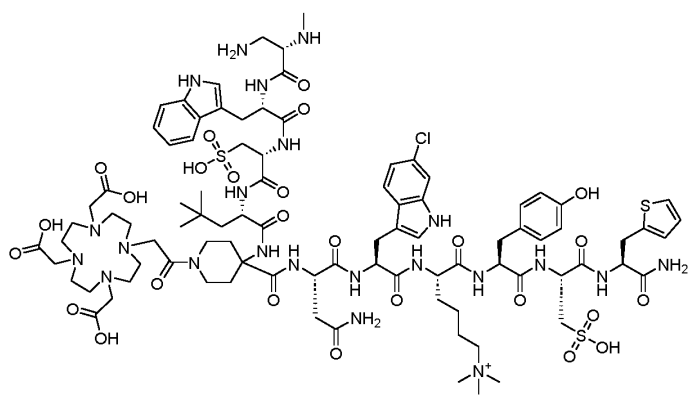
compound H-Nea-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-586) of the following formula



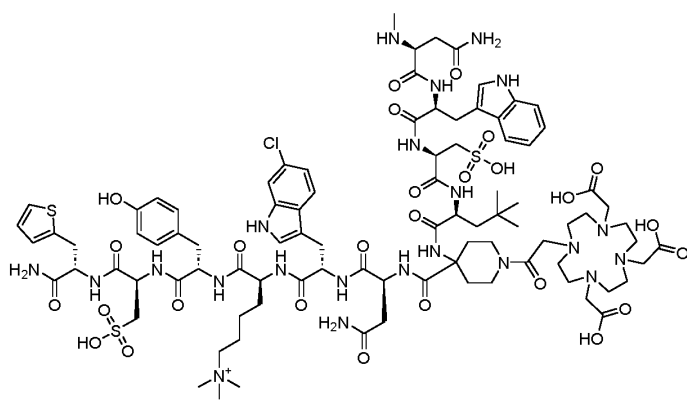
compound H-Heg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-
5 587) of the following formula



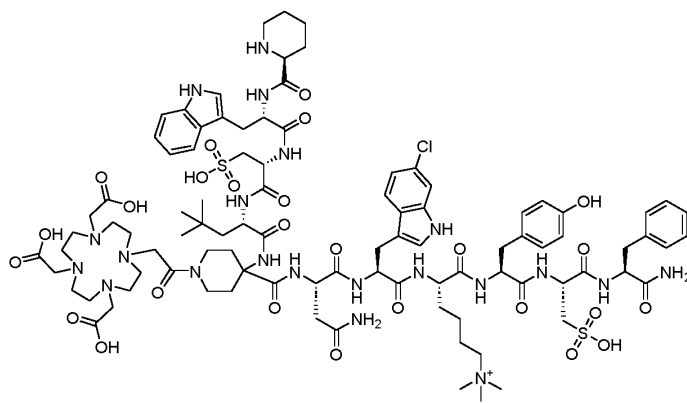
compound H-Mdap-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-598) of the following formula



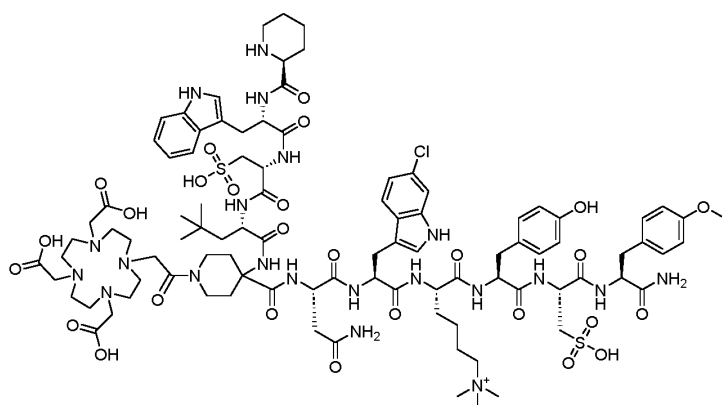
compound H-Nmn-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-599) of the following formula



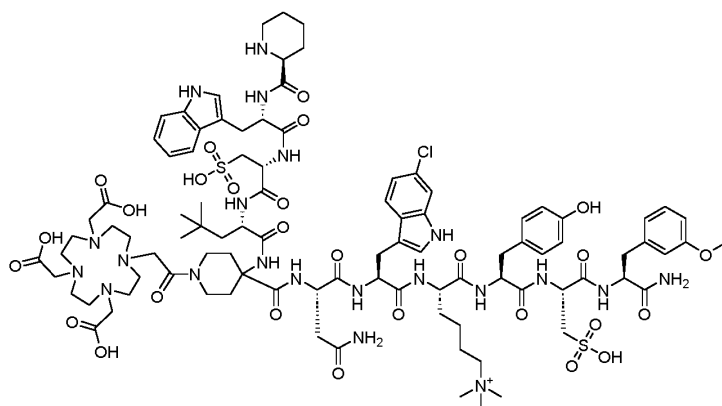
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂ (PCAD-600) of the following formula



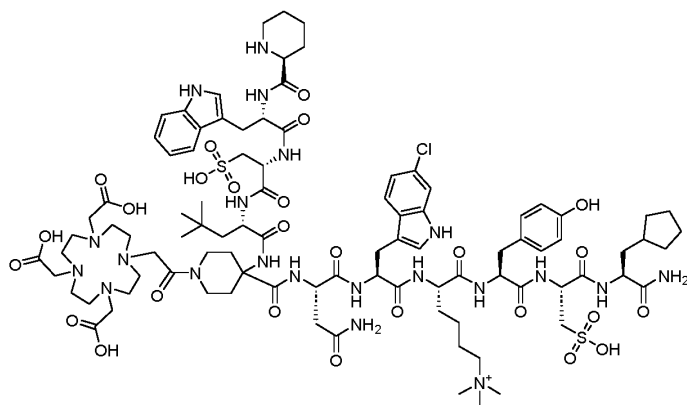
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Pmy-NH₂ (PCAD-601) of the following formula



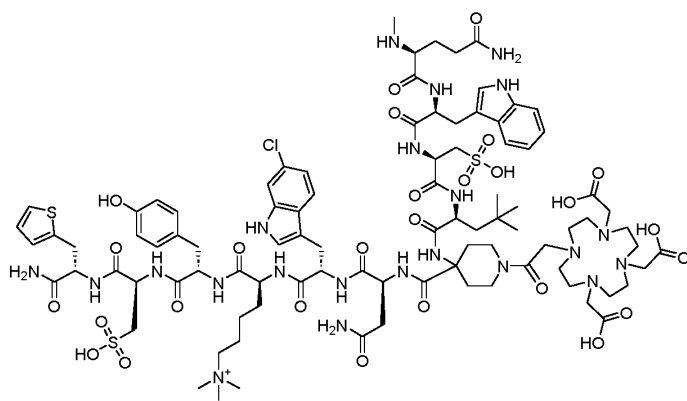
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mof3-NH₂ (PCAD-602) of the following formula



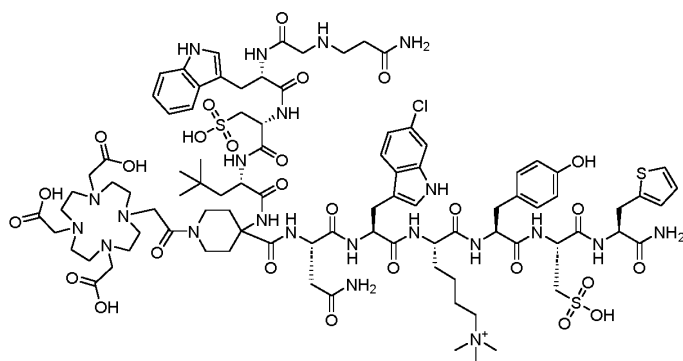
compound H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Cpa-NH₂ (PCAD-603) of the following formula



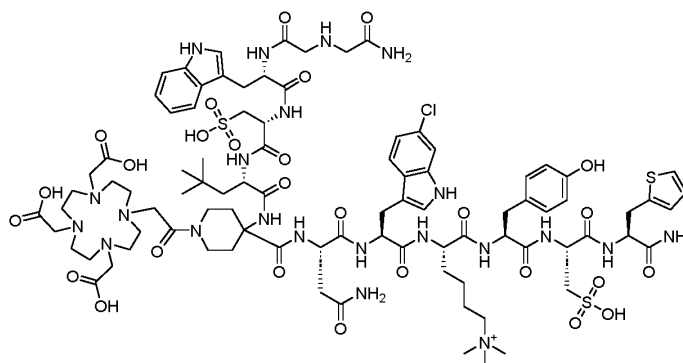
compound H-Nmq-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-604) of the following formula



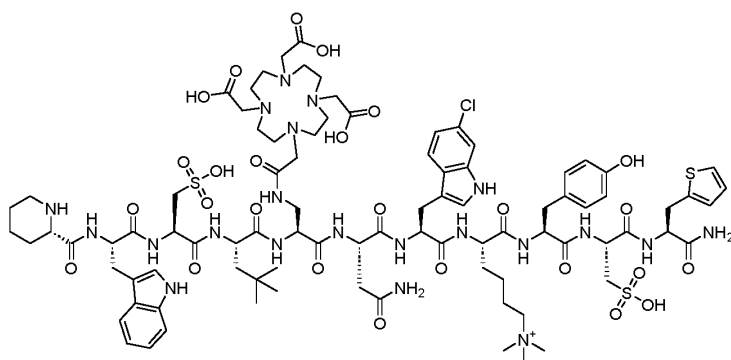
compound H-Ngln-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-606) of the following formula



5 compound H-Nasn-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-607) of the following formula



compound H-Pip-Trp-Cya-Npg-Dap(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-609) of the following formula



Example 24: FACS binding assay

In order to determine binding of compounds according to the present invention to P-cadherin-expressing cells, a competitive FACS binding assay was established.

P-cadherin-expressing human DU-145 prostate cancer cells (Cell Line Service, #CLS 300168) were cultured in MEM Eagle with stable glutamine (Pan Biotech, #P04-09500) including 15% fetal bovine serum (Pan Biotech, #P30-3306), 1% pyruvate (Sigma-Aldrich, # S8636), 1% Non-essential amino acid solution (Pan Biotech, #P08-32100) and 100 U/ml penicillin and 100 µg/ml streptomycin (Pan Biotech, #P06-07100). Cells were detached with Cell Dissociation Buffer (Thermo Scientific, #13151014) and washed in FACS buffer (PBS (Pan Biotech, #P04-36500) including 1% FBS, 1 mM calcium chloride (Sigma-Aldrich, # 21115) and 1 mM magnesium chloride (Sigma-Aldrich, # M1028)). Cells were diluted in FACS buffer to a final concentration of 100,000 cells per ml and 200 µl of the cell suspension are transferred to a u-shaped non-binding 96-well plate (Greiner Bio-One, #650901). Cells were washed in ice-cold FACS buffer and incubated with increasing concentrations of peptides at 4°C for 30 min followed by the addition of 50 nM of Alexa-Fluor 488-labeled compound (H-Pip-W-Cya-Npg-Apc(AF488-Ttds)-N-6Clw-KMe3-Y-Cya-Thi-NH₂) and further incubation at 4°C for 60 min. Cells were washed twice with FACS buffer and resuspended in 200 µl FACS buffer.

Cells were analyzed in an Attune NxT flow cytometer. Median fluorescence intensities (FITC channel) were calculated by Attune NxT software and plotted against peptide concentrations. Four parameter logistic (4PL) curve fitting and pIC₅₀ calculations were performed using ActivityBase software. The results of this assay as subject to Example 24 for each compound according to the present invention are presented in in Table 10, following Example 25. pIC₅₀ category A stands for pIC₅₀ values ≥ 7.8 , category B for pIC₅₀ values between 7.0 and 7.7, category C for pIC₅₀ values between 6.1 and 6.9 and category D for pIC₅₀ values ≤ 6.0 .

Example 25: Surface plasmon resonance assay

Surface plasmon resonance (SPR) is an optical technique used to measure molecular interactions in real time. SPR occur when plane-polarized light hits a metal film under total internal reflection conditions. SPR signal is directly dependent on the refractive index of the medium on the sensor chip. In an SPR experiment, one molecule (i.e. P-cadherin) is immobilized on a sensor chip and binding to a second molecule (i.e. test compounds) is measured under flow. The binding of the compound on the surface changes the refractive index. In responses the reflection angle changes as compounds bind and dissociate on the immobilized protein on the surface. This response is measured in resonance units (RU). The RUs are

proportional to the number of molecules bound to the surface. The RUs are recorded and displayed as a sensorgram in real time. Kinetic binding constants and equilibrium binding constants can be derived from the sensorgrams.

Surface plasmon resonance (SPR) studies were performed using a Biacore™ T200 or S200 SPR system (Cytiva, formerly GE Life Sciences) to assess binding of compounds to recombinant P-cadherin protein.

In this example biotinylated recombinant protein comprising the extracellular domains of human P-cadherin (bio-P-cad, Proteros, #HPC_21_1, comprising amino acids Asp108-Asp320 of the protein sequence according to UniProt entry P22223 (SEQ ID NO: 1)) was immobilized on a biotin capture chip (Biotin CAPture Kit, Cytiva, Cat# 28920234) according to the supplier's instructions. Bio-P-cad was diluted in Running Buffer (10 mM HEPES, 150 mM NaCl, 0.1% DMSO, 0.05% Tween-20, 1 mM CaCl₂, pH 7.4) to a final concentration of 100 nM and then flushed over the Biotin CAPture chip to immobilized ~300 RUs.

Stock solutions of test compounds were prepared by dissolving each compound in DMSO. DMSO stock solution were diluted 1:1000 in Running Buffer without DMSO. Further sequential dilutions were made with Running Buffer containing 0.1% DMSO. SPR binding analyses were performed in Single Cycle Kinetic (SCK) mode at 25°C. Flow cell without immobilized bio-P-cad served as reference flow cell. The chip was regenerated with Regeneration Solution (6 M GuHCl, 0.25 M NaOH) to remove the bio-P-cad from the chip surface after each SCK run. In between every three SCK measurements, a blank run with Running Buffer instead of test compound was included to correct for baseline drifts (double reference subtraction method). Table 9 describes the protocol steps for SCK measurements on bio-P-cad.

Table 9: SPR protocol steps for SCK with bio-P-cad immobilized on a Biotin CAPture chip.

Step	Injected solution	Contact time	Flow rate
Startup cycle as a triple run:	Running Buffer	60 s	30 µl/min
Washing & surface regeneration	Regeneration Solution	5 s	
Binding Biotin CAPture Reagent	Biotin CAPture Reagent (25% in Running Buffer)	300 s	2 µl/min
Binding target protein bio-P-cad (capturing)	100 nM bio-P-cad	200 s	5 µl/min

Washing (removal of unbound Biotin CAPture Reagent & Target)	Running Buffer	60 s	30 μ l/min
Washing (stabilization of baseline)	Running Buffer	200 s	30 μ l/min
1. Binding kinetics of test compound	Lowest compound concentration (8 - 40 nM)	120 s	30 μ l/min
2. Binding kinetics of test compound	Intermediated compound concentration (40 - 200 nM)	120 s	30 μ l/min
3. Binding kinetics of test compound	Highest compound concentration 200 - 1000 nM)	120 s	30 μ l/min
Dissociation cycle	Running Buffer	1200 s	30 μ l/min
Regeneration 2x	Regeneration Solution	60 s	5 μ l/min

For each test compound, SPR raw data sensorgrams were recorded using the Biacore™ T200 or S200 control software. Sensorgrams were processed and analyzed with the Biacore™ Insight Evaluation software. The signal of the reference flow cell (without target) was subtracted from the active flow cell signal (immobilized target) to obtain a reference subtracted sensorgram. The reference subtracted sensorgram for each test compound was further corrected for baseline drift by subtracting the sensorgram of a reference subtracted blank run (Running Buffer only). The dissociation constant (K_D) was calculated from the double reference subtracted sensorgrams using the 1:1 Langmuir binding model. The pK_D value (negative decadic logarithm of dissociation constant) was calculated using Microsoft Excel.

The results of this assay for a selection of compounds according to the present invention are presented in Table 10. pK_D category A stands for pK_D values ≥ 8.5 , category B for pK_D values from 7.5 to 8.4, category C for pK_D values from 6.5 to 7.4, and category D for pK_D values < 6.5 .

Table 10. Compound ID, sequence, synthesis (described in Examples 1-23), exact calculated mass, LC/TOF-MS exact mass found, retention time (t_R) in minutes as determined by HPLC, pIC_{50} category of FACS binding, and pK_D category for P-cadherin SPR activity assay

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-062	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH ₂	IIIa	2183.823	2183.826	5.4	A	A
PCAD-063	H-Ida(O3TdN2-DOTA)-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	V	2281.961	2281.955	6.5	B	B
PCAD-064	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-NH ₂	IIa	1693.766	1693.770	5.6	B	C
PCAD-065	H-Pip-Trp-Cya-Npg-Apc-Pro-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1672.664	1672.660	6.9	ND	A
PCAD-066	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Asn-Asp-Thi-NH ₂	Ia	1485.590	1485.591	6.3	ND	B
PCAD-068	H-Pip-Trp-Cya-Thi-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2101.760	2101.745	6.1	A	A
PCAD-070	H-Pip-Trp-Amd-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH ₂	IIa	1935.916	1935.919	6.4	D	D
PCAD-071	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Nle-Tyr-Pro-NH ₂	Ia	1443.719	1443.718	7.0	ND	B
PCAD-072	H-Pip-Trp-Cya-Npg-Apc(BnTCMC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IVc	2236.923	2236.932	6.7	A	A
PCAD-073	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ala-Cya-Thi-NH ₂	IIa	1947.842	1947.830	5.9	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-074	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ay3-Cya-Thi-NH ₂	IIf	2054.879	2054.878	4.8	A	A
PCAD-075	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Nmf-NH ₂	Ia	1697.714	1697.725	7.0	B	B
PCAD-076	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NHBz	Ib	1356.606	1356.602	7.1	ND	C
PCAD-077	H-Ida-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1693.613	1693.617	6.7	A	A
PCAD-078	H-Pip-Trp-Asp-Npg-Apc(CuDOTA)-Asn-6Clw-KMe3-TzaOH-Cya-Thi-NH ₂	IIIb	2105.783	2105.786	5.2	A	B
PCAD-079	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Cya-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2112.786	2112.790	6.7	A	A
PCAD-080	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mff-NH ₂	Ila	2087.869	2087.871	6.8	A	A
PCAD-081	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Nle-Asp-Thi-NH ₂	Ia	1484.631	1484.628	7.2	ND	B
PCAD-082	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH ₂	Ila	2039.843	2039.841	5.4	A	A
PCAD-083	H-Pip-Trp-Cya-Npg-Asp-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1678.602	1678.610	7.0	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-084	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Lys-Tyr-Asp-Thi-NH ₂	Ia	1534.647	1534.644	5.8	ND	A
PCAD-085	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Glu-Thi-NH ₂	Ia	1667.703	1667.702	6.8	ND	A
PCAD-086	H-Pip-Trp-Cya-Cba-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1687.639	1687.628	6.5	A	A
PCAD-087	H-Pip-Trp-Cya-Abu-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1647.608	1647.598	5.9	A	B
PCAD-089	H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Smc-Ile-Tyr-Pro-Asp-Smc-NH ₂	Ia	1702.727	1702.830	6.4	ND	C
PCAD-090	H-Pip-Trp-Asp-Npg-Ams-Asn-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1458.730	1458.732	6.3	ND	B
PCAD-092	H-Pip-Trp-Lys-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1666.756	1666.747	5.8	B	B
PCAD-093	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH ₂	IIa	2060.832	2060.830	5.5	A	A
PCAD-094	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Gly-NH ₂	Ia	1593.651	1593.643	6.0	B	A
PCAD-095	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Pro-Cya-Thi-NH ₂	Ia	1623.644	1623.652	6.6	ND	A
PCAD-096	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Npg-NH ₂	Ia	1473.766	1473.763	7.9	ND	C

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-098	H-Pip-Trp-Asp-Npg-Aib-Asn-Trp-Gln-Ile-Tyr-Pro-Ttds-Lys(DOTA)-NH ₂	Ila	2259.194	2259.184	6.2	C	C
PCAD-099	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Har-Tyr-Cya-Thi-NH ₂	Ila	2039.843	2039.841	5.4	A	A
PCAD-100	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-Asp-Thi-NH ₂	Ia	1534.611	1534.611	6.6	ND	A
PCAD-102	H-Gly-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1635.608	1635.619	6.6	A	A
PCAD-104	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Egz-NH ₂	Ia	1661.714	1661.705	6.5	B	A
PCAD-106	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH ₂	Ila	2075.810	2075.812	5.7	A	A
PCAD-108	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Asp-NH ₂	Ila	1808.793	1808.786	5.5	B	C
PCAD-110	H-Pip-Trp-Cya-Npg-ser-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1650.607	1650.618	6.6	A	A
PCAD-111	H-Pip-Trp-Asp-Npg-Ams-Asn-Trp-NH ₂	Ia	957.471	957.469	5.4	ND	C
PCAD-112	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ser-Cya-Thi-NH ₂	Ila	1963.836	1963.835	4.9	A	A
PCAD-113	H-Ppaz(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	IIb	1846.889	1846.883	6.2	ND	C

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-114	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-My-Cya-Thi-NH ₂	Ile	2039.868	2039.875	5.4	A	A
PCAD-115	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-Bal-OH	Ile	2111.889	2111.893	5.2	A	A
PCAD-116	H-Pip-Trp-Cit-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1695.746	1695.756	6.3	A	A
PCAD-117	H-Nma-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Asp-Thi-NH ₂	Ila	1935.802	1935.797	6.3	ND	B
PCAD-119	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ila	1869.941	1869.944	6.4	C	B
PCAD-120	H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1459.714	1459.716	6.5	ND	B
PCAD-122	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Lys-NH ₂	Ia	1664.725	1664.736	5.9	B	A
PCAD-123	H-Pip-Trp-Cya-Npg-Lys-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1691.670	1691.677	6.9	A	A
PCAD-124	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-His-Asp-Thi-NH ₂	Ia	1508.606	1508.608	6.0	ND	B
PCAD-125	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Hle-Asp-Thi-NH ₂	Ia	1498.647	1498.643	7.4	ND	B
PCAD-126	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Phg-NH ₂	Ia	1669.682	1669.676	6.5	B	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-127	H-Pip-Trp-Cya-Npg-Apc(NOPO)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IVb	2166.774	2166.765	7.0	A	A
PCAD-128	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Bal-NH ₂	Ia	1607.667	1607.660	6.0	B	A
PCAD-129	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NHEtTh	IId	1996.862	1996.873	5.6	B	B
PCAD-130	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-NH ₂	Ila	1402.644	1402.647	5.6	C	C
PCAD-131	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Cpg-NH ₂	Ia	1661.714	1661.706	6.6	B	A
PCAD-132	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Cit-Asp-Thi-NH ₂	Ia	1528.632	1528.634	6.4	ND	B
PCAD-133	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-gln-Ile-Tyr-Pro-NH ₂	Ia	1443.719	1443.718	6.5	ND	D
PCAD-135	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Asp-Tyr-Asp-Thi-NH ₂	Ia	1521.579	1521.575	6.2	ND	B
PCAD-136	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-OH	Id	1690.639	1690.631	6.7	A	A
PCAD-137	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe3-Tyr-Ser-Thi-NH ₂	Ila	2025.925	2025.960	6.4	B	A
PCAD-138	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-en	Id	1579.672	1579.665	5.8	B	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-139	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHiPen	IId	2109.946	2109.948	5.7	B	A
PCAD-140	H-Pip-Trp-Arg-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1694.762	1694.758	6.1	ND	B
PCAD-141	H-Pip-7Clw-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1723.616	1723.620	7.2	A	A
PCAD-142	H-Pro-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1675.639	1675.631	6.5	A	A
PCAD-144	H-Pip-Trp-Asp-Npg-Lys(DOTA)-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ila	1872.941	1872.939	6.0	C	D
PCAD-145	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NH ₂	Ila	1886.843	1886.835	5.7	B	B
PCAD-146	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Ala-NH ₂	Ia	1607.667	1607.667	6.3	B	A
PCAD-147	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Af3-NH ₂	Ia	1508.745	1508.742	6.1	ND	C
PCAD-148	H-Nmd-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1707.629	1707.637	6.7	A	A
PCAD-149	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Nle-Thi-NH ₂	Ia	1651.745	1651.742	7.7	C	A
PCAD-150	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Opa-Cya-Thi-NH ₂	Ila	2024.868	2024.876	4.7	A	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-151	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-NHHex	Ib	1620.724	1620.709	7.4	B	B
PCAD-152	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH ₂	Ila	2066.879	2066.826	5.1	A	A
PCAD-153	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Asp-Thi-NH ₂	Ila	2003.901	2003.902	6.4	A	A
PCAD-154	H-Pip-Hyw7-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ile	2091.830	2091.818	6.0	A	A
PCAD-155	H-Pip-Trp-Nmd-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1667.703	1667.713	6.4	D	D
PCAD-156	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH ₂	Ila	1961.854	1961.852	5.3	A	A
PCAD-157	H-Pip-Trp-Asp-Npg-Aib-Asn-Trp-Lys(DOTA)-Ile-Tyr-Pro-NH ₂	Ila	1828.951	1828.960	6.8	C	C
PCAD-158	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Val-Ile-Tyr-Pro-NH ₂	Ia	1414.729	1414.728	7.7	ND	C
PCAD-159	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-NH ₂	Ia	1103.496	1103.495	5.8	ND	C
PCAD-160	H-Pip-Trp-Cya-Npg-Apc-Asn-Nmw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1669.709	1669.709	6.0	B	A
PCAD-161	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2103.902	2103.932	6.4	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-162	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Fura-Cya-Thi-NH ₂	Ila	2013.852	2013.853	6.6	A	A
PCAD-164	H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Tyr-Asp-Phe-Ser-NH ₂	Ia	1598.704	1598.694	6.6	ND	B
PCAD-165	H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1481.709	1481.765	5.9	ND	C
PCAD-167	H-Pip-Trp-Cya-Tyr-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1725.618	1725.627	6.0	A	B
PCAD-168	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH ₂	Ila	2011.873	2011.906	6.6	A	A
PCAD-169	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ala-Cya-Thi-NH ₂	Ila	1983.808	1983.803	6.3	A	A
PCAD-170	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH ₂	Ila	2103.839	2103.839	6.9	A	A
PCAD-172	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Hly-Tyr-Cya-Thi-NH ₂	Ila	2011.836	2011.835	5.4	A	A
PCAD-173	H-Pip-Trp-Ala-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1609.698	1609.692	6.5	ND	B
PCAD-174	H-Pip-Trp-Cya-Npg-Gly-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1620.597	1620.605	7.0	ND	A
PCAD-175	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-1Ni-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2052.878	2052.869	6.6	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-177	H-Pip-Trp-Cya-Npg-Apc(DOTA-PEG12)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ilg	2675.186	2675.181	6.9	A	A
PCAD-178	H-Pip-Trp-Cya-Npg-Apc-Asn-Hfe-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1630.698	1630.698	6.5	B	C
PCAD-179	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Lys(DOTA)-Cya-Thi-NH ₂	Ila	2040.866	2040.883	6.0	A	A
PCAD-181	H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Arg-Ile-Tyr-Pro-NH ₂	Ia	1509.752	1509.809	5.8	ND	C
PCAD-183	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Arg-Ile-Tyr-Pro-NH ₂	Ia	1471.761	1471.760	6.5	ND	B
PCAD-184	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-1Ni-KMe3-Ala-Cya-Thi-NH ₂	Ila	1960.852	1960.843	6.3	A	B
PCAD-185	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Hfe-Tyr-Asp-Thi-NH ₂	Ia	1567.636	1567.633	7.7	ND	C
PCAD-186	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Gly-Tyr-Cya-Thi-NH ₂	Ia	1576.534	1576.543	6.8	A	B
PCAD-189	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Cpg-NH ₂	Ia	1471.750	1471.749	7.7	ND	C
PCAD-190	H-Pip-Trp-Cya-Npg-Apc-asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1689.655	1689.651	7.0	ND	A
PCAD-191	H-Pip-Trp-Lys(DOTA)-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ila	1858.962	1858.970	6.4	C	D

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-192	H-Pip-Trp-Cya-Npg-Leu-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1676.659	1676.666	8.0	A	A
PCAD-193	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Tyr-Tyr-Pro-NH ₂	Ia	1493.698	1493.698	6.5	ND	C
PCAD-194	H-Pip-Trp-Cya-Mcf-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1743.584	1743.594	6.9	A	A
PCAD-195	H-Lac-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ic	1650.607	1650.615	7.0	A	B
PCAD-196	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe2-Tyr-Cya-Thi-NH ₂	IIa	2025.852	2025.849	5.4	A	A
PCAD-197	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Asp-Thi-NH ₂	IIa	1961.817	1961.825	6.3	ND	A
PCAD-198	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-His-NH ₂	Ia	1483.725	1483.723	6.0	ND	C
PCAD-199	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-DachSS	IIc	2019.899	2019.890	6.0	B	A
PCAD-200	H-Pip-Nmw-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1703.670	1703.680	7.0	ND	A
PCAD-201	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Phe-NH ₂	Ia	1493.734	1493.731	7.6	ND	C
PCAD-202	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Bta-NH ₂	IIa	2125.850	2125.855	7.1	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-203	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-NH ₂	Ila	1771.816	1771.807	6.0	B	B
PCAD-204	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ead-Cya-Thi-NH ₂	Ila	2030.824	2030.823	5.4	A	A
PCAD-205	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Gly-Cya-Thi-NH ₂	Ia	1583.613	1583.617	6.4	ND	A
PCAD-206	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-NH ₂	Ila	1608.753	1608.759	5.8	B	B
PCAD-207	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Fura-NH ₂	Ila	2059.858	2059.864	6.5	A	A
PCAD-208	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Hci-Tyr-Cya-Thi-NH ₂	Ila	2040.827	2040.826	5.7	A	A
PCAD-209	H-Pip-Trp-Cya-Npg-Apc(DOTA)-KMe3-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2131.934	2131.937	6.3	A	A
PCAD-210	H-Pip-Trp-Cya-Pip-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1673.623	1673.634	6.1	A	B
PCAD-211	H-Pip-Trp-Thr-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1639.708	1639.704	6.5	ND	B
PCAD-212	H-Pip-Trp-Cya-Npg-Apc-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1676.659	1676.656	6.8	ND	A
PCAD-213	H-Aib-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1663.639	1663.642	6.7	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-214	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Ile-NH ₂	Ia	1459.750	1459.749	7.5	ND	B
PCAD-215	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Cha-Asp-Thi-NH ₂	Ia	1524.663	1524.659	7.7	ND	B
PCAD-216	H-Nmf-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1739.670	1739.681	7.0	A	A
PCAD-217	H-Pip-Trp-Cya-Npg-ala-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1634.612	1634.620	7.0	A	A
PCAD-218	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Nle-NH ₂	Ia	1459.750	1459.748	7.6	ND	C
PCAD-219	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-NH ₂	IIa	1438.611	1438.604	6.4	A	C
PCAD-221	H-Pip-Trp-Cya-Npg-Apc(AF488-Ttds)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IVa	2507.832	2507.839	7.0	ND	A
PCAD-222	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr(Bzl)-Asp-Thi-NH ₂	Ia	1624.658	1624.653	8.2	ND	B
PCAD-223	H-Pip-Trp-Cya-Npg-Om(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2063.835	2063.835	6.7	A	A
PCAD-224	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Lys-Thi-NH ₂	IIa	2052.936	2052.940	6.1	B	A
PCAD-225	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-NHcHex	Ib	1618.708	1618.709	7.0	B	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-228	H-Pip-Trp-Cya-Npg-Apc(DOTA-glu)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ilg	2204.877	2204.882	6.6	A	A
PCAD-229	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Cit-Tyr-Asp-Thi-NH ₂	Ia	1563.637	1563.633	6.2	ND	A
PCAD-231	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Ppa-Cya-Thi-NH ₂	Ila	2024.868	2024.875	4.7	A	A
PCAD-232	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2119.784	2119.788	6.6	A	A
PCAD-233	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Guf-Cya-Thi-NH ₂	Ila	2080.906	2080.904	4.8	A	A
PCAD-234	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe3-Tyr-Ser-Thi-NH ₂	Ila	2039.940	2039.959	6.5	B	A
PCAD-236	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Thr-Thi-NH ₂	Ila	2025.888	2025.921	6.7	A	A
PCAD-237	H-Pip-Trp-Cya-Npg-Apc(LuDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2247.752	2247.742	7.0	A	A
PCAD-238	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mpa-NH ₂	Ila	2070.874	2070.879	5.7	A	A
PCAD-239	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Lys(DOTA)-NH ₂	Ila	2050.905	2050.913	5.8	B	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-243	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2089.887	2089.909	6.4	A	A
PCAD-244	H-Pip-Trp-Cya-Chg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1701.655	1701.668	6.8	A	A
PCAD-246	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHMe	IId	2053.883	2053.882	5.3	A	A
PCAD-248	H-Pip-Trp-Cya-2Ni-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1759.639	1759.650	7.2	A	B
PCAD-249	H-Pip-Trp-Cya-Npg-Apc(DOTAM)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2072.883	2072.876	6.7	A	A
PCAD-250	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Cya-Thi-NH ₂	Ila	1997.784	1997.789	6.1	A	A
PCAD-251	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Tle-NH ₂	Ia	1459.750	1459.748	7.4	ND	B
PCAD-252	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1689.655	1689.655	6.7	A	A
PCAD-253	H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IVd	2074.851	2074.842	6.8	A	A
PCAD-255	H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIb	2089.850	2089.856	6.8	ND	ND

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-256	H-Pip-Trp-Cya-Npg-Apc(PbDOTAM)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2274.840	2274.839	6.5	A	A
PCAD-257	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-Bal-NH ₂	IIa	2110.905	2110.907	5.2	A	A
PCAD-258	H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Smc-Ile-Tyr-NH ₂	Ia	1373.623	1373.675	6.3	ND	C
PCAD-259	H-Pip-Trp-Cya-Npg-Apc(PbPSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2276.808	2276.807	6.8	A	A
PCAD-260	H-Pip-Trp-Cya-Npg-Apc(PbDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2277.792	2277.794	6.9	A	A
PCAD-261	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NH ₂	Ia	1266.559	1266.559	6.1	ND	C
PCAD-262	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Glu-Tyr-Pro-NH ₂	Ia	1459.677	1459.677	6.2	ND	C
PCAD-263	H-Pip-Trp-Cya-Npg-Apc(PbBnTCMC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2438.881	2438.889	6.7	A	A
PCAD-264	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-2Ni-Cya-Thi-NH ₂	IIa	2073.888	2073.895	6.4	A	A
PCAD-265	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Leu-Asp-Thi-NH ₂	Ia	1484.631	1484.633	7.0	ND	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-267	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Chg-Asp-Thi-NH ₂	Ia	1510.647	1510.641	7.5	ND	B
PCAD-268	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-pro-NH ₂	Ia	1443.719	1443.712	6.8	ND	C
PCAD-273	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Onf-NH ₂	IIa	2094.874	2094.879	6.7	A	A
PCAD-275	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Thi-NH ₂	IIa	1927.856	1927.861	5.9	B	B
PCAD-277	H-Pip-Trp-Val-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1427.760	1427.760	7.2	ND	B
PCAD-278	H-Pip-Trp-Nle-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1651.745	1651.753	6.9	B	B
PCAD-279	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2039.868	2039.871	5.4	A	A
PCAD-280	H-Pip-Trp-Val-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1637.729	1637.726	6.6	A	A
PCAD-281	H-Pip-Trp-Cya-Hfe-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1723.639	1723.652	6.9	A	A
PCAD-282	H-Pip-Trp-asp-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1653.688	1653.686	6.3	D	D
PCAD-283	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH ₂	IIa	2011.836	2011.834	5.4	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-284	H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ilg	2201.914	2201.913	6.5	A	A
PCAD-288	H-Pip-Trp-Asp-Npg-Thr-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1459.714	1459.712	6.4	ND	B
PCAD-289	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH ₂	Ila	2053.858	2053.856	5.4	A	A
PCAD-294	H-Pip-Trp-Cya-Npg-Apc-Gly-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1632.633	1632.633	6.9	ND	A
PCAD-295	H-Pip-Trp-Cbg-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1649.729	1649.737	6.7	B	A
PCAD-296	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Pheol-OH	Ilc	2056.883	2056.886	6.9	B	A
PCAD-297	H-Pip-Trp-Cya-Npg-Apc-Asn-1Ni-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1666.698	1666.701	6.9	A	A
PCAD-298	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Phe-Leu-Glu-NH ₂	Ia	1735.861	1735.861	8.0	ND	C
PCAD-300	H-Pip-Tpi-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH ₂	Ila	1933.900	1933.905	6.3	D	D
PCAD-301	H-Pip-Trp-Cya-Nml-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1689.655	1689.650	6.1	A	A
PCAD-303	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-Ttds-Lys(DOTA)-NH ₂	Ila	2506.114	2506.130	6.7	B	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-304	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Ac)-Tyr-Cya-Thi-NH ₂	Ila	2039.831	2039.829	5.8	A	A
PCAD-305	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-His-Tyr-Asp-Thi-NH ₂	Ia	1543.611	1543.608	5.8	ND	A
PCAD-306	H-Pip-Trp-Cya-Npg-Apc-Asn-Cha-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1622.730	1622.731	6.9	D	D
PCAD-307	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Pro-Thi-NH ₂	Ia	1635.713	1635.722	6.9	B	A
PCAD-308	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-phe-NH ₂	Ila	1921.900	1921.896	5.9	C	C
PCAD-309	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH ₂	Ila	2039.868	2039.867	5.4	A	A
PCAD-310	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Gly-Thi-NH ₂	Ia	1595.682	1595.679	6.7	ND	A
PCAD-311	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Aib-Cya-Thi-NH ₂	Ia	1611.644	1611.645	6.4	A	A
PCAD-312	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-en	IIc	2082.910	2082.912	5.0	A	A
PCAD-313	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1443.719	1443.718	7.0	ND	C
PCAD-314	H-Pip-Trp-Cya-Npg-Apc(DOTA-Kzw)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIId	2353.965	2353.958	6.6	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-316	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Amf-NH ₂	Ia	1697.714	1697.726	7.0	B	A
PCAD-318	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-His-Pro-NH ₂	Ia	1417.714	1417.715	6.2	ND	C
PCAD-319	H-Pip-Mw2-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH ₂	Ila	1935.916	1935.922	6.1	B	C
PCAD-320	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Npg-Asp-Thi-NH ₂	Ia	1498.647	1498.644	7.5	ND	B
PCAD-321	H-Lys-Trp-Asp-Phe-Ser-Asn-Trp-Smc-Ile-Tyr-Pro-NH ₂	Ia	1470.675	1470.720	6.4	ND	C
PCAD-322	H-Pip-Trp-Cya-Npg-Lys-Apc(DOTA)-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2089.887	2089.898	6.3	A	A
PCAD-323	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Chg-NH ₂	Ia	1485.766	1485.764	7.9	ND	C
PCAD-325	H-Pip-Trp-Cya-Npg-Apc-Leu-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1688.696	1688.692	8.7	A	A
PCAD-327	H-Pip-Trp-Asn-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH ₂	Ila	1996.837	1996.836	5.3	A	A
PCAD-328	H-Pip-Trp-Leu-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1651.745	1651.753	6.8	B	A
PCAD-330	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Glu-Ile-Tyr-Pro-NH ₂	Ia	1444.703	1444.703	7.0	ND	C

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-331	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Nmy-Asp-Phe-NH ₂	Ila	1935.916	1935.920	6.1	C	C
PCAD-332	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Lys-Thi-NH ₂	Ia	1666.756	1666.753	6.3	B	A
PCAD-333	H-Pip-Trp-Cya-Npg-Apc(NOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	1974.787	1974.791	6.9	A	A
PCAD-334	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Dopa-Cya-Thi-NH ₂	Ila	2055.863	2055.860	5.1	A	A
PCAD-336	H-Pip-Trp-Eep-Npg-Aib-Asn-6Clw-Gln-NH ₂	Ia	1194.505	1194.501	5.6	ND	C
PCAD-342	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Mpa-Cya-Thi-NH ₂	Ila	2024.868	2024.875	4.5	A	A
PCAD-343	H-Ala-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1649.623	1649.630	6.6	A	A
PCAD-344	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Fso-Thi-NH ₂	Ia	1765.686	1765.683	7.2	ND	A
PCAD-347	H-Pip-Bta-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1706.616	1706.613	7.3	A	B
PCAD-349	H-Pip-Bmw-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2089.850	2089.862	6.9	A	A
PCAD-350	H-Pip-Trp-Cya-Npg-Apc(GaDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2141.737	2141.727	6.7	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-351	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NHPrPh	Ib	1384.637	1384.633	7.6	ND	C
PCAD-353	H-Nmk(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	IIb	1876.936	1876.930	6.4	ND	C
PCAD-355	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Hse-Tyr-Asp-Thi-NH ₂	Ia	1507.600	1507.597	6.3	ND	A
PCAD-356	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-Trp-Gln-Tyr-Asp-Phe-NH ₂	IIa	1921.900	1921.900	6.1	B	B
PCAD-357	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH ₂	IIa	1975.869	1975.867	5.4	A	A
PCAD-359	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2075.835	2075.830	6.6	A	A
PCAD-360	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Val-NH ₂	Ia	1445.734	1445.733	7.2	ND	C
PCAD-362	H-Nmv-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1691.670	1691.689	6.7	A	B
PCAD-364	H-Pip-Trp-Cya-Npg-Apc-Ala-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1646.649	1646.647	6.9	ND	A
PCAD-365	H-Tap(DOTA)-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	IIb	1846.889	1846.884	6.4	ND	C
PCAD-366	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Dip-NH ₂	IIa	2145.910	2145.916	7.3	B	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-367	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-Leu-NH ₂	Ia	1556.803	1556.801	7.5	ND	B
PCAD-368	H-Pip-Trp-Asp-Npg-Ams-Lys(DOTA)-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ila	1858.962	1858.980	6.3	C	B
PCAD-369	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Glu-Cya-Thi-NH ₂	Ia	1655.634	1655.642	6.4	ND	A
PCAD-371	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Om-Tyr-Cya-Thi-NH ₂	Ila	1983.805	1983.802	5.3	A	A
PCAD-372	H-Pip-Trp-Lys(DOTA)-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2052.936	2052.952	6.0	A	B
PCAD-373	H-Pip-Trp-Cya-Npg-Apc-Tyr-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1738.675	1738.673	6.9	ND	A
PCAD-375	H-Pip-Trp-Cya-Npg-Apc(NODAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2046.808	2046.814	6.9	A	A
PCAD-376	H-Pip-Trp-Ile-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1441.776	1441.775	7.3	ND	B
PCAD-378	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Guf-Tyr-Cya-Thi-NH ₂	Ila	2073.827	2073.825	5.5	B	B
PCAD-380	H-Pip-Trp-Cya-Npg-Apc-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1703.707	1703.715	6.5	ND	A
PCAD-381	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Val-NH ₂	Ia	1635.698	1635.712	6.5	B	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-382	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Pcof-Cya-Thi-NH ₂	Ila	2067.863	2067.861	5.3	A	B
PCAD-383	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH ₂	Ila	2033.788	2033.800	6.7	A	A
PCAD-386	H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Tyr-Asp-Phe-Ser-Glu-NH ₂	Ia	1727.747	1727.744	6.5	ND	B
PCAD-389	H-Pip-Trp-Tle-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1651.745	1651.753	6.6	B	A
PCAD-390	H-Pip-Trp-Asp-Npg-Ams-Asp-Trp-Gln-Tyr-Asp-Phe-NH ₂	Ia	1511.672	1511.671	6.7	ND	B
PCAD-391	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Aib-Ile-Tyr-Pro-NH ₂	Ia	1400.713	1400.712	7.3	ND	D
PCAD-394	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Glu-NH ₂	Ia	1665.672	1665.673	6.1	B	A
PCAD-395	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Trp-Pro-NH ₂	Ia	1466.735	1466.735	7.6	ND	C
PCAD-396	H-Pip-Trp-Cya-Npg-Tyr-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1726.639	1726.647	7.4	A	A
PCAD-397	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Gln-NH ₂	Ila	1530.702	1530.694	5.4	C	C
PCAD-399	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Phe-Pro-NH ₂	Ia	1427.724	1427.724	7.5	ND	C

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-401	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHPr	IId	2081.915	2081.916	5.7	A	A
PCAD-402	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Lys(DOTA)-Thi-NH ₂	Ila	2052.936	2052.950	6.4	B	A
PCAD-406	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Hle-NH ₂	Ia	1473.766	1473.764	7.9	ND	C
PCAD-407	H-Pip-Trp-Cya-Npg-Apc-Asn-Bta-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1672.655	1672.656	6.9	A	A
PCAD-411	H-Pip-Trp-Cha-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1691.776	1691.777	7.4	B	B
PCAD-412	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Ile-Asp-Thi-NH ₂	Ia	1484.631	1484.632	7.1	ND	B
PCAD-413	H-Pip-Trp-Cya-Npg-Apc(InDOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	VII	2185.715	2185.705	6.9	A	A
PCAD-414	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH ₂	Ila	2033.788	2033.788	5.7	A	A
PCAD-415	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Ala-Cya-Thi-NH ₂	Ia	1597.628	1597.635	6.6	ND	A
PCAD-416	H-Pip-Trp-Cya-Npg-Apc-Ams-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1676.659	1676.659	6.9	A	A
PCAD-417	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Off-NH ₂	Ila	2087.869	2087.869	6.8	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-419	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Nle-Tyr-Asp-Thi-NH ₂	Ia	1519.636	1519.632	7.5	ND	B
PCAD-420	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHEt	IId	2067.899	2067.901	5.5	A	A
PCAD-421	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Ala-Thi-NH ₂	Ia	1609.698	1609.695	7.0	ND	A
PCAD-423	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH ₂	Ila	2053.858	2053.856	5.4	A	A
PCAD-424	H-Nma-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2049.819	2049.830	6.5	A	A
PCAD-425	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-1Ni-NH ₂	Ila	2119.894	2119.893	7.2	A	A
PCAD-426	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Gln-Tyr-NHEtPh	Ib	1370.621	1370.619	7.4	ND	C
PCAD-427	H-Pip-Trp-Cya-Val-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1661.623	1661.638	6.2	A	A
PCAD-428	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH ₂	Ia	1625.693	1625.691	6.8	ND	A
PCAD-429	H-Pip-Trp-Pcof-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1729.719	1729.717	6.6	A	B
PCAD-430	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Dab-Cya-Thi-NH ₂	Ia	1626.655	1626.654	6.1	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-432	H-Pip-Trp-Asp-Npg-Aib-Asn-6Clw-Asn-Tyr-Asp-Thi-NH ₂	Ia	1520.595	1520.591	6.1	ND	A
PCAD-434	H-Pip-Trp-Cya-Npg-Apc(DOTAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2147.856	2147.852	6.8	A	A
PCAD-437	H-Pip-Trp-Cya-Nle-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1675.639	1675.650	6.6	A	A
PCAD-438	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Tyr-NH ₂	Ia	1699.693	1699.694	6.3	B	A
PCAD-440	H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Ser-NH ₂	Ia	1623.662	1623.675	6.3	B	A
PCAD-442	H-Pip-Trp-Asp-Npg-Dap-Asn-Trp-Gln-Ile-Tyr-Pro-NH ₂	Ia	1443.730	1443.729	5.8	ND	B
PCAD-443	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Ile-Tyr-Thi-NH ₂	Ia	1499.691	1499.688	7.5	ND	B
PCAD-445	H-Pip-Trp-Asp-Npg-Aib-Asp-Trp-Gln-Thr-Tyr-Pro-NH ₂	Ia	1431.682	1431.682	6.2	ND	C
PCAD-448	H-KMe4-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIc	2149.932	2149.925	6.2	A	A
PCAD-449	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH ₂	IIa	1997.821	1997.818	5.4	A	A
PCAD-452	H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egg-Tyr-Cya-Thi-NH ₂	IIa	2023.836	2023.829	5.1	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-453	H-Nms-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1679.634	1679.644	6.7	A	A
PCAD-454	H-Pip-Trp-Cya-Phe-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1709.623	1709.635	6.6	A	A
PCAD-456	H-Pip-Trp-Cya-Npg-Apc-Asn-Pcf-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1650.644	1650.645	6.8	B	B
PCAD-459	H-Pip-Trp-Cya-Phg-Apc-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ia	1695.608	1695.620	6.4	A	A
PCAD-460	H-Nmg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2035.803	2035.809	6.6	A	A
PCAD-461	H-Ida-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2079.793	2079.803	6.5	A	A
PCAD-462	H-Pip-Trp-Cya-Gel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2089.850	2089.860	6.9	A	A
PCAD-463	H-Mida-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2093.809	2093.811	6.4	A	A
PCAD-464	H-Mdab(Me)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2092.861	2092.865	6.3	A	A
PCAD-465	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Ala-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2032.829	2032.831	6.6	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-466	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Val-Cya-Thi-NH ₂	Ila	2011.840	2011.842	6.9	A	A
PCAD-467	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH ₂	Ila	2102.846	2102.849	6.4	A	A
PCAD-468	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2062.839	2062.856	6.6	A	A
PCAD-470	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Ala-Tyr-Cya-Thi-NH ₂	Ila	1976.730	1976.745	6.8	A	A
PCAD-471	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Thr-Tyr-Cya-Thi-NH ₂	Ila	2006.740	2006.755	6.8	A	A
PCAD-472	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Gln-Tyr-Cya-Thi-NH ₂	Ila	2033.751	2033.767	6.6	A	A
PCAD-474	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Gly-Cya-Thi-NH ₂	Ila	1969.793	1969.810	6.2	A	A
PCAD-476	H-Pip-Nmw-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2089.850	2089.868	6.8	A	A
PCAD-478	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NH ₂	Ila	1922.810	1922.812	6.2	A	A
PCAD-479	H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2133.800	2133.787	6.9	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-480	H-Pip-Trp-Cya-Mgel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIb	2103.866	2103.859	6.8	A	A
PCAD-481	H-Pip-Trp-Cya-Npg-Ala-Asn-6Clw-NH ₂	Ia	997.388	997.389	6.7	B	C
PCAD-489	H-Pip-Trp-Penox-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2103.866	2103.879	6.7	A	A
PCAD-491	H-Nmo(Me)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2106.877	2106.885	6.3	A	A
PCAD-492	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Dab(Me)-Cya-Thi-NH ₂	IIIe	2026.851	2026.847	6.0	A	A
PCAD-529	H-Pip-Trp-Cya-Npg-Dab(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2049.819	2049.825	5.7	A	A
PCAD-530	H-Mor-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2077.814	2077.821	5.7	A	A
PCAD-532	H-Nms-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2065.814	2065.822	5.7	A	A
PCAD-534	H-Nme-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2107.825	2107.831	5.7	A	A
PCAD-536	H-Nmt-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2079.830	2079.836	5.7	A	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-537	H-Nmo-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2092.861	2092.868	5.5	A	A
PCAD-542	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2048.824	2048.831	5.7	A	A
PCAD-543	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Nms-Cya-Thi-NH ₂	IIa	2013.819	2013.827	5.3	A	A
PCAD-544	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Nmg-Cya-Thi-NH ₂	IIa	1983.808	1983.818	5.3	A	A
PCAD-547	H-Pip-Trp-Cya-Nml-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2075.835	2075.841	5.5	A	A
PCAD-549	H-Nmd-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2093.809	2093.815	5.7	A	A
PCAD-551	H-Ppaz-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2076.830	2076.836	5.4	A	A
PCAD-553	H-Nipa-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIf	2077.850	2077.851	5.8	A	A
PCAD-576	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Bmt-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2076.855	2076.851	6.1	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-578	H-Apg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2078.846	2078.836	6.0	A	A
PCAD-579	H-Pip-Trp-Cya-Cpg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIa	2073.819	2073.811	6.1	A	A
PCAD-580	H-Azp-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2089.850	2089.840	6.3	A	A
PCAD-581	H-Aeg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2064.830	2064.818	6.0	A	B
PCAD-583	H-Nglu-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIg	2093.809	2093.631	6.2	A	A
PCAD-584	H-Mcya-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2129.776	2129.775	5.6	A	B
PCAD-585	H-Mdab-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2078.846	2078.845	5.4	A	A
PCAD-586	H-Nea-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2063.835	2063.831	5.7	A	A
PCAD-587	H-Heg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2065.814	2065.816	5.6	A	A

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-598	H-Mdap-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIe	2064.830	2064.827	5.5	A	C
PCAD-599	H-Nmn-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2092.825	2092.823	5.7	A	A
PCAD-600	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH ₂	IIa	2069.878	2069.875	5.8	A	A
PCAD-601	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Pmy-NH ₂	IIa	2099.889	2099.885	5.9	B	A
PCAD-602	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Mof3-NH ₂	IIa	2099.889	2099.885	5.9	A	A
PCAD-603	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Cpa-NH ₂	IIa	2061.910	2061.904	6.0	A	A
PCAD-604	H-Nmq-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIh	2106.841	2106.842	5.6	A	A
PCAD-606	H-Ngln-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIg	2092.825	2092.829	5.7	A	A
PCAD-607	H-Nasn-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	IIIg	2078.809	2078.811	5.6	A	B

ID	Sequence	Synthesis	Calc. Mass	Found Mass	tR / min	pIC50 CAT	pKD CAT
PCAD-609	H-Pip-Trp-Cya-Npg-Dap(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	Ila	2035.803	2035.798	5.6	A	A

Example 26: Surface plasmon resonance assay for assessment of binding selectivity

Surface plasmon resonance (SPR) study was performed using a Biacore™ T200 SPR system (Cytiva, formerly GE Life Sciences) to assess binding of PCAD-359 to recombinant E-cadherin protein (anti-target). For direct comparison, binding to recombinant P-cadherin (target) served as positive control in this assay.

The recombinant proteins comprising the extracellular domains of human E-cadherin (E-cadherin-Fc, Sino Biological, #10204-H02H, as the processed mature protein including amino acids Asp155-Ile707 according to UniProt entry P12830-1 (SEQ ID NO: 2) and Fc region of human IgG1 at the C-terminus) and human P-cadherin (P-cadherin-Fc, R&D Systems Biological, #861-PC-100, including amino acids Asp108 - Gly654 according to UniProt entry P22223 (SEQ ID NO: 1) and Fc region of human IgG1 at the C-terminus) were immobilized on two different flow cells (2 and 4 respectively) of the Protein A-Chip (Cytiva, CAT 29127555) according to the supplier's instructions. The proteins were diluted in Running Buffer (10 mM HEPES, 150 mM NaCl, 0.1% DMSO, 0.05% Tween-20, 1 mM CaCl₂, pH 7.4) to a final concentration of 250 nM (E-cadherin-Fc) or 100 nM (P-cadherin-Fc) and then flushed over the Protein A-Chip to immobilize ~2500 RUs.

Stock solution of the test compound was prepared by dissolving in DMSO. DMSO stock solution was diluted 1:1000 in Running Buffer without DMSO. Further sequential dilutions were made with Running Buffer containing 0.1% DMSO. SPR binding analysis was performed in Single Cycle Kinetic (SCK) mode at 25°C. Flow cell 1 without immobilized proteins served as reference flow cell. The chip was regenerated with 10 mM Glycine, pH 1,5 to remove the proteins from the chip surface after each SCK run. A blank run with Running Buffer instead of the test compound was performed at the beginning and the end of the experiment to correct for baseline drifts (double reference subtraction method). Table 11 describes the protocol steps for SCK measurements on E-cadherin-Fc and P-cadherin-Fc.

Table 11: SPR protocol steps for SCK with E-cadherin-Fc and P-cadherin-Fc immobilized on a Protein A-Chip.

Step	Injected solution	Flow Cell	Contact time	Flow rate
Startup cycle as a triple run: Washing & surface regeneration	Running Buffer Regeneration Solution	all	60 s 5 s	30 μ L/min
Binding Antitarget protein	250 nM E-cadherin-Fc	2	300 s	5 μ L/min
Binding Target protein	100 nM P-cadherin-Fc	4	300 s	5 μ L/min
Washing (removal of unbound Target)	Running Buffer	all	60 s	30 μ L/min
Washing (stabilization of baseline)	Running Buffer	all	500 s	30 μ L/min
1. Binding kinetics of test compound	Lowest compound concentration (8 - 40 nM)	all	120 s	30 μ L/min
2. Binding kinetics of test compound	Intermediated compound concentration (40 - 200 nM)	all	120 s	30 μ L/min
3. Binding kinetics of test compound	Highest compound concentration 200 - 1000 nM)	all	120 s	30 μ L/min
Dissociation cycle	Running Buffer	all	1200 s	30 μ L/min
Regeneration 3x	10 mM Glycine, pH 1,5	all	60 s	5 μ L/min

- SPR raw data sensorgrams were recorded using the Biacore™ T200 control software.
- 5 Sensorgrams were processed and analyzed with the Biacore™ Insight Evaluation software. The signal of the reference flow cell (without Target or Antitarget proteins) was subtracted from the active flow cell signal (immobilized proteins) to obtain a reference subtracted sensorgram. The reference subtracted sensorgram was further corrected for baseline drift by subtracting the sensorgram of a reference subtracted blank run (Running Buffer only). The dissociation
- 10 constant (K_D) was calculated from the double reference subtracted sensorgrams using the 1:1 Langmuir binding model. The pK_D value (negative decadic logarithm of dissociation constant) was calculated using Microsoft Excel.

The results of this assay for a selection of compounds according to the present invention are presented in Table 12. pK_D category A stands for pK_D values > 8.5, category B for pK_D values from 7.5 to 8.4, category C for pK_D values from 6.5 to 7.4, and category D for pK_D values < 6.5.

5 Table 12. Compound ID, sequence, and pK_D categories for P-cad and E-cad SPR activity assay

ID	Sequence	pK _D CAT of binding to P-cadherin	pK _D CAT of binding to E-cadherin
PCAD- 359	H-Pip-Trp-Cya-Npg- Apc(DOTA)-Asn-6Clw- KMe3-Tyr-Cya-Thi-NH ₂	A	D

Example 27: Plasma stability assay

In order to determine the stability of selected compounds of the invention in human and mouse plasma, a plasma stability assay was carried out. Such plasma stability assay measures
 10 degradation of compounds of the present invention in blood plasma. This is an important characteristic of a compound as compounds, with the exception of pro-drugs, which rapidly degrade in plasma, generally show poor *in vivo* efficacy. The results show that those compounds are highly stable in human and mouse plasma. The stability is sufficient for the diagnostic, therapeutic and theragnostic use of these compounds according to the present invention.

15 The plasma stability samples were prepared by spiking 50 µl plasma aliquots (all K2EDTA) with 1 µl of a 0.5 mM compound stock solution in DMSO. After vortexing the samples were incubated in a Thermomixer at 37°C for 0 and 6 hours. After incubation the samples were stored on ice until further treatment. All samples were prepared in duplicates.

A suitable internal standard was added to each sample (1 µl of a 0.5 mM stock solution in
 20 DMSO). Protein precipitation was performed using two different methods depending on the compound conditions as indicated in Table 8.

A) 250 µl of acetonitrile containing 1% trifluoroacetic acid was added. After incubation at room temperature for 30 min the precipitate was separated by centrifugation and 150 µl of the supernatant was diluted with 150 µl of 1% aqueous formic acid.

25 B) 150 µl of a zinc sulphate precipitation agent containing 78% 0.1 M zinc sulphate and 22% acetonitrile was added. After incubation at room temperature for 30 min the precipitate was

separated by centrifugation. To 100 µl of the supernatant 10 µl of 1% formic acid was added followed by further incubation at 60°C for 10 min to complete the formation of the zinc chelate, if the compound contains a free DOTA moiety.

The determination of the analyte in the clean sample solutions was performed on an Agilent 1290 UHPLC system coupled to an Agilent 6530 Q-TOF mass spectrometer. The chromatographic separation was carried out on a Phenomenex BioZen XB-C18 HPLC column (50 x 2 mm, 1.7 µm particle size).

Two different elution gradients were applied using a mixture of 0.1% formic acid in water as eluent A and acetonitrile as eluent B:

- 10 A) 2% B to 41% in 7 min, 800 µl/min, 40°C.
- B) 5% B to 50% B in 6 min, 800 µl/min, 40°C.

Mass spectrometric detection was performed in positive ion ESI mode by scanning the mass range from m/z 50 to 3000 with a sampling rate of 2 / sec.

From the mass spectrometric raw data the ion currents for the double or triple charged monoisotopic signal was extracted for both, the compound and the internal standard.

Quantitation was performed by external matrix calibration with internal standard using the integrated analyte signals.

Additionally, recovery was determined by spiking a pure plasma sample that only contained the internal standard after treatment with a certain amount of the compound.

20 Carry-over was evaluated by analysis of a blank sample (20% acetonitrile) after the highest calibration sample.

The results of this assay performed on some of the compounds according to the present invention are given in the following Table 13. The result is stated as “% intact compound remaining after 6 h incubation” and means that from the amount of material at the start of the experiment the stated percentage is detected as unchanged material at the end of the experiment by LC-MS quantification. Since all compounds are more than 50% intact after 6 h they are considered as stable enough for diagnostic and therapeutic applications.

Table 13. Results of the plasma stability assay

Compound	Protein precipitation method	LC-MS method	% intact compound remaining after 6h incubation	
			Human plasma	Mouse plasma
PCAD-120	A	A	ND	> 95%
PCAD-098	A	A	ND	81%
PCAD-157	A	A	ND	87%
PCAD-119	A	A	ND	93%
PCAD-390	A	B	ND	92%
PCAD-275	A	A	ND	94%
PCAD-197	A	A	ND	84%
PCAD-117	A	A	ND	> 95%
PCAD-283	A	A	ND	88%
PCAD-357	A	A	ND	> 95%
PCAD-289	A	A	ND	> 95%
PCAD-279	A	A	ND	> 95%
PCAD-106	B	A	ND	76%
PCAD-359	B	A	89%	92%
PCAD-072	B	A	ND	65%
PCAD-223	B	A	ND	92%
PCAD-249	B	A	> 95%	> 95%
PCAD-253	B	A	> 95%	88%
PCAD-255	B	A	ND	> 95%

Example 28: Proteolytic stability assay against NEP

Peptides are often sensitive to proteolytic cleavage in the blood (Werle *et al.*, *Amino Acids*,
5 2006, 30, 351-367). If peptides degrade rapidly, in vivo elimination could be dominated by

metabolism. Since metabolites often demonstrate poor binding to the target, performance of the compound during radiopharmaceutical use (diagnostic or therapeutic) can be significantly decreased. Therefore, evaluating the stability of the compound against proteases in the early stages of compound development is essential.

5 Two classes of proteases and peptidases can be found in the blood circulation: soluble and membrane-bound proteases. The conduction of a plasma stability study only covers the impact of the soluble fraction on compound stability, since all membrane-bound proteases are separated during blood collection (proteins expressed on the surface of blood vessels) or during plasma generation (proteins expressed on blood cells). Thus, the result of a plasma stability
10 assay is not always predictive for in vivo behavior.

Membrane-bound peptidases are mainly responsible for the activation and deactivation of bioactive peptides, such as hormones, cytokines, and neurohormones (Antczak *et al.*, *Bioessays*, **2001**, 23, 251-260). They activate hormones by cleavage of a pre-hormone and deactivate them through another cleavage step. Activation is usually very specific, as well as the activation
15 peptidases, including ACE, ECE, and DPPIV. With a specific activation, signaling remains specific even if deactivation is more unspecific. Thus, several peptidases that are mainly responsible for hormone deactivation reveal a broad substrate pattern (e.g, neutral endopeptidase , meprines). It is not possible to assess all peptidases during early compound development. Therefore, more importance should be focused on those peptidases with broad
20 substrate patterns, since it is more likely that the peptide sequence fits into this pattern.

NEP (neutral endopeptidase, EC 3.4.24.11, CD10, CALLA, endopeptidase 24.11, enkephalinase, neprilysin, membrane metallopeptidase A) is a membrane-bound metallopeptidase. It is expressed on neutrophils and highly active in blood (Antczak *et al.*, *Bioessays*, **2001**, 23, 251-260). In addition, the cleavage pattern of NEP is very broad, covering
25 many different peptide hormones, with more than 50 different natural substrates already described (Bayes-Genis *et al.*, *Journal of the American College of Cardiology*, **2016**, 68, 639-653). NEP preferably cleaves amide bonds between a hydrophilic and hydrophobic amino acid (preferably leucine or phenylalanine), even in small cyclic peptides such as CNP. Plamboeck et al. (2005) showed a significant impact of NEP caused cleavage on the pharmacokinetic
30 behavior of peptides (Plamboeck *et al.*, *Diabetologia*, **2005**, 48, 1882-1890).

To assess the stability of compounds against NEP, the compounds were subjected to an in vitro assay based on the protocol described by Edelson et al. (Edelson *et al.*, *Pulmonary pharmacology & therapeutics*, **2013**, 26, 229-238).

Recombinant soluble human NEP (BioTechne, Wiesbaden, Germany) at a concentration of 100 ng/ml was mixed with the compound (10 μ M) and a stable internal standard (10 μ M) and incubated at 37°C. After several time points, samples were taken and analyzed with LC-MS.

The determination of the analyte in the clean sample solutions was performed on an Agilent 1290 UHPLC system coupled to an Agilent 6530 Q-TOF mass spectrometer. The chromatographic separation was carried out on a Phenomenex BioZen XB-C18 HPLC column (50 x 2 mm, 1.7 μ m particle size) with gradient elution using a mixture of 0.1% formic acid in water as eluent A and acetonitrile as eluent B (2% B to 41% in 7 min, 800 μ l/min, 40°C). Mass spectrometric detection was performed in positive ion ESI mode by scanning the mass range from m/z 50 to 3000 with a sampling rate of 2 / sec.

From the mass spectrometric raw data the ion currents for the double or triple charged monoisotopic signal was extracted for both, the compound and the internal standard.

Quantitation was performed by external matrix calibration with internal standard using the integrated analyte signals.

The activity of NEP was examined using a commercially available chromogenic substrate of NEP.

The results of this assay performed on some of the compounds according to the present invention are given in the following Table 14. The result is stated as “% intact compound remaining after 24 h incubation” and means that from the amount of material at the start of the experiment the stated percentage is detected as unchanged material at the end of the experiment by LC-MS quantification. Since all compounds are more than 50% intact after 24 h they are considered as stable enough for diagnostic and therapeutic applications.

Table 14. Results of the NEP stability assay

Compound	% intact compound remaining after 24h incubation
PCAD-120	93%
PCAD-119	54%
PCAD-390	> 95%
PCAD-283	89%
PCAD-279	> 95%

PCAD-106	93%
PCAD-359	> 95%
PCAD-255	92%

Example 29: ^{111}In -, ^{68}Ga - and ^{177}Lu -labeling of selected compounds

In order to serve as a diagnostically, therapeutically, or theranostically active agent, a compound needs to be labeled with a radioactive isotope. The labeling procedure needs to be appropriate to ensure a high radiochemical yield and purity of the radiolabeled compound of the invention. This example shows that the compounds of the present invention are appropriate for radiolabeling and can be labeled in high radiochemical yield and purity.

For ^{111}In -labeling, ~90 MBq of $^{111}\text{InCl}_3$ (in 0.02 M HCl; Curium, Germany) were mixed with 1 nmol of compound (200 μM stock solution diluted from 10 mM stock solution in DMSO with 0.1 M HEPES) per 30 MBq and radiolabeling buffer (1 M ammonium acetate pH 5.5) at a final buffer concentration of 0.1 M. The mixture was heated to 90 °C for 15-20 min. After cooling down, ascorbic acid (Woerwag Pharma, Germany), DTPA (Heyl, Germany) and TWEEN-20 were added at a final concentration of 25 mg/ml, 0.1 mg/ml and 0.1%, respectively.

Radiochemical purity was analyzed by HPLC. 5 μl of diluted labeling solution was analyzed with a Poroshell SB-C18 2.7 μm , 2.1 x 50 mm (Agilent). Eluent A: H_2O , 0.1 % TFA eluent B: ACN, gradient from 5% B to 70% B within 15 min, flow rate 0.5 ml/min; detector: NaI (Raytest), DAD 230 nm. The peak eluting with the dead volume represents free radionuclide, the peak eluting with the peptide-specific retention time as determined with an unlabeled sample represents radiolabeled compound. Radiochemical purity was usually > 90% at end of synthesis. Exemplary radiochemical purities for ^{111}In -labeled compounds are shown in Table 15. An exemplary radiochromatogram is shown in Fig. 2A with all peaks labeled with their retention times.

Table 15. Radiochemical purity of ^{111}In -labeled compounds at end of synthesis as measured by HPLC.

Compound ID	HPLC retention time [min]	HPLC area%
^{111}In -PCAD-197	8.4	96.4
^{111}In -PCAD-117	8.4	95.9

¹¹¹ In-PCAD-449	8.0	96.2
¹¹¹ In-PCAD-283	8.1	95.7
¹¹¹ In-PCAD-196	8.1	91.5
¹¹¹ In-PCAD-357	8.3	98.1
¹¹¹ In-PCAD-289	8.2	95.9
¹¹¹ In-PCAD-279	8.0	90.6
¹¹¹ In-PCAD-106	8.2	98.3
¹¹¹ In-PCAD-359	8.1	98.3
¹¹¹ In-PCAD-152	7.8	98.6
¹¹¹ In-PCAD-062	7.8	95.3

For ⁶⁸Ga-labeling, 500 µl Ga-68 eluate (200-250 MBq; 0.1 M HCl) was mixed with radiolabeling buffer (2 M ammonium acetate buffer containing 25 mg/ml ascorbic acid pH 5.5) at a final buffer concentration of 0.2 M. Then 1 nmol of compound (200 µM stock solution diluted from 10 mM stock solution in DMSO with ultrapure water) per 20 MBq was added. The mixture was heated to 40 °C (PCAD-333, PCAD-375) or 95 °C (all other compounds) for 10 min. After cooling down, 5 µl of a 5 mM EDTA solution was added. The reaction mixture was then transferred onto a pre-conditioned (50 µl absolute ethanol followed by 500 µl water) Water Oasis HLB 1 cc Vac cartridge. The column was washed with 200 µl water and the product eluted in 25 µl fractions of absolute ethanol into vials containing each 200 µl PBS buffer, 23 µl 25 mg/ml ascorbic acid and 2 µl 5 mM EDTA solution. The activity of each fraction was measured and the radiochemical purity of the 2-3 fractions containing the highest amount of radioactivity was determined and used for further experimentation.

Radiochemical purity was analyzed by HPLC. 5 µl of diluted labeling solution was analyzed with a Poroshell SB-C18 2.7 µm, 2.1 x 50 mm (Agilent). Eluent A: H₂O, 0.1 % TFA eluent B: ACN, gradient from 5% B to 70% B within 15 min, flow rate 0.5 ml/min; detector: NaI (Raytest), DAD 230 nm. The peak eluting with the dead volume represents free radionuclide, the peak eluting with the peptide-specific retention time as determined with an unlabeled sample represents radiolabeled compound. Radiochemical purity was usually > 90% at end of synthesis. Exemplary radiochemical purities for ⁶⁸Ga-labeled compounds are shown in

Table 16. An exemplary radiochromatogram is shown in Fig. 2B with all peaks labeled with their retention times.

Table 16: Radiochemical purity of ^{68}Ga -labeled compounds at end of synthesis as measured by HPLC.

Compound ID	HPLC retention time [min]	HPLC area%
^{68}Ga -PCAD-279	7.9	99.5
^{68}Ga -PCAD-359	8.0	99.4
^{68}Ga -PCAD-424	7.8	99.9
^{68}Ga -PCAD-333	8.0	99.1
^{68}Ga -PCAD-375	7.9	99.9
^{68}Ga -PCAD-434	7.9	99.7
^{68}Ga -PCAD-284	7.8	99.2
^{68}Ga -PCAD-314	7.6	99.9
^{68}Ga -PCAD-127	7.8	99.9
^{68}Ga -PCAD-168	8.0	94.9
^{68}Ga -PCAD-161	7.7	98.7

5

For ^{177}Lu -labeling, an aliquot containing the desired amount of radioactivity of $^{177}\text{LuCl}_3$ (in 0.04 M HCl; Isotopia, Israel) was mixed with the 3.5-fold volume of 1 M ammonium acetate (pH 5.5). Then 1 nmol of compound (200 μM stock solution diluted from 10 mM stock solution in DMSO with ultrapure water) per 30 MBq was added. The mixture was heated to 90 °C for 20 min. After cooling down, the reaction was quenched with equal volume of 50 mg/ml ascorbic acid: 10 mM DTPA (10:1) and formulated in PBS.

10

Radionuclide incorporation was analyzed by TLC (Whatman paper; 0.1 M EDTA) as > 99% at end of synthesis. An exemplary Radio-TLC chromatogram is shown in Fig. 2C.

Example 30: Imaging studies

15

Radioactively labeled compounds can be detected by imaging methods such as SPECT and PET. Furthermore, the data acquired by such techniques can be confirmed by direct measurement of radioactivity contained in the individual organs prepared from an animal

injected with a radioactively labeled compound of the disclosure. Thus, the biodistribution (the measurement of radioactivity in individual organs) of a radioactively labeled compound can be determined and analyzed. This example shows that the compounds of the present disclosure show a biodistribution appropriate for diagnostic imaging and therapeutic treatment of tumors.

5 **SPECT/CT Imaging**

All animal experiments were conducted in compliance with the German or Greece animal protection laws. Different animal models were used to investigate the compounds of the disclosure. Female NMRI nude mice (6-8 weeks old, Janvier Labs, France) were inoculated with 1×10^7 cells of a HEK293 clone stably expressing human P-cadherin (HEK-P-cad) in the right shoulder. All cell lines were injected in serum free media with Matrigel (1:1). When tumors reached an appropriate size, the mice received ~ 30 MBq ^{111}In -labelled or ^{177}Lu -labelled compounds of the disclosure (diluted to ~ 100 μl with PBS) administered intravenously via the tail vein. SPECT/CT images were obtained using the γ -CUBE and the X-CUBE system (MOLECUBES NV, Gent, Belgium) respectively, applying exemplarily the following acquisition and reconstruction parameters (Table 17 and Table 18).

Table 17: Acquisition and reconstruction parameters for SPECT (γ -CUBE)

SPECT parameters ¹¹¹ In			
Animals per bed	2 or 3		
Type of SPECT scanning	Spiral, whole body		
Energy Window (s)	Peaks (KeV)		Energy window (%)
	Peak 1	171.28	±10%
	Peak 2	245.35	±10%
Reconstruction	Spiral protocol, MLEM algorithm, 500 μm resolution		
SPECT parameters ¹⁷⁷ Lu			
Animals per bed	2		
Type of SPECT scanning	Spiral, whole body		
Energy Window (s)	Peaks (KeV)		Energy window (%)
	Primary	113	±10%
	Secondary	210	±10%

Reconstruction	Spiral protocol, MLEM algorithm, 500 µm resolution
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Table 18 Acquisition and reconstruction parameters for CT (X-CUBE).

CT Parameters	
Animals per bed	2 or 3
Type of CT scanning	Spiral high-resolution
Pitch	1.4
X-ray power (kVp)	50
Exposure time (ms)	32
Reconstruction resolution ((µm)	100 µm or 200 µm
Binning	1

Imaging data were saved as DICOM files and analysed using VivoQuant™ software (Invicro,
5 Boston, USA). Two to four animals were used per time point. Results are expressed as a
percentage of injected dose per gram of tissue (%ID/g).

PET/CT Imaging

All animal experiments were conducted in compliance with the German or Greece animal
protection laws. Female NMRI nude mice (6-8 weeks old, Janvier Labs, France) were
10 inoculated with 1x10⁷ HEK-P-cad cells in the right shoulder. When tumors reached an
appropriate size, the mice received ~ 2-4 MBq ⁶⁸Ga-labelled compounds of the disclosure
(diluted to ~ 100 µl with PBS) administered intravenously via the tail vein.

PET imaging for was performed 15 minutes, 1 hour, and 3 hours post-injection using a β-CUBE
(MOLECUBES NV, Gent, Belgium). CT imaging was performed using a X-CUBE
15 (MOLECUBES NV, Gent, Belgium).

Table 20 Acquisition and reconstruction parameters for PET β-eye tomographic system

PET parameters	
Animals per bed	1 (whole body)
Photodetectors	Silicon Photomultipliers

Scintillators	LYSO:Ce		
Energy Window (s)	Peaks (KeV)		Energy window (%)
	Peak	511	±11.8%
Sensitivity	3.2% at the center of FOV		
Spatial resolution	1.3 mm at the center of FOV		
Reconstruction	MLEM algorithm, 1mm Point Spread Function (PSF) modeling,		

Table 21 Acquisition and reconstruction parameters for CT (X-CUBE).

CT Parameters	
Animals per bed	1 or 4
Type of CT scanning	Spiral high-resolution
Pitch	1.4
X-ray power (kVp)	50
Exposure time (ms)	32
Reconstruction resolution ((μm))	100 μ m or 200 μ m
Binning	1

Imaging data were saved as DICOM files. For quantification, VivoQuantTM software (Invicro, Boston, USA) was used to draw regions of interest (ROIs) in relevant tissues. A ROI was drawn over the left ventricle of the heart, serving as blood pool surrogate (BPS). Two to four animals were used per time point. Results are expressed as a percentage of injected dose per gram of tissue (%ID/g). Representative results are shown in Fig. 3 to 12.

It can be observed that the compounds of the invention accumulate rapidly, i.e., as early as 1h post injection, in the P-cad expressing tissues (xenografts), as shown in the ¹¹¹In-SPECT/CT, ¹⁷⁷Lu-SPECT/CT and ⁶⁸Ga-PET/CT imaging experiments. Furthermore, the retention of radioactivity in the tumor (target) tissues was confirmed up to 72 hours after injection. This result shows that the specific accumulation of radioactivity to tumor tissues is retained for at least three days post injection. Importantly, little or no radioactivity was found in healthy tissues

such as kidney, liver or the blood pool surrogate (BPS), indicating that the compounds of the invention achieve excellent biodistribution, i.e., high accumulation in the tumor tissues and low or no accumulation in the healthy tissues, leading to favorable tumor-to-healthy tissue ratios. These results therefore demonstrate the suitability of the compounds of the invention as a
5 diagnostic agent and/or a therapeutic agent.

Example 31: Synthesis IIIh: Synthesis of compound H-Nmg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-460)

The linear sequence of the peptide (Boc-Nmg-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 µmol scale on a DEG Rink amide resin applying the
10 '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Fmoc-Nmg-OH as final coupling step followed by '*Fmoc deprotection*' to liberate the α amine moiety of the resin-bound Nmg residue and an ultimate '*Boc protection*' of the α amine. After removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*',
15 DOTA(tBu)₃-OH was coupled employing the '*Coupling of chelator building blocks*' method. Afterwards the branched peptide (H-Nmg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (25 to 45% B in 20 min – Kinetex) to yield
20 17.64 mg of the pure title compound (17.3%). HPLC t_R = 6.6 min. LC/TOF-MS: exact mass 2035.809 (calculated 2035.803). C₈₉H₁₂₇ClN₂₁O₂₆S₃ (MW = 2038.740).

Example 32: Synthesis IIIe: Synthesis of compound H-Mdab-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-585)

The linear sequence of the peptide (H-Dab-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 µmol scale on a DEG Rink amide resin applying the
25 '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Fmoc-Dab(Boc)-OH as final coupling step followed by '*Fmoc deprotection*' to liberate the α amine moiety of the resin-bound Dab residue. Next, the α amine underwent protection with a nosyl group and methylation through Mitsunobu reaction as described in '*Monomethylation of primary amines*' to yield the nosylated Mdab residue. However, denosylation was first performed after removal of the Alloc protecting group from the Apc side chain employing an '*Alloc/Allyl deprotection*' and coupling of DOTA(tBu)₃-OH according to the '*Coupling of*'
30

chelator building blocks' method. Afterwards the branched peptide (H-Mdab-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield 2.02 mg of the pure title compound (1.9%). HPLC t_R = 5.4 min. LC/TOF-MS: exact mass 2078.845 (calculated 2078.846). C₉₁H₁₃₂ClN₂₂O₂₆S₃ (MW = 2081.808).

Example 33: Synthesis IIIf: Synthesis of compound H-Nipa-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-553)

The linear sequence of the peptide (H-Ala-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated Solid-Phase Synthesis*' in a 50 μmol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Fmoc-Ala-OH as final coupling step followed by '*Fmoc deprotection*' to liberate the α amine moiety of the resin-bound Ala residue. Next, the N-terminal Ala residue was transformed into the Nipa (*N*-isopropyl alanine) residue by reductive alkylation. Briefly, the resin swollen in 1% acetic acid in DMF was reacted with acetone (37 μL, 0.5 mmol, 10 eq.) in 0.5 mL of 1% acetic acid in DMF for 30 min at room temperature. Then NaBH₃CN (31.4mg, 0.5 mmol, 10 eq.) in 0.5 mL of 1% acetic acid in DMF was added and the resin was agitated at room temperature overnight. The resin was then washed with DMF, MeOH, and DMF (3 mL each, 3x 1 minute). After Boc protection of the N terminus following the '*Boc protection*' method, the Alloc protecting group from the Apc side chain was removed according to the '*Alloc/Allyl deprotection*' method followed by coupling of DOTA(tBu)₃-OH as described in the '*Coupling of chelator building blocks*'. Afterwards the branched peptide (H-Nipa-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield 11.20 mg of the pure title compound (10.8%). HPLC t_R = 5.8 min. LC/TOF-MS: exact mass 2077.851 (calculated 2077.850). C₉₂H₁₃₃ClN₂₁O₂₆S₃ (MW = 2080.820).

Example 34: Synthesis IIIg: Synthesis of compound H-Nglu-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂ (PCAD-583)

The linear sequence of the peptide (H-Trp-Cya-Npg-Apc(Alloc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂) was assembled according to the '*General procedures for Automated/Semi-automated*

Solid-Phase Synthesis in a 50 μ mol scale on a DEG Rink amide resin applying the '*Solid phase peptide synthesis (SPPS)*' method with an N-terminal coupling of Fmoc-Trp(Boc)-OH as final coupling step followed by '*Fmoc deprotection*' to liberate the α amine moiety of the resin-bound Trp residue. Next, the N-terminal Nglu residue was assembled by peptoid synthesis. Briefly, the resin swollen in DMF was reacted with a solution of bromoacetic acid (69.5 mg, 0.5 mmol, 10 eq.) and DIC (39 μ L, 0.25 mmol, 5 eq.) in 2 mL of DMF for 60 min at room temperature. The resin was washed with DMF (3 mL each, 3x 1 minute) followed by treatment with a solution of β -alanine t-butyl ester hydrochloride (113.5 mg, 0.625 mmol, 12.5 eq.) and DIPEA (216 μ L, 1.25 mmol, 25 eq.) in 3 mL of DMSO. After a wash with DMF (3 mL each, 5x 1 minute) and Boc protection of the N terminus following the '*Boc protection*' method, the Alloc protecting group from the Apc side chain was removed according to the '*Alloc/Allyl deprotection*' method followed by coupling of DOTA(tBu)₃-OH as described in the '*Coupling of chelator building blocks*'. Afterwards the branched peptide (H-Nglu-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂) was cleaved from the synthesis resin according to '*Complete resin cleavage and deprotection of peptides*' (cleavage time 4 hours), and the obtained crude material was subjected to purification by '*Preparative HPLC*' (20 to 40% B in 20 min – Kinetex) to yield 1.31 mg of the pure title compound (1.2%). HPLC t_R = 6.2 min. LC/TOF-MS: exact mass 2093.631 (calculated 2093.809). C₉₁H₁₂₉ClN₂₁O₂₈S₃ (MW = 2096.777).

20 **Example 35: Surface plasmon resonance assay for assessment of species cross reactivity**

Surface plasmon resonance experiments to assess binding of compounds to recombinant orthologous P-cadherin proteins were performed essentially as described in example 25. Biotinylated proteins (C-terminally Avi-tagged, fragments comprising domains EC1 and EC2, *biortus*) used in this study are described in Table 22.

25 Table 22: Protein constructs used for analysis of species cross-reactivity via SPR.

Batch No.	Species	Boundary (aa)	MW (Da)
BP42159-20240723	Homo sapiens (Human)	108-320	25475
BP42084-20240710	Cynomolgus monkey	108-320	25449
BP42106-20240703	Rattus norvegicus (Rat)	100-312	25523
BP42197-20240716	Canis lupus familiaris (Dog)	311-523	25498
BP42085-20240710	Sus scrofa (Pig)	109-321	25398

BP42086-20240715	Mus musculus (Mouse)	100-312	25665
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In each experiment two biotinylated P-cadherin proteins from two different species were immobilized on two different flow cells (2 and 3) of a biotin capture chip (Biotin CAPture Kit, Cytiva, Cat# 28920234) according to the supplier's instructions. Additionally, human P-cadherin was immobilized on the flow cell 4 of the CAP-Chip and served as positive control. The proteins were diluted in Running Buffer (10 mM HEPES, 150 mM NaCl, 0.1% DMSO, 0.05% Tween-20, 1 mM CaCl₂, pH 7.4) to a final concentration of 100 nM and then flushed over the CAP-Chip to immobilize ~300 RUs. Flow cell 1 without immobilized proteins served as reference flow cell. Deviating from the procedure described in example 25, target immobilization was performed at 100 nM protein concentration for 300 s at a flow rate of 2 μ L/min. Results of the assessment of species cross reactivity for selected compounds are shown in Table 23. Binding of P-cadherin ligands to orthologous P-cadherin proteins is well conserved across many species, facilitating the toxicological assessment required for a clinical development.

Table 23. Compound ID, sequence, and pK_D categories for SPR binding affinities to orthologous P-cadherin proteins (mouse, rat dog, pig, cynomolgus monkey and human). pK_D category A stands for pK_D values $\geq$ 8.5, category B for pK_D values from 7.5 to 8.4, category C for pK_D values from 6.5 to 7.4, and category D for pK_D values $<$ 6.5.

<u>ID</u>	<u>Sequence</u>	<u>pK_D CAT for binding to orthologous P-cad proteins</u>					
		<u>mouse</u>	<u>rat</u>	<u>dog</u>	<u>pig</u>	<u>monkey</u>	<u>human</u>
PCAD-359	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	B	B	B	A	A	A
PCAD-223	H-Pip-Trp-Cya-Npg-Om(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	C	B	B	B	A	A

<u>ID</u>	<u>Sequence</u>	<u>pK_D CAT for binding to orthologous P-cad proteins</u>					
		<u>mouse</u>	<u>rat</u>	<u>dog</u>	<u>pig</u>	<u>monkey</u>	<u>human</u>
PCAD -236	H-Pip-Trp-Cya-Npg- Apc(DOTA)-Asn- 6Clw-KMe3-Tyr-Thr- Thi-NH ₂	C	C	B	C	A	A
PCAD -383	H-Pip-Trp-Cya-Npg- Apc-Asn-6Clw- Lys(DOTA)-Tyr-Cya- Thi-NH ₂	C	C	B	B	A	A
PCAD -232	H-Pip-Trp-Cya-Npg- Apc(DOTA)-Asn- Brw6-KMe3-Tyr-Cya- Thi-NH ₂	B	B	B	B	A	A
PCAD -255	H-Pip-Trp-Cya-Mnpg- Apc(DOTA)-Asn- 6Clw-KMe3-Tyr-Cya- Thi-NH ₂	B	B	B	A	A	A
PCAD -460	H-Nmg-Trp-Cya-Npg- Apc(DOTA)-Asn- 6Clw-KMe3-Tyr-Cya- Thi-NH ₂	C	C	C	B	A	A
PCAD -468	H-Pip-Trp-Cya-Npg- Apc(DOTA)-Thr-6Clw- KMe3-Tyr-Cya-Thi- NH ₂	C	C	B	B	A	A
PCAD -476	H-Pip-Nmw-Cya-Npg- Apc(DOTA)-Asn- 6Clw-KMe3-Tyr-Cya- Thi-NH ₂	C	C	C	B	A	A

<u>ID</u>	<u>Sequence</u>	<u>pK_D CAT for binding to orthologous P-cad proteins</u>					
		<u>mouse</u>	<u>rat</u>	<u>dog</u>	<u>pig</u>	<u>monkey</u>	<u>human</u>
PCAD-478	H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-NH ₂	B	C	B	B	A	A
PCAD-489	H-Pip-Trp-Penox-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH ₂	B	A	A	A	A	A

Example 36: ²¹²Pb-labelling of selected compounds

Compounds were labelled with 0.5–2.4 MBq ²¹²Pb (0.5 M sodium acetate/0.1 M HCl; pH 5–6) at specific activities ranging from 0.1–1.0 MBq/μg (0.21–2.08 MBq/nmol), typically in a reaction volume of 100–200 μL. The reaction mixtures were incubated on a Thermomixer (Eppendorf, Germany) at 60 °C and 450 rpm for 25 minutes. The quality of the radioligands was evaluated by determining the radiochemical purity (RCP) by thin layer chromatography (TLC) using instant TLC strips (Tec-control, model #150-772, Biodex Medical Systems, NY, US) with 0.9 % NaCl as the mobile phase. A sample of the radioligand was diluted in a formulation buffer containing 7.5 % bovine serum albumin (BSA; Sigma-Aldrich Norway AS, Oslo, Norway) and 5 mM EDTA (VWR, PA, US) in phosphate buffered saline (PBS), adjusted to a pH between 7 and 7.5. The mixture was left at room temperature for 5–10 minutes to allow the chelation of unbound radioisotopes with EDTA, and 1–3 μl of the mixture was applied to the origin line of the ITLC strip. The solvent front migrated to the front line of the strip (top half), together with the unbound EDTA-chelated radionuclides, while radiolabelled ligand was retained at the origin line (bottom half). The strips were bisected and the activity in each part was measured in a gamma counter (Wizard2 3470 gamma counter; Perkin Elmer, MA, US). The RCP was calculated as the percentage of total activity present in the bottom half of the strip. The TLC strips were re-measured after > 2 hours when ²¹²Pb was in equilibrium with progenies, and the RCP was calculated again.

Compounds were efficiently labelled with ^{212}Pb at specific activities of 0.05–1 MBq/ μg and ligand concentrations $\geq 23 \mu\text{g/mL}$ with initial RCP values $\geq 88 \%$ and RCP values at equilibrium $\geq 99 \%$ (Table 24).

Table 24. Radiochemical purity (RCP) of compounds after radiolabelling with ^{212}Pb at different specific activities. N = two replicates, one experiment. NA, not available.

5

Compound ID	Specific activity (MBq/ μg)	Ligand concentration ($\mu\text{g/mL}$)	Initial RCP (%)	RCP at equilibrium (%) > 2 hours later
^{212}Pb -PCAD-072	0.05	249.2	96.4 ± 0.5	99.4 ± 0.2
	0.10	120.9	97.4 ± 0.0	NA
	0.68	23.1	88.2 ± 0.6	99.0 ± 0.0
^{212}Pb -PCAD-253	0.05	249.2	99.3 ± 0.0	99.70 ± 0.3
	0.10	50.0	98.0 ± 0.3	99.70 ± 0.0
	0.25	50.0	98.3 ± 0.2	99.8 ± 0.0
	0.48	25.0	98.8 ± 0.1	99.8 ± 0.0
	0.76	25.0	99.4 ± 0.1	99.9 ± 0.0
	0.97	25.0	99.3 ± 0.1	99.8 ± 0.0
^{212}Pb -PCAD-359	0.05	261.5	99.4 ± 0.1	99.8 ± 0.2
	0.50	111.1	$99.3 \pm \text{NA}$	$99.8 \pm \text{NA}$
	1.00	58.8	$97.9 \pm \text{NA}$	$99.1 \pm \text{NA}$

Example 37: *Ex vivo* biodistribution studies in mice with HEK-P-cad and HCC-1954 tumors

All animal experiments were approved by the Institutional Committee on Research Animal Care (Department of Comparative Medicine, Oslo University Hospital) and the Norwegian Food Safety Authority (Brumunddal, Norway) as part of FOTS application #30669. All procedures and experiments involving animals in this study were performed in accordance with the Interdisciplinary Principles and Guidelines for the Use of Animals in Research, Marketing and Education (New York Academy of Sciences, NY, US) and the EU Directive 2010/63/EU for animal experiments. The animals were maintained under specific pathogen-free conditions with ad libitum access to food and water. Cages (max 8 mice per cage) were housed in a scintainer, which was maintained at constant temperature (24 °C) and humidity (60 %). Cells of a HEK293 clone stably expressing human P-cadherin (HEK-P-cad) were maintained in RPMI 1640 medium (GlutaMAX™ Supplement) supplemented with 10 % fetal bovine serum and 1 % penicillin/streptomycin. The human breast cancer cell line HCC1954 was maintained in RPMI 1640 medium (ATCC modification including L-glutamine, HEPES, sodium pyruvate, high glucose, low sodium bicarbonate) supplemented with 10 % fetal bovine serum and 1 % penicillin/streptomycin. Cells were cultured under standard cell culture conditions, grown at subconfluence and then split until sufficient cell numbers were obtained. Female athymic nude mice (ATHYM-Foxn1^{nu/nu}) from Janvier Labs (Le Genest-Saint-Isle, France) were used. The mice were 6 weeks old and weighed 18–25 g at the beginning of the study. The mice were inoculated subcutaneously with 10×10^6 HEK-P-cad or 2×10^6 HCC-1954 cells in supplement-free RPMI1640 medium mixed 1:1 with Matrigel Matrix (Corning, NY, US) in a total volume of 100 µl. The tumor volume ($(\text{length} \times \text{width}^2)/2$) and body weight were monitored twice weekly. The tumors were allowed to reach a volume of 100–250 mm³, and tumor-bearing mice were randomized based on tumor size before radioligand injection. The mice were injected intravenously via tail vein with 43–54 kBq (0.25–0.48 nmol = 0.52–1.01 µg) of ²¹²Pb-PCAD-253, or 66–68 kBq (0.65–0.71 nmol = 1.35–1.49 µg) of ²¹²Pb-PCAD-359 in 85–150 µl of formulation buffer (5 mM EDTA/0.1 % BSA in PBS). *Ex vivo* biodistribution was performed 1 and 20 hours after injection. Mice were given gas anaesthesia (~3.5 % Sevoflurane (Baxter, IL, US) in oxygen at a flow rate of 0.5 litres/ minute) for blood collection by cardiac puncture. Mice were then euthanized by cervical dislocation, and selected organs/tissues were collected in pre-weighed tubes. The radioactivity in the tissue was measured with an automated gamma counter (Wizard2 3470 gamma counter) for 1 minute. Organ measurements for individual mice,

as well as standards from the injection solution, were decay-corrected to the time of sacrifice. Tissue uptake was expressed as the percentage of injected activity per gram tissue (%IA/g).

²¹²Pb-PCAD-253 showed rapid tumor accumulation and high retention in HEK-P-cad and HCC-1954 tumors (Figures 13 and 14). The radioligand showed fast clearance from blood and low uptake in non-targeted tissues such as the liver, spleen, intestines, lungs and femur. The radioligand was excreted mainly via the renal pathway with initial kidney uptake. The resulting tumor-to-kidney ratios were 1.7 at 1 hour and 1.4 at 20 hours for the HEK-P-cad model, and 0.9 and 1.0 for the HCC-1954 model. ²¹²Pb-PCAD-359 also exhibited rapid tumor accumulation and high retention in HEK-P-cad tumors, and tumor-to-kidney ratios of 1.4 at 1 and 20 hours (Figure 15).

Example 38: *In vivo* efficacy of ²¹²Pb-PCAD-253 in HCC-1954 (breast cancer) xenograft mouse model

Female athymic nude mice (ATHYM-Foxn1^{nu/nu}) bred at the Department of Comparative Medicine at the Norwegian Radium Hospital (Oslo University Hospital, Oslo, Norway) or from Janvier Labs were used. The human breast cancer cell line HCC1954 was maintained in RPMI 1640 medium (ATCC modification including L-glutamine, HEPES, sodium pyruvate, high glucose, low sodium bicarbonate) supplemented with 10 % fetal bovine serum and 1 % penicillin/streptomycin. Cells were cultured under standard cell culture conditions, grown at subconfluence and then split until sufficient cell numbers were obtained. The mice were 6–8 weeks old and weighed 18–28 g at the beginning of the study. The mice were inoculated subcutaneously with 2×10^6 HCC-1954 cells in supplement-free RPMI1640 medium mixed 1:1 with Matrigel Matrix (Corning) in a total volume of 130 μ l. The tumor volume ((length $\times$ width²)/2) and body weight were monitored twice weekly. The tumors were allowed to reach a volume of 50–230 mm³, and tumor-bearing mice were randomized based on tumor size before radioligand injection. The mice were injected intravenously via tail vein with 0.25 MBq (0.36 μ g = 0.17 nmol), 0.49 MBq (0.69 μ g = 0.33 nmol) or 1.01 MBq (1.38 μ g = 0.67 nmol) of ²¹²Pb-PCAD-253 in 95–100 μ l of formulation buffer (5 mM EDTA/0.1 % BSA in PBS). The control mice were injected with vehicle (100 μ l; same dilution as the 1 MBq radioligand solution). The tumor volume and body weight, as well as changes in general health, body condition, behavior, posture and appearance, were monitored twice weekly for the first 28 days following treatment initiation, with monitoring planned to continue for up to 6 months. The mice were euthanized by cervical dislocation if any of the following humane end points were reached; > 15 % weight loss from initial weight, rapid weight loss (> 10 % within 2 days), tumors exceed 20 mm in any

direction, ulcerate or interfere with normal behavior, or any signs of severe illness or discomfort.

The changes in body weight and tumor growth over time are presented in Figure 16. No changes in mean body weight were observed for the mice treated with ^{212}Pb -PCAD-253 (Figure 16A).

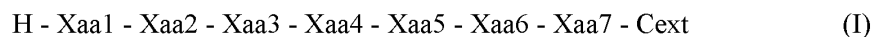
- 5 The control mice showed rapid tumor growth, and one mouse was sacrificed at day 21. Single administrations of ^{212}Pb -PCAD-253 delayed tumor growth in a dose-dependent manner (Figure 16B). At day 28, the tumor volumes in mice treated with 0.25, 0.5 and 1 MBq were significantly lower than in untreated mice (Figure 16C).

The disclosure of each and any references recited herein is incorporated herein by reference.

Claims

5

1. A compound comprising a peptide of formula (I):



10 or a pharmaceutically acceptable salt thereof,

wherein,

Xaa1 is (a) a residue of an α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid, preferably a residue of an L- α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid,

wherein Nmod is a group containing one or more selected from hydrogen, carbon, nitrogen oxygen and sulfur and optionally comprises a group Z^{1a} ,

20 wherein the side chain of Xaa1 optionally comprises a group Z^{1b} ,

wherein the side chain of Xaa1 and the α -nitrogen atom of Xaa1 optionally form a heterocycle, with the proviso that if the side chain of Xaa1 and the α -nitrogen atom of Xaa1 form a heterocycle, the N-terminal modification group Nmod is absent, or

25 (b) a residue of an L- α -hydroxy acid comprising a side chain,

wherein the side chain optionally comprises a group Z^{1b} ,

H is a hydrogen atom which is covalently linked to (a) the α -nitrogen atom of Xaa1 if Xaa1 is a residue of an α -amino acid comprising a side chain and one N-terminal modification group Nmod covalently attached to the α -nitrogen atom of the amino acid, or (b) the oxygen atom of the α -hydroxy group of Xaa1 if Xaa1 is a residue of an L- α -hydroxy acid comprising a side chain,

Xaa2 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,
 wherein the side chain comprises an optionally substituted indole or benzothiophene group,

5

Xaa3 is a residue of an L- α -amino acid comprising a side chain,
 wherein the side chain optionally comprises a group Z^2 ,

Xaa4 is a residue of an L- α -amino acid comprising a hydrophobic side chain and
 10 optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,
 wherein the side chain of Xaa4 and the α -nitrogen atom of Xaa4 optionally form a heterocycle,

15

Xaa5 is a residue of an α -amino acid comprising a side chain,
 wherein the side chain optionally comprises a group Z^3 ,

Xaa6 is a residue of an α -amino acid comprising a side chain, preferably a residue of an L- α -amino acid comprising a side chain,
 20 wherein the side chain optionally comprises a group Z^4 ,
 wherein the side chain of Xaa6 and the α -nitrogen atom of Xaa6 optionally form a heterocycle,

Xaa7 is a residue of an L- α -amino acid comprising a side chain and optionally
 25 comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,
 wherein the side chain comprises an aryl or heteroaryl group, preferably a bicyclic aryl or heteroaryl group,

Cext is a moiety covalently attached to the carbonyl group of Xaa7, which is represented
 30 by one of the formulae (Ia), (Ib), (Ic), (Id), and (Ie):

Cterm	(Ia)
Xaa8 - Cterm	(Ib)
Xaa8 - Xaa9 - Cterm	(Ic)
Xaa8 - Xaa9 - Xaa10 - Cterm	(Id)

Xaa8 - Xaa9 - Xaa10 - Xaa11

(Ie)

wherein,

5 Xaa8 is a residue of glycine or a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^5 ,

10 Xaa9 is a residue of an α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid, preferably Xaa9 is a residue of an L- α -amino acid comprising a side chain and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^6 ,

15 wherein the side chain of Xaa9 and the α -nitrogen atom of Xaa9 optionally form a heterocycle,

Xaa10 is a residue of an α -amino acid comprising a side chain, preferably a residue of an L- α -amino acid comprising a side chain,

wherein the side chain optionally comprises a group Z^7 ,

20 wherein the side chain of Xaa10 and the α -nitrogen atom of Xaa10 optionally form a heterocycle,

Xaa11 is a residue of a compound comprising an amino group and optionally comprising a carbonyl group, wherein the amino group is covalently attached to the carbonyl group of Xaa10,

25 wherein if the carbonyl group is present, said carbonyl group is covalently attached to a C-terminal modification group Cterm,

preferably Xaa11 is

30 (a) a residue of an α -amino acid comprising a side chain, a C-terminal modification group Cterm and optionally comprising a substituent covalently attached to the α -nitrogen atom of the amino acid,

wherein the side chain optionally comprises a group Z^8 ,

wherein the side chain of Xaa11 and the α -nitrogen atom of Xaa11 optionally form a heterocycle, or

(b) a residue of an optionally substituted β -amino alcohol, or

(c) a residue of a (C₁-C₆)alkylamine such as cyclohexylamine, or of an (C₂-C₆)alkyldiamine such as ethylenediamine,

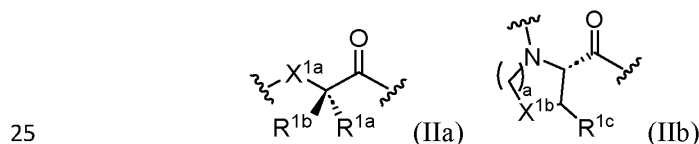
5 Cterm is a C-terminal modification group, which is selected from the group consisting of -NH₂, -OH, a group Z⁹, and -NHR^{cterm}, wherein R^{cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group,

10 each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently an effector E, such as a chelator, which may optionally comprise a linker moiety L that covalently links the effector E to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- 15 (β) a chelator optionally comprising a radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, natural killer cells (NK cells) and/or phagocytotic cells.

20 2. The compound or salt of claim 1, wherein at least one, e.g., one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve or thirteen of Xaa1, Xaa2, Xaa3, Xaa4, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is defined as follows:

Xaa1 is a residue of formula (IIa) or formula (IIb):



wherein,

in formula (IIa):

30 R^{1a} is selected from the group consisting of -H, a (C₁-C₆)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group

and a group of formula $-(CH_2)_bR^{1d}$, preferably R^{1a} is selected from the group consisting of -H and a group of formula $-(CH_2)_bR^{1d}$,

wherein R^{1d} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{1d} optionally comprises a group Z^{1b} , preferably R^{1d} is selected from the group consisting of -H, a polar and a charged group, more preferably R^{1d} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -C(O) Z^{1b} , -NH₂, -NH(Z^{1b}), -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -SO₃H, -NH-CONH₂, -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

wherein $b = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_bR^{1d}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_bR^{1d}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $b = 1, 2$ or 3 ,

R^{1b} is selected from the group consisting of -H and a methyl group, with the proviso that if R^{1a} is -H, R^{1b} is -H, preferably R^{1b} is -H,

X^{1a} is selected from the group consisting of -O- and -N(Nmod)-, preferably X^{1a} is -N(Nmod)-,

wherein Nmod is selected from the group consisting of -H, -CH₂COOH, -CH₂CONH₂, -CH₂C(O) Z^{1a} , $-(CH_2)_cNH(Z^{1a})$, a (C₁-C₆)alkyl group and a group of formula $-(CH_2)_cR^{1e}$,

wherein R^{1e} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{1e} optionally comprises a group Z^{1a} , preferably R^{1e} is selected from the group consisting of -H, -NH(Z^{1a}), a polar and a charged group, more preferably R^{1e} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z^{1a}) and -NH-C(NH)NH₂,

wherein $c = 2, 3, 4$ or 5 , wherein optionally one or two hydrogens of said two, three, four or five -CH₂- groups of the $-(CH_2)_cR^{1e}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_cR^{1e}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $c = 2$ or 3 ,

preferably Nmod is selected from the group consisting of -H, a (C₁-C₃)alkyl group and -CH₂COOH, more preferably Nmod is selected from the group consisting of a methyl group and -CH₂COOH, most preferably Nmod is a methyl group,

5

in formula (IIb):

a = 1, 2 or 3, preferably a = 1 or 2, more preferably a = 2,

R^{1c} selected from the group consisting of -H, -OH, -F, -NH₂ and a (C₁-C₃)alkyl group, preferably R^{1c} is -H,

10

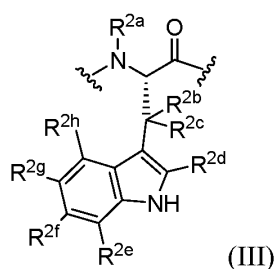
X^{1b} is selected from the group consisting of -CH₂-, -CH(OH)-, -CH(F)-, -CH(NH₂)-, -CH(NHR^{1g})-, -NH-, -S-, -SO-, -SO₂- and -O-, wherein R^{1g} is a methyl, an acetyl (Ac) or a group Z^{1b}, preferably X^{1b} is -CH₂-,

preferably Xaa1 is a residue of an *N*_α-methyl-L-α-amino acid, an *N*_α-(carboxymethyl)-L-α-amino acid, iminodiacetic acid (Ida) or (S)-piperidine-2-carboxylic acid (Pip),

more preferably Xaa1 is a residue of an amino acid selected from the group consisting of Pip, *N*-methyl-glycine (Nmg), *N*-methyl-L-alanine (Nma), *N*-methyl-L-serine (Nms), *N*-methyl-L-aspartic acid (Nmd), *N*-methyl-L-glutamic acid (Nme), *N*_α-methyl-L-lysine (Nmkl), *N*_α-methyl-*N*_ε-methyl-L-lysine (Nmkl(Me)), *N*_α-methyl-*N*_ε,*N*_ε-dimethyl-L-lysine (KMe3a), *N*_α-methyl-*N*_ε,*N*_ε,*N*_ε-trimethyl-L-lysine (KMe4), *N*_α-methyl-L-ornithine (Nmo), *N*_α-methyl-*N*_δ-methyl-L-ornithine (Nmo(Me)), *N*_α-(carboxymethyl)-L-ornithine (Cmo), *N*_α-(carboxymethyl)-*N*_δ-methyl-L-ornithine (Cmo(Me)), (S)-4-amino-2-(methylamino)butanoic acid (Mdab), *N*-(carboxymethyl)-L-alanine (Mida), (S)-2,4-bis(methylamino)butanoic acid (Mdab(Me)), (S)-3-amino-2-(methylamino)propanoic acid (Mdap), (S)-2,3-bis(methylamino)propanoic acid (Mdap(Me)), (S)-azepane-2-carboxylic acid (Azp), (S)-morpholine-3-carboxylic acid (Mor) and Ida,

most preferably Xaa1 is a residue of an amino acid selected from the group consisting of Pip and Nma,

30 Xaa2 is a residue of an amino acid of formula (III):



wherein,

in formula (III):

5 R^{2a} is selected from the group consisting of H and a (C₁-C₂)alkyl group, preferably R^{2a} is selected from the group consisting of -H and a methyl group, more preferably R^{2a} is -H,

R^{2b} and R^{2c} are each independently selected from the group consisting of -H and a methyl group,

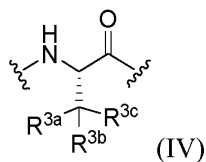
10 R^{2d} and R^{2e} are each independently selected from the group consisting of -H, -OH, -F, -Cl and a methyl group,

R^{2f} , R^{2g} and R^{2h} are each independently selected from the group consisting of -H and -F,

preferably each of R^{2b} , R^{2c} , R^{2d} , R^{2e} , R^{2f} , R^{2g} and R^{2h} is -H,

15 preferably Xaa2 is a residue of an amino acid selected from the group consisting of Trp, 7-chloro-L-tryptophan (7Clw), 7-methyl-L-tryptophan (7Mw), 7-fluoro-L-tryptophan (7Fw), (2*S*,3*S*)- β -methyl-L-tryptophan (Bmw) and N-methyl-L-tryptophan (Nmw), more preferably Xaa2 is a residue of Trp,

20 Xaa3 is a residue of an amino acid of formula (IV):



wherein,

in formula (IV):

25 R^{3a} and R^{3b} (a) are each independently selected from the group consisting of -H, -F and a (C₁-C₂)alkyl group, or

(b) form together a 3-, 4-, 5- or 6-membered carbocycle or heterocycle, preferably a 3-, 4- or 5-membered carbocycle, preferably R^{3a} and R^{3b} are each independently selected from the group consisting of H and a methyl group,

5 R^{3c} is selected from the group consisting of a halogen atom, a polar group, a negatively charged group and an aliphatic group, wherein R^{3c} optionally comprises a group Z^2 ,

10 preferably R^{3c} is selected from the group consisting of -OH, -COOH, -SO₃H, -CONH(R^{3d}), -NH-CONH(R^{3d}), -SO₂NH(R^{3d}), -F, -Cl, a (C₁-C₄)alkyl group, a (C₃-C₄)carbocycle group and -NH(Z^2), wherein R^{3c} is optionally linked to the β -carbon atom of Xaa3 by a linker comprising one, two or three -CH₂- groups and one hydrogen atom of said one, two, or three -CH₂- groups that link R^{3c} to the β -carbon atom of Xaa3 is optionally replaced by a substituent selected from the group

15 consisting of -F, -OH, -COOH, a methyl group, and/or wherein one of the said -CH₂- groups, which is different from the R^{3c} adjacent -CH₂- group, is optionally replaced by -O-, -S-, -SO- or -SO₂-, wherein R^{3d} is selected from the group consisting of -H, a methyl group and a (C₂-C₄)alkyl group, wherein said (C₂-C₄)alkyl group is optionally substituted

20 by one or two substituents independently selected from the group consisting of -OH, -COOH, -SO₃H and -CONH₂,

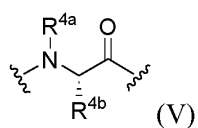
25 more preferably R^{3c} is selected from the group consisting of a methyl group, -COOH, -CONH₂ and -SO₃H and R^{3c} is optionally linked to the β -carbon atom of Xaa3 by one -CH₂- group, most preferably R^{3c} is selected from the group consisting of -COOH and -SO₃H and the optional linker is absent,

preferably Xaa3 is a residue of an amino acid selected from the group consisting of Asp, L-cysteic acid (Cya), β,β -dimethyl-L-aspartic acid (Dmd), β,β -dimethyl-L-cysteic acid (Penox),

30 Glu, Val and Asn,

more preferably Xaa3 is a residue of an amino acid selected from the group consisting of Penox, Asp and Cya,

Xaa4 is a residue of an amino acid of formula (V):



wherein,

in formula (V):

5 R^{4a} is selected from the group consisting of -H and a (C₁-C₃)alkyl group, preferably R^{4a} is selected from the group consisting of -H and a methyl group,

R^{4b} is selected from the group consisting of a (C₃-C₈)alkyl group, a (C₃-C₇)carbocycle, an aryl group, a heteroaryl group and a group of
 10 formula $-(CH_2)_dR^{4c}$, wherein one or two hydrogen atoms of R^{4b} are optionally replaced by atoms or groups each and independently selected from the group consisting of -NH₂, -OH, a halogen atom and a (C₁-C₃)alkyl group, preferably -F, -Cl or a methyl group, preferably R^{4b} is selected from the group consisting of a (C₃-C₅)alkyl group, a
 15 (C₅-C₆)carbocycle, a phenyl group, a 2-thienyl group and a group of formula $-(CH_2)_dR^{4c}$,

wherein d = 1, 2 or 3, preferably d = 1,

wherein R^{4c} is selected from the group consisting of a (C₃-C₇)carbocycle, an aryl group and a heteroaryl group, wherein one or two hydrogen atoms
 20 of R^{4c} are optionally replaced by atoms or groups each and independently selected from the group consisting of -NH₂, -OH, a halogen atom and a (C₁-C₃)alkyl group, preferably -F, -Cl or a methyl group, preferably R^{4c} is selected from the group consisting of a (C₄-C₆)carbocycle, a phenyl group and a 2-thienyl group, and

25 wherein one -CH₂- group of R^{4b} is optionally replaced by an atom selected from the group consisting of -O- and -S-,

or alternatively, R^{4a} and R^{4b} form together an optionally up to two-fold substituted 5-, 6-, or 7-membered heterocycle, wherein each substituent
 30 is each and independently selected from the group consisting of a (C₁-C₃)alkyl group, a halogen atom, -NH₂ and -OH, preferably R^{4a} and R^{4b} form together a 6-membered unsubstituted heterocycle,

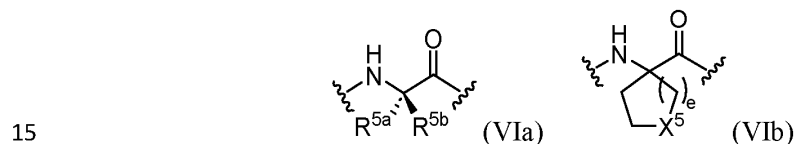
preferably Xaa4 is a residue of an amino acid selected from the group consisting of L-neopentyl-glycine (Npg), *N*-methyl-L-neopentyl-glycine (Mnpg), Leu, *N*-methyl-L-leucine (Nml), L-homoleucine (Hle), Phe, L- γ -ethyl-leucine (Gel), *N*-methyl-L- γ -ethyl-leucine (Mgel),
 5 L-norleucine (Nle), *N*-methyl-L-norleucine (NMB), L-cyclobutyl-alanine (Cba), L-cyclopentyl-alanine (Cpa), L-cyclohexyl-alanine (Cha), L-cyclopentyl-glycine (Cpg) and L-cyclohexyl-glycine (Chg),

more preferably Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Leu, Mnpg, Nml, and Chg,

10 even more preferably Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnpg and Nml,

most preferably Xaa4 is a residue of Npg,

Xaa5 is a residue of an amino acid of formula (VIa) or (VIb):



wherein,

in formula (VIa):

20 R^{5a} is selected from the group consisting of -H, a (C₁-C₆)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula $-(CH_2)_fR^{5c}$, preferably R^{5a} selected from the group consisting of -H and a group of formula $-(CH_2)_fR^{5c}$,

25 wherein R^{5c} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{5c} optionally comprises a group Z³, preferably R^{5c} is selected from the group consisting of -H, -NH(Z³), -C(O)Z³, a polar group and a charged group, more preferably R^{5c} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -C(O)Z³, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z³), -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

30 wherein f = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the $-(CH_2)_fR^{5c}$ group are replaced by a methyl group, and/or wherein one -CH₂- group

of the $-(CH_2)_fR^{5c}$ group which is different from the terminal $-CH_2-$ groups of is optionally replaced by $-O-$, $-S-$, $-SO-$ or $-SO_2-$, preferably $f = 1, 2, 3$ or 4 ,

R^{5b} is selected from the group consisting of $-H$ and a group of formula $-(CH_2)_gR^{5d}$,

wherein R^{5d} is selected from the group consisting of $-H$, a polar, a charged and a hydrophobic group, wherein R^{5d} optionally comprises a Z^3 group, preferably R^{5d} is selected from the group consisting of $-H$, a polar group and a charged group, more preferably R^{5d} is selected from the group consisting of $-H$, $-OH$, $-CONH_2$, $-COOH$, $-SO_3H$, $-NH_2$, $-NH(CH_3)$, $-N(CH_3)_2$ and $-N(CH_3)_3^+$, most preferably R^{5d} is selected from the group consisting of $-H$ and $-OH$,

wherein $g = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five $-CH_2-$ groups of the $-(CH_2)_gR^{5d}$ group are replaced by a methyl group, and/or wherein one $-CH_2-$ group of the $-(CH_2)_gR^{5d}$ group which is different from the terminal $-CH_2-$ groups is optionally replaced by $-O-$, $-S-$, $-SO-$ or $-SO_2-$, preferably R^{5b} is selected from the group consisting of $-H$ and a methyl group, preferably $g = 1, 2, 3$ or 4 , more preferably $g = 1$ or 2 ,

in formula (VIb):

$e = 0, 1, 2$ or 3 , preferably $e = 2$,

X^5 is absent or selected from the group consisting of $-N(R^{5e})-$, $-O-$, $-S-$, $-SO-$, $-SO_2-$ and $-CH_2-$,

wherein R^{5e} is selected from the group consisting of $-H$, $-Ac$, $(C_1-C_3)alkyl$ group and a group Z^3 , preferably R^{5e} is selected from the group consisting of $-H$, a methyl group and a group Z^3 , more preferably R^{5e} is a group Z^3 ,

wherein optionally one or two hydrogen atoms of any $-CH_2-$ groups that form the side chain are each and individually replaced by $-F$ or a methyl group,

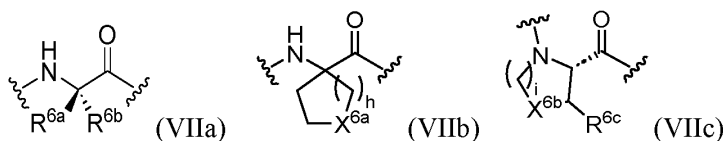
preferably X^5 is selected from the group consisting of $-N(R^{5e})-$, $-O-$ and $-CH_2-$, more preferably X^5 is $-N(R^{5e})-$,

preferably Xaa5 is a residue of an α,α -dialkylamino acid of formula (VIa), an L- α -amino acid of formula (VIa) comprising a polar or charged side chain, or an amino acid of formula (VIb),

more preferably Xaa5 is a residue of an amino acid selected from the group consisting of 2-aminoisobutyric acid (Aib), α -methyl-serine (Ams), α -methyl-lysine (Amk), (S)-2,3-diaminopropionic acid (Dap), (S)-2,4-diaminobutyric acid (Dab), L-ornithine (Orn), Lys, N_δ -methyl-L-ornithine (Orn(Me)), N_δ,N_δ -dimethyl-L-ornithine (OMe2), $N_\delta,N_\delta,N_\delta$ -trimethyl-L-ornithine (OMe3), N_ϵ -methyl-L-lysine (Lys(Me)), N_ϵ,N_ϵ -dimethyl-L-lysine (KMe2), $N_\epsilon,N_\epsilon,N_\epsilon$ -trimethyl-L-lysine (KMe3), Gly, Ala, Ser, 4-amino-tetrahydropyran-4-carboxylic acid (Thp), 4-amino-piperidine-4-carboxylic acid (Apc), 1-amino-1-cyclohexane carboxylic acid (Egz), Apc(Z^3), Lys(Z^3), Orn(Z^3), Dab(Z^3) and Dap(Z^3),

most preferably Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z^3), Orn(Z^3) and Apc(Z^3),

Xaa6 is a residue of an amino acid of formula (VIIa), (VIIb) or (VIIc):



wherein,

in formula (VIIa):

R^{6a} is selected from the group consisting of -H and a group of formula -
(CH₂)_kR^{6d},

wherein R^{6d} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{6d} optionally comprises a group Z⁴, preferably R^{6d} is selected from the group consisting of -H, a polar group and a charged group, more preferably R^{6d} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂ and -N(CH₃)₃⁺, most preferably R^{6d} is selected from the group consisting of -H, -OH, -CONH₂ and -COOH,

wherein k = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂)_kR^{6d} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_kR^{6d} group which is different from the

terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably k = 1, 2 or 3, more preferably k = 1 or 2, preferably R^{6a} is selected from the group consisting of -H and a methyl group, more preferably R^{6a} is -H,

5 R^{6b} is selected from the group consisting of -H, a (C₁-C₆)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula -(CH₂)_mR^{6e}, preferably R^{6b} is selected from the group consisting of -H and a group of formula -(CH₂)_mR^{6e},

10 wherein R^{6e} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{6e} optionally comprises a group Z⁴, preferably R^{6e} is selected from the group consisting of -H, -NH(Z⁴), -C(O)Z⁴, a polar group and a charged group, more preferably R^{6e} is selected from the group consisting of -H, -OH, -CONH₂, -COOH, -C(O)Z⁴, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z⁴) and -NH-C(NH)NH₂ and -NH-C(NH)-NH(CH₃),

15 wherein m = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂)_mR^{6e} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_mR^{6e} group which is different from the terminal -CH₂- groups of is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably m = 1, 2, 3 or 4,

20

in formula (VIIB):

h = 0, 1, 2 or 3, preferably h = 2,

25 X^{6a} is absent or selected from the group consisting of -NR^{6f}-, -O-, -S-, -SO-, -SO₂- and -CH₂-,

wherein R^{6f} is selected from the group consisting of -H, -Ac, (C₁-C₃)alkyl group and a group Z⁴, preferably R^{6f} is selected from the group consisting of -H, a methyl group and a group Z⁴, more preferably R^{6f} is a group Z⁴,

30 wherein optionally one or two hydrogen atoms of any of the -CH₂- groups that form the side chain are each and individually substituted by -F or a methyl group,

preferably X^{6a} is selected from the group consisting of $-N(R^{6f})-$, $-O-$ and $-CH_2-$, more preferably X^{6a} is $-N(R^{6f})-$,

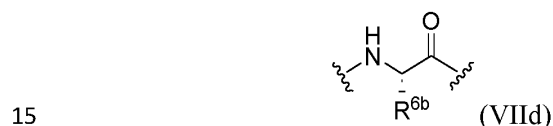
in formula (VIIc):

5 R^{6c} is selected from the group consisting of $-H$, $-OH$, $-F$, $-NH_2$, a (C_1-C_3) alkyl group, preferably R^{6c} is $-H$,

X^{6b} is selected from the group consisting of $-CH(R^{6g})-$, $-S-$, $-O-$, $-NH-$, preferably X^{6b} is $-CH(R^{6g})-$,

10 wherein R^{6g} is selected from the group consisting of $-H$, $-OH$, $-F$, $-NH_2$ and a (C_1-C_3) alkyl group, preferably R^{6g} is $-H$,
 $i = 1$ or 2 , preferably $i = 1$,

preferably $Xaa6$ is a residue of an L-amino acid of formula (VIIa), and more preferably $Xaa6$ is a residue of an L-amino acid of formula (VIId):



wherein,

in formula (VIId):

20 R^{6b} is selected from the group consisting of $-H$ and a group of formula $-(CH_2)_mR^{6e}$,

25 wherein R^{6e} is selected from the group consisting of $-H$, a polar group, a charged group and a hydrophobic group, wherein R^{6e} optionally comprises a group Z^4 , preferably R^{6e} is selected from the group consisting of $-H$, $-NH(Z^4)$, a polar and a charged group, more preferably R^{6e} is selected from the group consisting of $-H$, $-OH$, $-CONH_2$, $-COOH$, $-C(O)Z^4$, $-NH-CONH_2$, $-SO_3H$, $-NH_2$, $-NH(CH_3)$, $-N(CH_3)_2$, $-N(CH_3)_3^+$, $-NH(Z^4)$ and $-NH-C(NH)NH_2$ and $-NH-C(NH)-NH(CH_3)$,

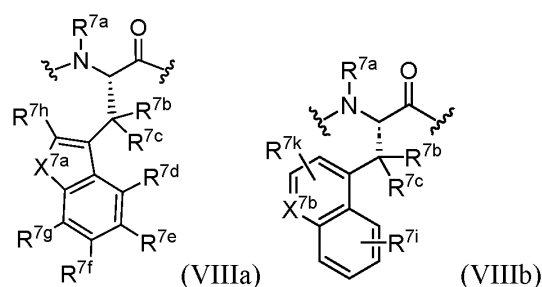
30 wherein $m = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five $-CH_2-$ groups of the $-(CH_2)_mR^{6e}$ group are replaced by a methyl group, and/or wherein one $-CH_2-$ group of the $-(CH_2)_mR^{6e}$ group which is different from the

terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably m = 1, 2, 3 or 4, more preferably m = 1 or 2,

preferably Xaa6 is a residue of an amino acid selected from the group consisting of Asn, Asp, Glu, Gln, Cya, Lys, Lys(Me), Orn, Orn(Me), Dab, Dab(Me), Gly, Ala, Thr, Ser, Leu, Tyr, Apc, Lys(Z⁴) and Apc(Z⁴),

more preferably Xaa6 is a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Z⁴), Lys(Me), Thr and Ser, and most preferably a residue of Asn,

Xaa7 is a residue of an amino acid of formula (VIIIa) or of formula (VIIIb):



wherein,

in formula (VIIIa):

R^{7a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, preferably R^{7a} is -H or a methyl group, more preferably R^{7a} is -H, R^{7b} and R^{7c} are each independently selected from the group consisting of -H and a methyl group, preferably R^{7b} and R^{7c} are -H, R^{7d}, R^{7e}, R^{7f} and R^{7h} are each independently selected from the group consisting of -H, -OH, a (C₁-C₂)alkyl group, -OCH₃ and a halogen atom, preferably R^{7d}, R^{7e}, R^{7f} and R^{7h} are each independently selected from the group consisting of -H, -F, -Cl, -Br and a methyl group, more preferably R^{7d}, R^{7e} and R^{7h} are each independently selected from the group consisting of -H, -F, -Cl and a methyl group, most preferably R^{7d}, R^{7e} and R^{7h} are -H, and R^{7f} is selected from the group consisting of -Br and -Cl, R^{7g} is selected from the group consisting of -H, -F and -Cl, more preferably R^{7g} is selected from the group consisting of -H and -F, most preferably R^{7g} is -H,

X^{7a} selected from the group consisting of -NH- and -S-, preferably X^{7a} is -NH-,

in formula (VIIIb):

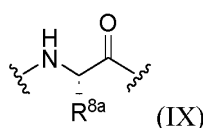
5 R^{7a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, preferably R^{7a} is -H or a methyl group, more preferably R^{7a} is -H,
 R^{7b} and R^{7c} are each independently selected from the group consisting of -H and a methyl group, preferably R^{7b} and R^{7c} are -H,
 R^{7i} and R^{7k} are each independently selected from the group consisting of
10 -H, -OH, a methyl group, -OCH₃ and a halogen atom, preferably R^{7i} and R^{7k} are each independently selected from the group consisting of -H, -F, -Cl and a methyl group, more preferably R^{7i} and R^{7k} are -H,
 X^{7b} selected from the group consisting of -CH= and -N=, preferably X^{7b} is -CH=,

15

preferably Xaa7 is a residue of an amino acid selected from the group consisting of Trp, 6-chloro-L-tryptophan (6Clw), L-6-methyl-tryptophan (6Mw), 5-chloro-L-tryptophan (5Clw), 3-benzothienyl-L-alanine (Bta), 3-(1-naphthyl)-L-alanine (1Ni), 5-fluoro-L-tryptophan (5Fw), 6-fluoro-L-tryptophan (6Fw), 7Fw and 6-bromo-L-tryptophan (Brw6),

20 more preferably Xaa7 is a residue of an amino acid selected from the group consisting of 6Clw and Brw6,

Xaa8 is a residue of an amino acid of formula (IX):



25

wherein,

in formula (IX):

R^{8a} is selected from the group consisting of -H and a group of formula -
(CH₂)_n R^{8b} ,

30

wherein R^{8b} is selected from the group consisting of -H, a polar, a charged and a hydrophobic group, wherein R^{8b} optionally comprises a group Z⁵, preferably R^{8b} is selected from the group consisting of -H,

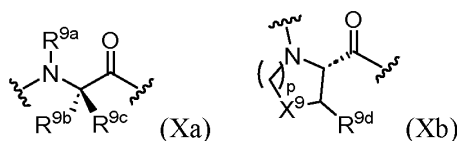
$-\text{NH}(\text{Z}^5)$, $-\text{C}(\text{O})\text{Z}^5$, a polar group and a charged group, more preferably R^{8b} comprises a positively charged group, and even more preferably R^{8b} is selected from the group consisting of $-\text{N}(\text{R}^{8c})(\text{R}^{8d})$, $-\text{N}(\text{CH}_3)_2(\text{R}^{8e})^+$, $-\text{NH}(\text{Z}^5)$, $-\text{N}(\text{R}^{8f})-\text{C}(\text{N}(\text{R}^{8g}))-\text{N}(\text{R}^{8h})(\text{R}^{8i})$ and a piperidinyl group, wherein R^{8c} , R^{8d} , R^{8f} , R^{8g} , R^{8h} and R^{8i} are each independently selected from the group consisting of $-\text{H}$ and a (C_1-C_3) alkyl group, preferably R^{8c} and R^{8d} are each independently selected from the group consisting of $-\text{H}$ and a methyl group, wherein R^{8e} is selected from the group consisting of a (C_1-C_3) alkyl group and $-(\text{CH}_2)_3\text{SO}_3^-$, most preferably R^{8b} is selected from the group consisting of $-\text{NH}_2$, $-\text{NH}(\text{CH}_3)$, $-\text{N}(\text{CH}_3)_2$, $-\text{N}(\text{CH}_3)_3^+$, $-\text{NH}-\text{C}(\text{NH})-\text{NH}_2$, $-\text{NH}-\text{C}(\text{NH})-\text{NH}(\text{CH}_3)$, $-\text{NH}-\text{C}(\text{NH})-\text{N}(\text{CH}_3)_2$ and $-\text{NH}-\text{C}(\text{N}(\text{CH}_3))\text{NH}(\text{CH}_3)$,

wherein $n = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogens of said one, two, three, four or five $-\text{CH}_2-$ groups of the $-(\text{CH}_2)_n\text{R}^{8b}$ group are replaced by a methyl group, and/or wherein one $-\text{CH}_2-$ group of the $-(\text{CH}_2)_n\text{R}^{8b}$ group which is different from the terminal $-\text{CH}_2-$ groups is optionally replaced by $-\text{O}-$, $-\text{S}-$, $-\text{SO}-$ or $-\text{SO}_2-$, preferably $n = 1, 2, 3$ or 4 , more preferably $n = 3$ or 4 ,

preferably Xaa8 is a residue of an amino acid selected from the group consisting of Lys, Lys(Me), KMe2, KMe3, (S) -3-((5-amino-5-carboxypentyl)dimethylammonio)propane-1-sulfonate (Kzw), Lys(Z^5), 3-(4-piperidinyl)-L-alanine (Egg), Arg, N_ω -methyl-L-arginine (Arg(Me)), N_ω, N_ω -dimethyl-L-arginine (RMe2), L-homoarginine (Har), Orn, Orn(Me), OMe2, OMe3, γ -(2-pyridyl)-L-ornithine (Opy), L-homolysine (Hly), L-citrulline (Cit), Gln, L-homocitrulline (Hci), N_ω, N_ω -dimethyl-L-arginine (Egd) and N_ϵ -iso-propyl-L-lysine (Kip),

more preferably Xaa8 is a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Lys(Z^5), Arg(Me) and RMe2, and most preferably a residue of KMe3,

Xaa9 is a residue of an amino acid of formula (Xa) or (Xb):



wherein,

in formula (Xa):

5 R^{9a} is selected from the group consisting of -H and (C_1-C_2) alkyl group, preferably R^{9a} is -H,

R^{9b} is selected from the group consisting of -H and a group of formula $-(CH_2)_oR^{9c}$,

10 wherein R^{9c} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{9c} optionally comprises a group Z^6 , preferably R^{9c} is selected from the group consisting of -H, an aryl group, a heteroaryl group, a polar group and a charged group, more preferably R^{9c} is selected from the group consisting of -H, an aryl group, a heteroaryl group, -OH, -CONH₂, -COOH, -NH-CONH₂, -SO₃H, -NH₂, -NH(CH₃), -N(CH₃)₂, -N(CH₃)₃⁺, -NH(Z⁴) and -NH-C(NH)NH₂, most preferably R^{9c} is selected from the group consisting of -H, a methyl group, an aryl group and a heteroaryl group, wherein said aryl group or heteroaryl group is optionally substituted by 1 or 2 substituents, preferably 1 substituent, wherein, preferably, each substituent is independently selected from the group consisting of a halogen atom, a (C_1-C_3) alkyl group, -CN, -COOH, -CONH₂, -NO₂, -NH₂, -NH-CN-NH₂, -SO₃H, -OH, an -O (C_1-C_3) alkyl group, wherein each substituent is optionally linked, preferably via a methylene group, to the aryl group or heteroaryl group, and wherein said group aryl group or heteroaryl group preferably comprises one aromatic ring,

25 wherein $o = 1, 2, 3$ or 4 , wherein optionally one or two hydrogen atoms of said one, two, three or four -CH₂- groups of the $-(CH_2)_oR^{9c}$ group are replaced by a methyl group, and/or wherein one -CH₂- group of the $-(CH_2)_oR^{9c}$ group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably $o = 1$ or 2 , more preferably $o = 1$,

30 R^{9c} is selected from the group consisting of -H and methyl group, with the proviso that if R^{9b} is -H, R^{9c} is -H, preferably R^{9c} is -H,

in formula (Xb):

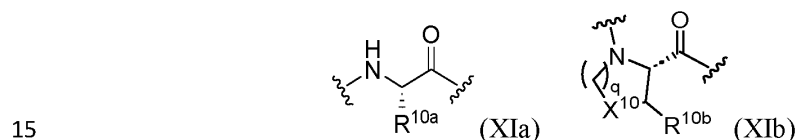
R^{9d} is selected from the group consisting of -H, -OH, -F, -NH₂, a (C₁-C₃)alkyl group, preferably R^{9d} is -H,

X^9 is selected from the group consisting of -CH(R^{9f})-, -S-, -O-, -NH-, preferably X^9 is -CH(R^{9f})-,

5 wherein R^{9f} is selected from the group consisting of -H, -OH, -F, -NH₂ and a methyl group, preferably R^{9f} is -H,
p = 1 or 2, preferably p = 1,

preferably Xaa9 is a residue of an amino acid selected from the group consisting of Gly,
10 Ala, Dab, Glu, Pro, 4-carbamoyl-L-phenylalanine (Pcnf), Lys(Z^6) and Tyr,
more preferably Xaa9 is a residue of an amino acid selected from the group consisting of Ala and Tyr,

Xaa10 is a residue of formula (XIa) or (XIb):



wherein,

in formula (XIa):

R^{10a} is selected from the group consisting of -H and a group of formula
20 -(CH₂)_r R^{10c} ,

wherein R^{10c} is selected from the group consisting of -H, a polar group, a charged group and a hydrophobic group, wherein R^{10c} optionally comprises a group Z^7 , preferably R^{10c} is selected from the group consisting of -NH(Z^7), a polar group and a charged group, more
25 preferably R^{10c} is a negatively charged group, most preferably R^{10c} is selected from the group consisting of -COOH and -SO₃H,

wherein r = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂)_r R^{10c} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_r R^{10c} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably r = 1,
30 2, 3 or 4, more preferably r = 1 or 2,

in formula (XIb):

R^{10b} is selected from the group consisting of -H, -OH, -F, -NH₂, a (C₁-C₃)alkyl group, preferably R^{10b} is -H,

5 X^{10} is selected from the group consisting of -CH(R^{10d})-, -S-, -O-, -NH-, preferably X^9 is -CH(R^{10d})-,

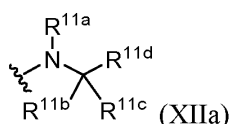
wherein R^{10d} is selected from the group consisting of -H, -OH, -F, -NH₂ and a methyl group, preferably R^{10d} is -H,

$q = 1$ or 2 , preferably $q = 1$,

10

preferably Xaa10 is a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Ser, Lys and Thr, more preferably Xaa10 is a residue of an amino acid selected from the group consisting of Asp and Cya,

15 Xaa11 is a residue of formula (XIIa):



wherein,

in formula (XIIa):

20 R^{11a} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, preferably R^{11a} is -H,

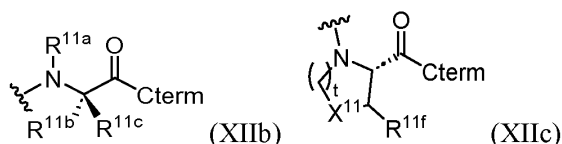
R^{11b} is selected from the group consisting of -H, a (C₁-C₈)alkyl group, a (C₃-C₇)carbocycle, (C₃-C₇)heterocycle, an aryl group, a heteroaryl group and a group of formula -(CH₂)_s R^{11e} ,

25 wherein R^{11e} is selected from the group consisting of a polar group, a charged group and a hydrophobic group, wherein R^{11e} optionally comprises a group Z^8 , preferably R^{11e} is a hydrophobic group, more preferably R^{11e} is selected from the group consisting of an aryl group and a heteroaryl group,

30 wherein $s = 1, 2, 3, 4$ or 5 , wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂)_s R^{11e} group are replaced by a methyl group, and/or wherein one -CH₂- group

of the $-(CH_2)_sR^{11e}$ group which is different from the terminal $-CH_2-$ groups is optionally replaced by $-O-$, $-S-$, $-SO-$ or $-SO_2-$, preferably $s = 1, 2$ or 3 , more preferably $s = 1$, or alternatively, R^{11a} and R^{11b} form together an optionally up to two-fold substituted 5-, 6-, or 7-membered heterocycle, wherein each substituent is each and independently selected from the group consisting of a (C_1-C_3) alkyl group, a halogen atom, $-NH_2$ and $-OH$, preferably R^{11a} and R^{11b} form together a 5- or 6-membered heterocycle, R^{11c} is selected from the group consisting of $-H$ and a (C_1-C_2) alkyl group, preferably R^{11c} is $-H$, or alternatively, R^{11b} and R^{11c} form together an optionally substituted 3-, 4-, 5-, 6- or 7-membered carbocycle or heterocycle, preferably a 6-membered carbocycle, wherein each substituent is independently selected from the group consisting of a (C_1-C_2) alkyl group, a halogen atom, $-NH_2$ and $-OH$, R^{11d} is selected from the group consisting of $-H$, a (C_1-C_2) alkyl group, $-CH_2(OH)$ and $-C(O)-Cterm$, preferably R^{11d} is $-C(O)-Cterm$,

preferably Xaa11 is a residue of formula (XIIf) or (XIIfc):



wherein

in formula (XIIf):

R^{11a} is selected from the group consisting of $-H$ and a (C_1-C_2) alkyl group, preferably R^{11a} is $-H$, R^{11b} is selected from the group consisting of $-H$, a (C_1-C_8) alkyl group, a (C_3-C_7) carbocycle, a (C_3-C_7) heterocycle, an aryl group, a heteroaryl group and a group of formula $-(CH_2)_sR^{11e}$,

wherein R^{11e} is selected from the group consisting of a polar group, a charged group and a hydrophobic group, wherein R^{11e} optionally comprises a group Z^8 , preferably R^{11e} is a hydrophobic group, more preferably R^{11e} is selected from the group consisting of an aryl group and

a heteroaryl group, wherein said aryl group or heteroaryl group is optionally substituted by atoms or groups each and independently selected from the group consisting of -NH₂, -OH, -CN, -CONH₂, -OCH₃, a halogen atom and a (C₁-C₃)alkyl group,

5 wherein s = 1, 2, 3, 4 or 5, wherein optionally one or two hydrogen atoms of said one, two, three, four or five -CH₂- groups of the -(CH₂)_sR^{11e} group are replaced by a methyl group, and/or wherein one -CH₂- group of the -(CH₂)_sR^{11e} group which is different from the terminal -CH₂- groups is optionally replaced by -O-, -S-, -SO- or -SO₂-, preferably s = 1, 2 or 3, more preferably s = 1,

10 R^{11c} is selected from the group consisting of -H and a (C₁-C₂)alkyl group, with the proviso that if R^{11b} is -H, R^{11c} is -H, preferably R^{11c} is -H, or alternatively, R^{11b} and R^{11c} form together an optionally substituted 3-, 4-, 5-, 6- or 7-membered carbocycle or heterocycle, preferably a 6-membered carbocycle, wherein each substituent is independently selected from the group consisting of a (C₁-C₂)alkyl group, a halogen atom, -NH₂ and -OH,

15 Cterm is selected from the group consisting of -NH₂, -OH, -NHR^{cterm} and a group Z⁹, wherein R^{cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group, preferably Cterm is NH₂,

20

in formula (XIIC):

25 R^{11f} is selected from the group consisting of -H, -OH, -F, -NH₂, a (C₁-C₃)alkyl group, preferably R^{11f} is -H,

X¹¹ is selected from the group consisting of -CH(R^{11g})-, -S-, -O-, -NH-, preferably X¹⁰ is -CH(R^{11g})-,

30 wherein R^{11g} is selected from the group consisting of -H, -OH, -F, -NH₂ and a methyl group, preferably R^{11g} is -H, t = 1, 2 or 3, preferably t = 1 or 2,

Cterm is selected from the group consisting of -NH₂, -OH, -NHR^{cterm} and a group Z⁹, wherein R^{cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group, preferably Cterm is NH₂,

more preferably Xaa11 is a residue of an L- α -amino acid of formula (XIb), wherein R^{11b} is a group of formula -CH₂R^{11e}, wherein R^{11e} is selected from the group consisting of an aryl group and a heteroaryl group, preferably a phenyl group or a 2-thienyl group, wherein said aryl group or heteroaryl group is optionally substituted by one or more, e.g., one, two or three, atoms or groups each and independently selected from the group consisting of -NH₂, -OH, -CN, -CONH₂, -OCH₃, a halogen atom and a (C₁-C₃)alkyl group, preferably the aryl group or heteroaryl group is unsubstituted or has one substituent, and wherein preferably Cterm is NH₂,
 even more preferably Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe, Egz, ortho-chloro-phenylalanine (Ocf), 3-(1-naphthyl)alanine (1Ni), 3-fluoro-phenylalanine (Mff), 2-cyano-L-phenylalanine (Onf), 2-fluoro-L-phenylalanine (Off), Ala and Val, with Cterm being preferably -NH₂,
 and even more preferably Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, with Cterm being preferably -NH₂,
 most preferably Xaa11 is Thi, with Cterm being preferably -NH₂,

Cext is a moiety of formula (Ie), and

Cterm is selected from the group consisting of -NH₂, -OH, -NHR^{Cterm} and a group Z⁹, wherein R^{Cterm} is selected from group consisting of a (C₁-C₆)alkyl group, a benzyl group, a 2-phenylethyl group and a 3-phenylpropyl group,
 preferably Cterm is NH₂,

in the above formulae, each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently an effector E, such as a chelator, which may optionally comprise a linker moiety L that covalently links the effector E to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α 1) a phosphorophore and (α 2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, NK cells and/or phagocytotic cells.

3. The compound or salt of claim 1 or 2, wherein at least one, e.g., one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve or thirteen, of Xaa1, Xaa2, Xaa3, Xaa4, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:
- 5 (a) Xaa1 is a residue of an *N*_α-methyl-L-α-amino acid, an *N*_α-(carboxymethyl)-L-α-amino acid, Ida or Pip, preferably a residue of an amino acid selected from the group consisting of Pip, Nmg, Nma, Nms, Nmd, Nme, Nmk, Nmk(Me), KMe3a, KMe4, Nmo, Nmo(Me), Cmo, Cmo(Me), Mdab, Mdab(Me), Mida, Mdap, Mdap(Me), Azp, Mor and Ida, more preferably a residue of an amino acid selected from the group consisting of Pip and
10 Nma, and still more preferably a residue of Pip,
 - (b) Xaa2 is a residue of an amino acid selected from the group consisting of Trp, 7Clw, 7Mw, 7Fw, Bmw and NmW, and preferably Xaa2 is a residue of Trp,
 - (c) Xaa3 is a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Dmd, Penox, Val and Asn, and preferably a residue of an amino acid selected from the
15 group consisting of Penox, Asp and Cya,
 - (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnpg, Leu, Nml, Hle, Phe, Gel, Mgel, Nle, NMB, Cba, Cpa, Cha, Cpg and Chg, preferably a residue of an amino acid selected from the group consisting of Npg, Leu, Mnpg, Nml and Chg, and more preferably a residue of an amino acid selected from the group
20 consisting of Npg, Mnpg and Nml, and most preferably Xaa4 is a residue of Npg,
 - (e) Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Amk, Dap, Dab, Orn, Orn(Me), OMe2, OMe3, Lys, Lys(Me), KMe2, KMe3, Gly, Ala, Ser, Thp, Apc, Egz, Apc(Z³), Lys(Z³), Orn(Z³), Dab(Z³) and Dap(Z³), and preferably a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc,
25 Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC, DOTAMGAM, PSCGA and NOTA, more preferably Xaa5 is a residue of an amino acid selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC),
30 Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),
 - (f) Xaa6 is a residue of an amino acid selected from the group consisting of Asn, Asp, Glu, Gln, Cya, Lys(Me), Orn, Orn(Me), Dab, Dab(Me), Gly, Ala, Thr, Ser, Leu, Tyr, Apc,

Lys(Z⁴) and Apc(Z⁴), wherein Z⁴ is preferably selected from the group consisting of DOTA, DOTAM and PSC, and Xaa6 is preferably a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Z⁴), Lys(Me), Thr and Ser, and more preferably Xaa6 is a residue of Asn,

- 5 (g) Xaa7 is a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, and preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6,
- (h) Xaa8 is a residue of an amino acid selected from the group consisting of Lys, Lys(Me), KMe2, KMe3, Kzw, Egg, Arg, Arg(Me), Lys(Z⁵), RMe2, Har, Orn, Orn(Me), OMe2,
10 OMe3, Opy, Hly, Cit, Gln, Hci, Egd and Kip, wherein Z⁵ is preferably selected from the group consisting of DOTA, DOTAM and PSC, preferably Xaa8 is a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Arg(Me), Lys(Z⁵) and RMe2, and more preferably a residue of KMe3,
- (i) Xaa9 is a residue of an amino acid selected from the group consisting of Gly, Ala, Dab,
15 Glu, Pro, Pcnf, Lys(Z⁶) and Tyr, wherein Z⁶ is preferably selected from the group consisting of DOTA, DOTAM and PSC, and preferably Xaa 9 is a residue of an amino acid selected from the group consisting of Ala and Tyr,
- (j) Xaa10 is a residue of an amino acid selected from the group consisting of Asp, Cya,
20 Glu, Thr, Lys and Ser, and preferably a residue of an amino acid selected from the group consisting of Asp and Cya,
- (k) Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe, Ocf, 1Ni, Mff, Onf, Off, Ala and Val, preferably a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, and more preferably a residue of Thi,
- (l) Cext is a moiety of formula (Ie), and
- 25 (m) Cterm is NH₂.

4. The compound of any one of claims 1 to 3, wherein at least one, e.g., one, two, three or four, of Xaa2, Xaa4, Xaa7 and Cext is/are defined as follows:

- (b) Xaa2 is a residue of an amino acid selected from the group consisting of Trp, 7Clw,
30 7Mw, 7Fw, Bmw and Nmw, and preferably Xaa2 is a residue of Trp, and

- (d) Xaa4 is a residue of an amino acid selected from the group consisting of Npg, Mnp_g, Leu, Nml, Hle, Phe, Gel, Mgel, Nle, NMB, Cba, Cpa, Cha, Cpg and Chg, preferably a residue of an amino acid selected from the group consisting of Npg, Leu, Mnp_g, Nml and Chg, more preferably a residue of an amino acid selected from the group consisting of Npg, Mnp_g and Nml, and most preferably a residue of Npg, and
- (g) Xaa7 is a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, and preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6, and
- (l) Cext is a moiety of formula (Ie),
- all Xaa2, Xaa4, Xaa7 and Cext preferably having the meanings defined in the above items (b), (d), (g) and (l).
5. The compound or salt of any one of claims 1 to 4, wherein in formula (I),
- Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Glu-Npg, Pip-Trp-Val-Npg, Pip-Trp-Asn-Npg, Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Leu, Pip-Trp-Cya-Leu, Pip-Trp-Glu-Leu, Pip-Trp-Val-Leu, Pip-Trp-Asn-Leu, Pip-Trp-Dmd-Leu, Pip-Trp-Asp-Chg, Pip-Trp-Cya-Chg, Pip-Trp-Glu-Chg, Pip-Trp-Val-Chg, Pip-Trp-Asn-Chg, Pip-Trp-Dmd-Chg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Glu-Nml, Pip-Trp-Val-Nml, Pip-Trp-Asn-Nml, Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnp_g, Pip-Trp-Cya-Mnp_g, Pip-Trp-Glu-Mnp_g, Pip-Trp-Val-Mnp_g, Pip-Trp-Asn-Mnp_g, Pip-Trp-Dmd-Mnp_g, Nma-Trp-Asp-Npg, Nma-Trp-Cya-Npg, Nma-Trp-Glu-Npg, Nma-Trp-Val-Npg, Nma-Trp-Asn-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Leu, Nma-Trp-Cya-Leu, Nma-Trp-Glu-Leu, Nma-Trp-Val-Leu, Nma-Trp-Asn-Leu, Nma-Trp-Dmd-Leu, Nma-Trp-Asp-Chg, Nma-Trp-Cya-Chg, Nma-Trp-Glu-Chg, Nma-Trp-Val-Chg, Nma-Trp-Asn-Chg, Nma-Trp-Dmd-Chg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Glu-Nml, Nma-Trp-Val-Nml, Nma-Trp-Asn-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnp_g, Nma-Trp-Cya-Mnp_g, Nma-Trp-Glu-Mnp_g, Nma-Trp-Val-Mnp_g, Nma-Trp-Asn-Mnp_g, Nma-Trp-Dmd-Mnp_g, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnp_g, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnp_g, Nmo(Me)-Trp-Cya-Mnp_g, Nmg-Trp-Cya-Mnp_g, Nmo(Me)-Trp-Cya-Nml, Nmg-Trp-Cya-Nml, Nmo(Me)-Trp-Asp-Mnp_g, Nmg-Trp-Asp-Mnp_g, Nmo(Me)-Trp-Asp-Nml, Nmg-Trp-Asp-Nml, Nmo(Me)-Trp-Asp-Npg, Nmg-Trp-Asp-Npg, Nmo(Me)-Trp-Penox-Npg, Nmg-Trp-Penox-Npg, Nmo(Me)-Trp-Penox-Nml, Nmg-Trp-

Penox-Nml, Nmo(Me)-Trp-Penox-Mnpg, Nmg-Trp-Penox-Mnpg, Nmo(Me)-Trp-Cya-Npg, Nmg-Trp-Cya-Npg, Azp-Trp-Cya-Mnpg, Mor-Trp-Cya-Mnpg, Azp-Trp-Cya-Nml, Mor-Trp-Cya-Nml, Azp-Trp-Asp-Mnpg, Mor-Trp-Asp-Mnpg, Azp-Trp-Asp-Nml, Mor-Trp-Asp-Nml, Azp-Trp-Asp-Npg, Mor-Trp-Asp-Npg, Azp-Trp-Penox-Npg, Mor-Trp-Penox-Npg, Azp-Trp-Penox-Nml, Mor-Trp-Penox-Nml, Azp-Trp-Penox-Mnpg, Mor-Trp-Penox-Mnpg, Azp-Trp-Cya-Npg and Mor-Trp-Cya-Npg,

preferably Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnpg, Pip-Trp-Cya-Mnpg, Pip-Trp-Dmd-Mnpg, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnpg, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnpg, Nma-Trp-Asp-Npg, Nma-Trp-Cya-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnpg, Nma-Trp-Cya-Mnpg and Nma-Trp-Dmd-Mnpg, and

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Xaa7 is preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6.

20 6. The compound or salt of any one of claims 1 to 5, wherein in formula (I),

Xaa1 – Xaa2 – Xaa3 – Xaa4 is a moiety selected from the group consisting of Pip-Trp-Asp-Npg, Pip-Trp-Cya-Npg, Pip-Trp-Dmd-Npg, Pip-Trp-Asp-Nml, Pip-Trp-Cya-Nml, Pip-Trp-Dmd-Nml, Pip-Trp-Asp-Mnpg, Pip-Trp-Cya-Mnpg, Pip-Trp-Dmd-Mnpg, Pip-Trp-Penox-Npg, Pip-Trp-Penox-Nml, Pip-Trp-Penox-Mnpg, Nma-Trp-Penox-Npg, Nma-Trp-Penox-Nml, Nma-Trp-Penox-Mnpg, Nma-Trp-Asp-Npg, Nma-Trp-Cya-Npg, Nma-Trp-Dmd-Npg, Nma-Trp-Asp-Nml, Nma-Trp-Cya-Nml, Nma-Trp-Dmd-Nml, Nma-Trp-Asp-Mnpg, Nma-Trp-Cya-Mnpg and Nma-Trp-Dmd-Mnpg, and

30 Xaa7 is preferably a residue of an amino acid selected from the group consisting of Trp, 6Clw, 6Mw, 5Clw, Bta, 1Ni, 5Fw, 6Fw, 7Fw and Brw6, more preferably a residue of an amino acid selected from the group consisting of 6Clw and Brw6.

7. The compound or salt of claim 5 or 6, wherein at least one, e.g., one, two, three, four, five, six, seven or eight, of Xaa5, Xaa6, Xaa8, Xaa9, Xaa10, Xaa11, Cext and Cterm is/are defined as follows:
- (e) Xaa5 is a residue of an amino acid selected from the group consisting of Aib, Ams, Thp, Apc, Lys(Z³), Orn(Z³) and Apc(Z³), wherein Z³ is preferably selected from the group consisting of DOTA, DOTAM, PSC, DOTAGA, NOPO, NODAGA, BnTCMC, DOTAMGAM, PSCGA and NOTA, preferably Xaa5 is a residue of an amino acid selected from the group consisting of Apc(DOTA), Apc(DOTAM), Apc(PSC), Apc(DOTAGA), Apc(NOPO), Apc(NODAGA), Apc(PSCGA), Apc(BnTCMC), Apc(DOTAMGAM), Apc(PSCGA) and Apc(NOTA),
 - (f) Xaa6 is a residue of an amino acid selected from the group consisting of Ala, Asn, Asp, Cya, Lys, Lys(Me), Lys(Z⁴), Thr and Ser, preferably Xaa6 is a residue of Asn,
 - (h) Xaa8 is a residue of an amino acid selected from the group consisting of Lys(Me), KMe2, KMe3, Kzw, Egg, Arg(Me), Lys(Z⁵) and RMe2, preferably a residue of KMe3,
 - (i) Xaa9 is a residue of an amino acid selected from the group consisting of Gly, Ala, Dab, Glu, Pro, Pcnf, Lys(Z⁶) and Tyr, preferably a residue of an amino acid selected from the group consisting of Ala and Tyr,
 - (j) Xaa10 is a residue of an amino acid selected from the group consisting of Asp, Cya, Glu, Lys, Thr and Ser, preferably a residue of an amino acid selected from the group consisting of Asp and Cya,
 - (k) Xaa11 is a residue of an amino acid selected from the group consisting of Thi, Phe and Ocf, preferably a residue of Thi,
 - (l) Cext is a moiety of formula (Ie), and
 - (m) Cterm is NH₂.
8. The compound or salt of any one of claims 1 to 7, which is represented by one of the following formulae:
- H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe2-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Har-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂

H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Guf-Cya-Thi-NH₂
 5 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-en
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Onf-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Off-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Ser-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Thr-Thi-NH₂
 10 H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys-6Clw-KMe3-Tyr-Ser-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe3-Lys(Z⁶)-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(Z⁵)-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NHMe
 H-Pip-Trp-Cya-Npg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Cya-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 20 H-Nma-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-KMe4-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH₂
 25 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH₂
 30 H-Pip-Trp-Asn-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Egg-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH₂

H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Mff-NH₂
 H-Pip-Trp-Cya-Npg-Lys-Apc(Z⁴)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc-Lys(Z⁴)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 5 H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Dmd-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Nml-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Ida-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Mida-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 10 H-Pip-Trp-Cya-Mnpg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmg-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Gel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Thr-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mgel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Penox-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo(Me)-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Dab(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 20 H-Mor-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Azp-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

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wherein, in the above formulae, en is a residue of ethylenediamine, and each of Z³, Z⁴, Z⁵ or Z⁶ is independently an effector E which may optionally comprise a linker moiety L, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from
 30 (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
 (β) a chelator optionally comprising a radionuclide; and
 (γ) a drug, preferably a cytotoxic drug; and

(δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, NK cells and/or phagocytotic cells.

9. The compound or salt of any one of claims 1 to 8, which is represented by one of the following formulae:

- 5 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₂-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Har-Tyr-Cya-Thi-NH₂
10 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-RMe₂-Tyr-Cya-Thi-NH₂
15 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
20 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asn-Npg-Apc(Z³)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Pcnf-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Guf-Cya-Thi-NH₂
25 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-en
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Ocf-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Mff-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Cya-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
30 H-Nma-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Orn(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Cya-Off-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe₃-Tyr-Ser-Thi-NH₂

- H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Thr-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
5 H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(Z⁵)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Mnpg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Nmg-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Gel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
10 H-Pip-Trp-Cya-Npg-Apc(Z³)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Mgel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Penox-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Nmo(Me)-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Dab(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
15 H-Pip-Trp-Cya-Npg-Apc(Z³)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

and preferably by one of the following formulae:

- H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
20 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
25 H-Pip-Trp-Asp-Npg-Apc(Z³)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Ocf-NH₂
H-Nma-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
30 H-Pip-Trp-Cya-Npg-Apc(Z³)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Mnpg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Mnpg-Orn(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Gel-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂

H-Pip-Trp-Cya-Npg-Apc(Z³)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Dab(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(Z³)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

5 wherein, in the above formulae, en is a residue of ethylenediamine, and each group Z³ and Z⁵ is independently an effector E which may optionally comprise a linker moiety L, the effector E being preferably selected from the group consisting of:

- (α) a chromophore, wherein the chromophore is preferably selected from (α1) a phosphorophore and (α2) a fluorophore such as fluorescein or rhodamine; and
- (β) a chelator optionally comprising a radionuclide; and
- (γ) a drug, preferably a cytotoxic drug; and
- (δ) an immune cell engaging effector, preferably recruiting and stimulating T cells, NK cells and/or phagocytotic cells.

15

10. The compound or salt of any one of claims 1 to 9, wherein each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently a chelator which may optionally comprise a linker moiety L, wherein the chelator comprises a radionuclide, and

20 wherein preferably the chelator is independently a residue of DOTA, DOTAGA, DOTAM, Crown, DOTP, NOTA, NODAGA, NODA-MPAA, HBED, TETA, CB-TE2A, DTPA, CHX-A''-DTPA, DFO, Macropa, HOPO ligand platform, TRAP, THP, AAZTA, DATA, NOPO, PCTA, PSC, sarcophagine, FSC, DEPA, DE4TA, NETA, NE3TA, H₄octapa, H₄CHXoctapa, H₄pypa, H₄py₄pa, HYNIC, NxS₄-x (N₄, N₂S₂, N₃S), ^{99m}Tc(CO)₃-chelators.

25 11. The compound or salt of claim 10, wherein the chelator is a residue of DOTA, DOTAGA, DOTAM, Crown, NOTA, NODAGA, NODA-MPAA, CB-TE2A, CHX-A''-DTPA, DFO, Macropa, THP, AAZTA, NOPO, PCTA, PSC, sarcophagine, NETA, H₄CHXoctapa, H₄pypa and N₄, preferably of DOTA, DOTAGA, DOTAM, NOTA, NODAGA, Macropa, Crown, NOPO, PCTA, PSC and N₄, more preferably of DOTA, DOTAM, Macropa, NOTA, PSC or NODAGA, and most preferably of DOTA.

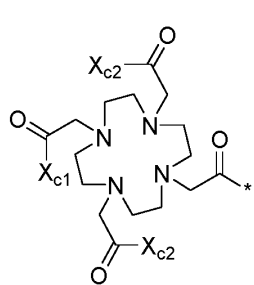
30 12. The compound or salt of any one of claims 1 to 11, wherein each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently a moiety represented by the following formula (XIII):

E-* (XIII)

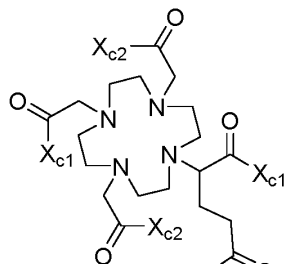
wherein,

* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

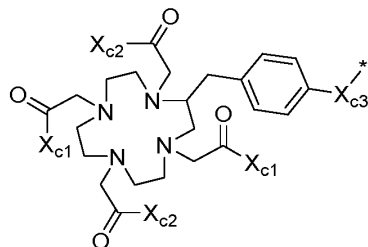
5 E is a residue represented by any one of the following formulae (XIVa) to (XIVn):



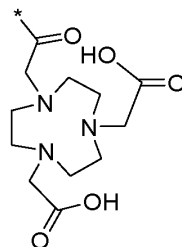
(XIVa)



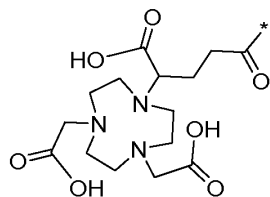
(XIVb)



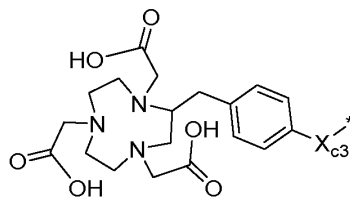
(XIVc)



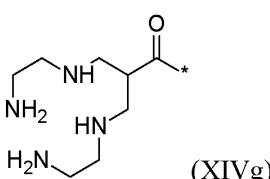
(XIVd)



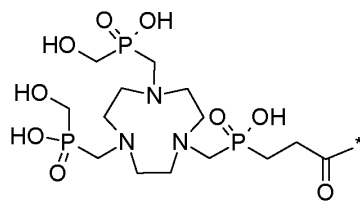
(XIVe)



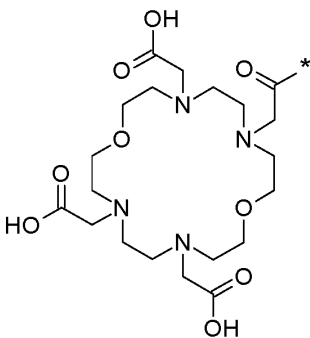
(XIVf)



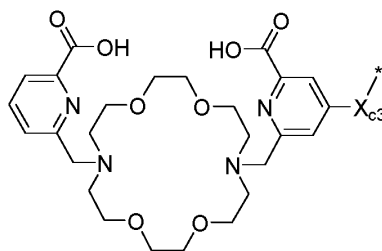
(XIVg)



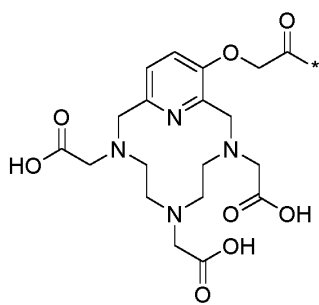
(XIVh)



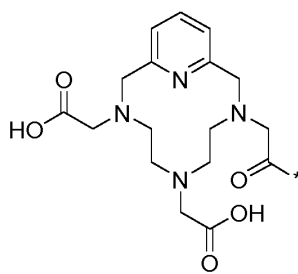
(XIVi)



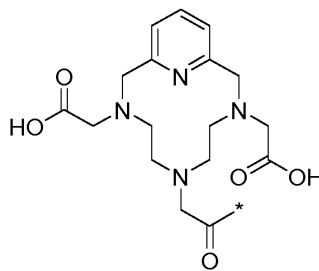
(XIVj)



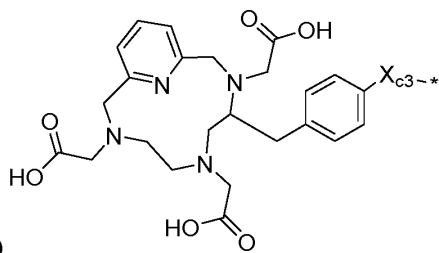
(XIVk)



(XIVl)



(XIVm)



(XIVn),

wherein,

X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂,

and

X_{c3} is independently selected from the group consisting of -NH-* for attachment to a carbonyl group and -N-C(S)-* for attachment to an N atom of an amino group, and

* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

the residue E optionally comprises a radionuclide.

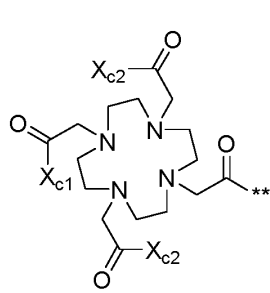
13. The compound or salt of any one of claims 1 to 12, wherein each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently a moiety represented by the following formula (XV):



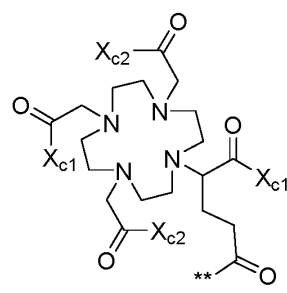
wherein,

* indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

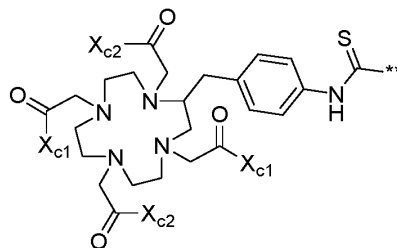
(a) E is a residue represented by any one of the following formulae (XVIa) to (XVIIn):



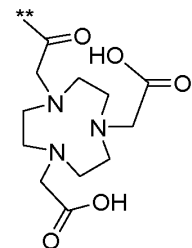
(XVIa)



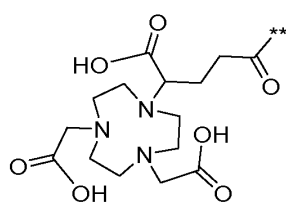
(XVIb)



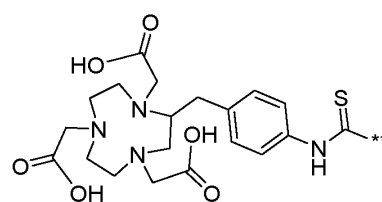
(XVIc)



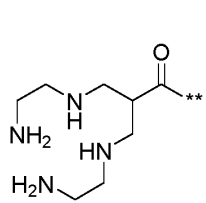
(XVIId)



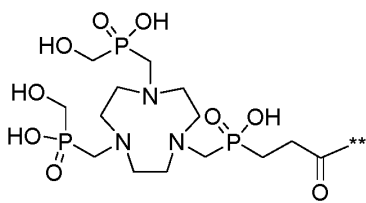
(XVIe)



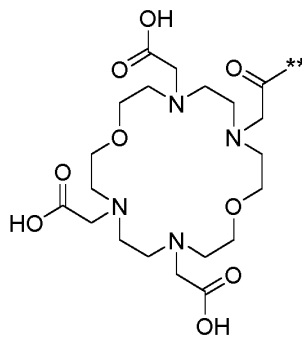
(XVIIf)



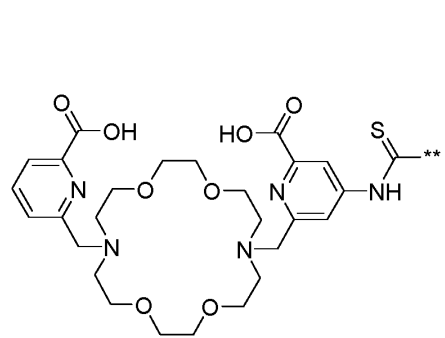
(XVIg)



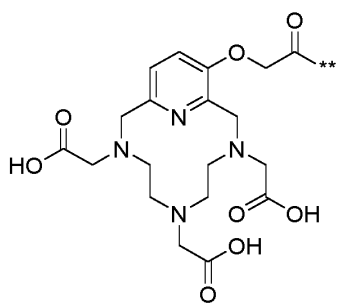
(XVIh)



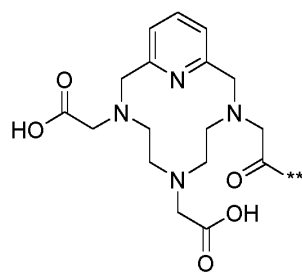
(XVIi)



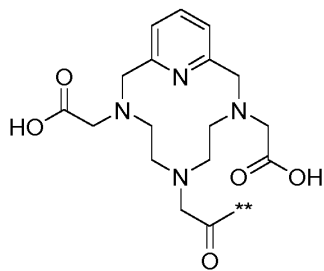
(XVIj)



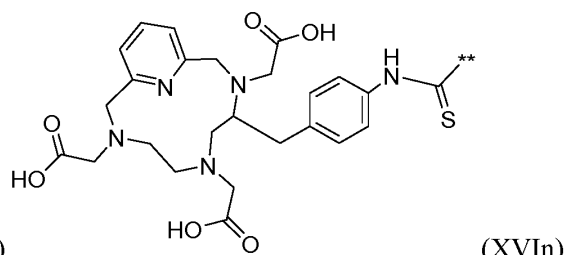
(XVIk)



(XVII)



(XVIIm)



(XVIIn),

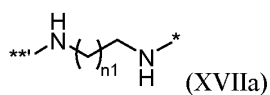
wherein,

X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂, and

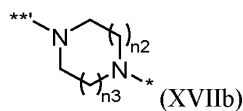
** indicates covalent attachment to L,

the residue E optionally comprises a radionuclide, and

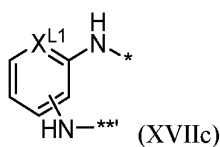
L is a linker moiety represented by any one of the formulae (XVIIa) to (XVIIi):



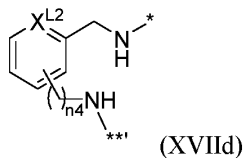
(XVIIa)



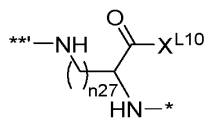
(XVIIb)



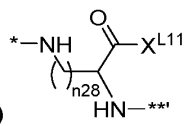
(XVIIc)



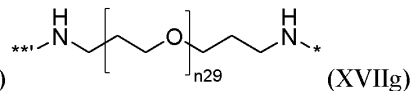
(XVIIId)



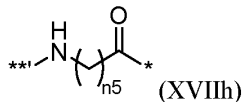
(XVIIe)



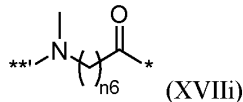
(XVIIIf)



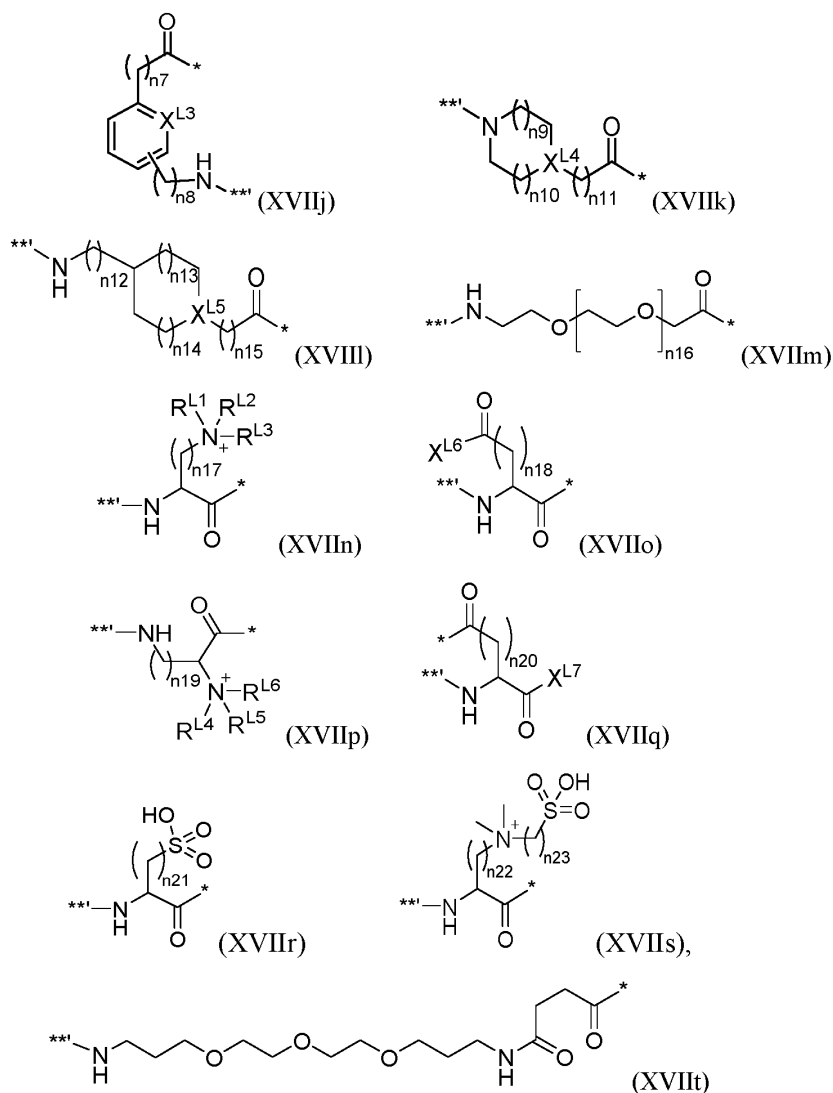
(XVIIg)



(XVIIh)



(XVIIi)



wherein,

n_1 is 1 to 5,

n_2 , n_3 , n_4 and n_{12} are each independently 0 to 2,

n_5 , n_6 and n_{29} are each independently 1 to 10,

n_7 and n_8 are each independently 0 to 4,

n_9 , n_{13} , n_{14} , n_{15} , n_{18} , n_{20} and n_{21} are each independently 1 or 2,

n_{10} and n_{11} are each independently 0 or 1,

n_{16} is 0 to 12,

n_{17} , n_{19} , n_{22} , n_{27} and n_{28} are each independently 1 to 4,

n_{23} is 2 to 4,

X^{L1} , X^{L2} , X^{L3} , X^{L4} and X^{L5} are each independently $=\text{CH}-$ or $=\text{N}-$,

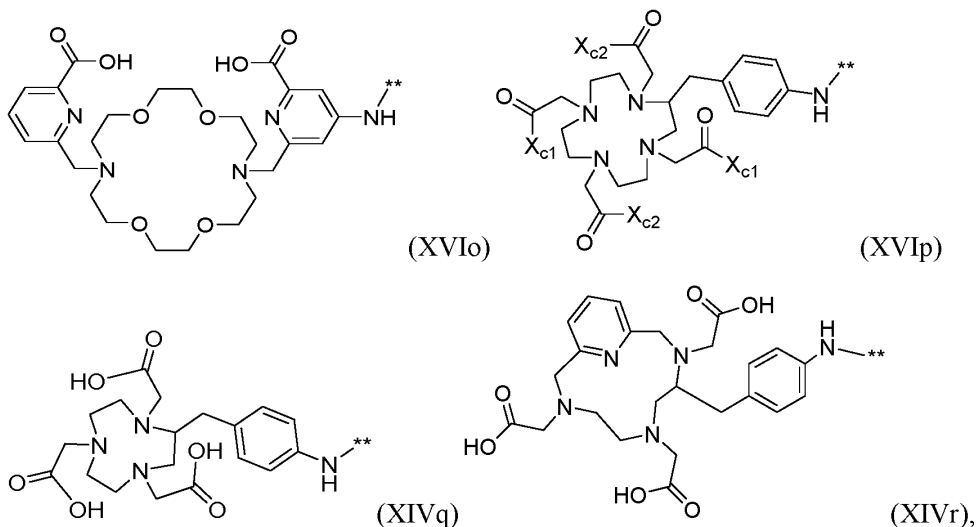
X^{L6} , X^{L7} , X^{L10} and X^{L11} are each independently $-\text{OH}$ or $-\text{NH}_2$,

R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} and R^{L6} are each independently -H or a methyl group,
 * indicates covalent attachment to Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8,
 Xaa9, Xaa10 or Xaa11, and
 ** indicates covalent attachment to E;

5

or,

(b) E is a residue represented by the following formula (XVIo) or (XVIr):



10

wherein,

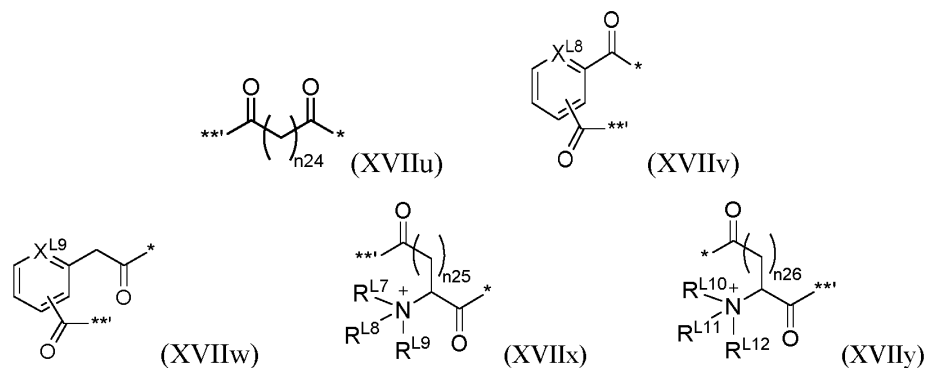
X_{c1} and X_{c2} are each independently selected from the group consisting
 of -OH and -NH₂, and

** indicates covalent attachment to L, and

15

the residue E optionally comprises a radionuclide,

L is a linker moiety represented by any one of the formulae (XVIIu) to (XVIIy):



wherein,

n24 is 1 to 5,

n25 and n26 are each independently 1 or 2,

X^{L8} and X^{L9} are each independently =CH- or =N-,

R^{L7}, R^{L8}, R^{L9}, R^{L10}, R^{L12} and R^{L12} are each independently -H or a methyl group, and

* indicates covalent attachment to an N atom of an amino group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

**' indicates covalent attachment to E.

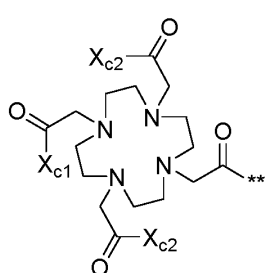
- 10 14. The compound or salt of any one of claims 1 to 12, wherein each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently a moiety represented by the following formula (XV'):



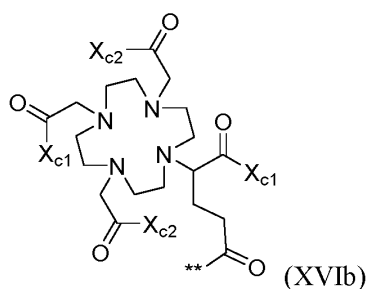
wherein,

* indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

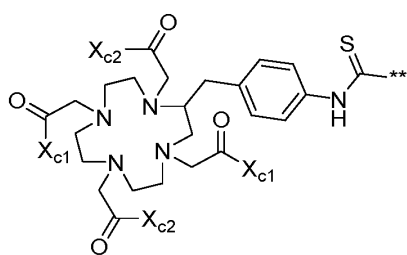
E is a residue represented by any one of the following formulae (XVIa) to (XVIIn):



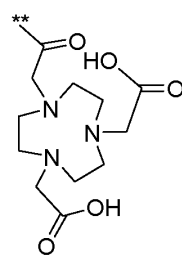
(XVIa)



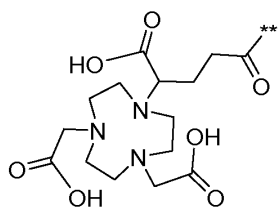
(XVIb)



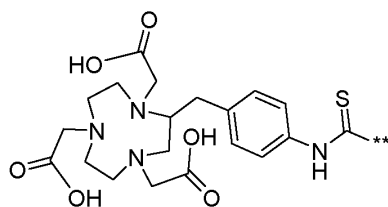
(XVIc)



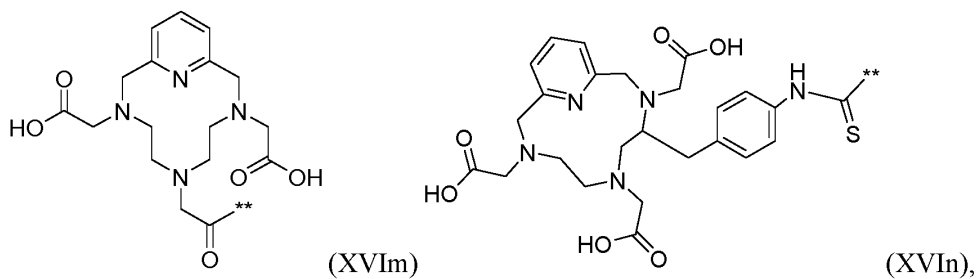
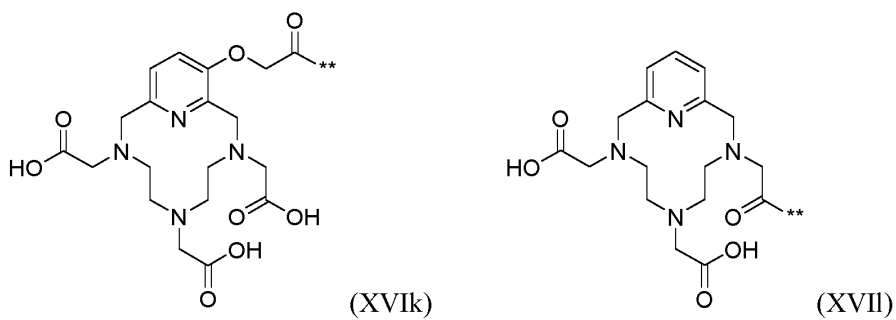
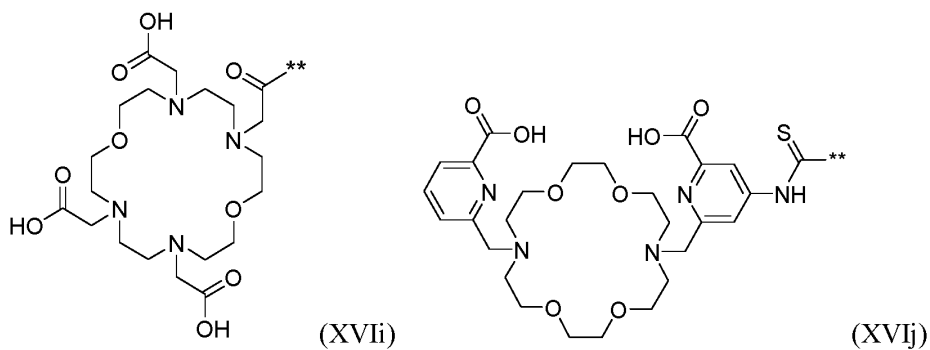
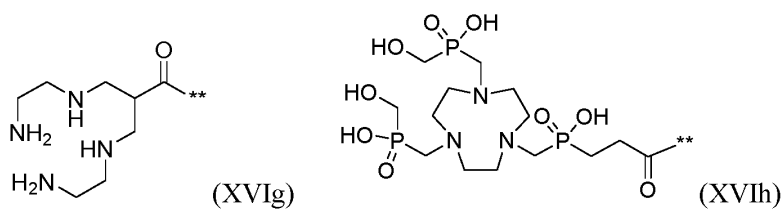
(XVIId)



(XVIe)



(XVIIf)



5

wherein,

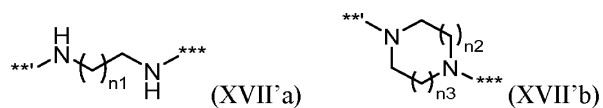
X_{c1} and X_{c2} are each independently selected from the group consisting of -OH and -NH₂, and

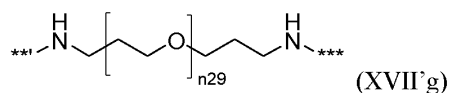
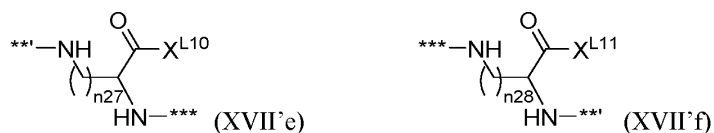
** indicates covalent attachment to L₁,

the residue E optionally comprises a radionuclide, and

10

L₁ is a linker moiety represented by any one of the formulae (XVII'a) to (XVII'g):





wherein,

n1 is 1 to 5,

n2, n3 and n4 are each independently 0 to 2,

n29 is 1 to 10,

n27 and n28 are each independently 1 to 4,

n23 is 2 to 4,

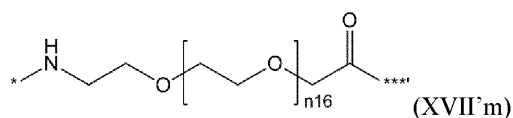
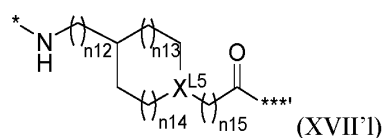
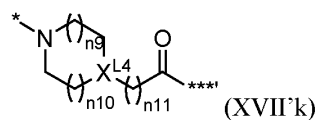
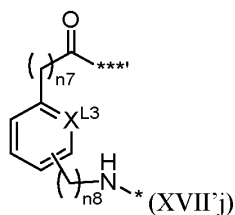
X^{L1} and X^{L2} are each independently =CH- or =N-,

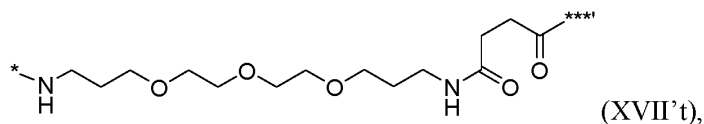
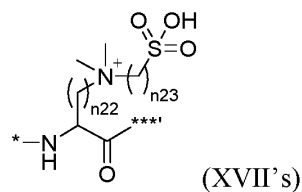
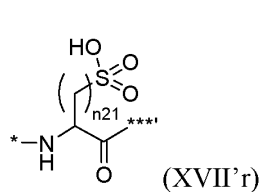
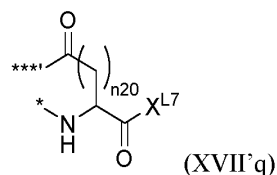
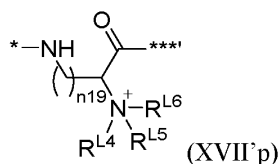
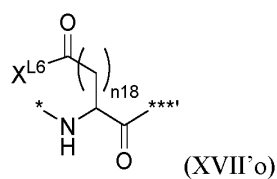
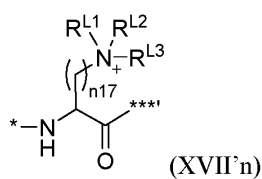
X^{L10} and X^{L11} are each independently -OH or -NH₂,

*** indicates covalent attachment to L₂, and

***' indicates covalent attachment to E; and

L₂ is a linker moiety represented by any one of the formulae (XVII'h) to (XVII't):





5

wherein,

n12 is 0 to 2,

n5 and n6 are each independently 1 to 10,

n7 and n8 are each independently 0 to 4,

n9, n13, n14, n15, n18, n20 and n21 are each independently 1 or 2,

10

n 10 and n11 are each independently 0 or 1,

n16 is 0 to 12,

n17, n19 and n22 are each independently 1 to 4,

n23 is 2 to 4,

X^{L3}, X^{L4} and X^{L5} are each independently =CH- or =N-,

15

X^{L6} and X^{L7} are each independently -OH or -NH₂,

R^{L1}, R^{L2}, R^{L3}, R^{L4}, R^{L5} and R^{L6} are each independently -H or a methyl group,

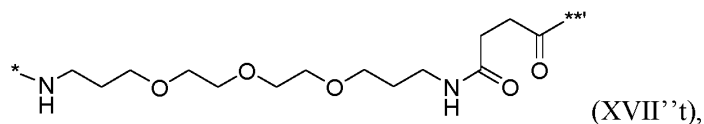
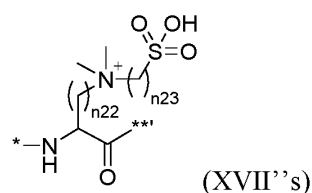
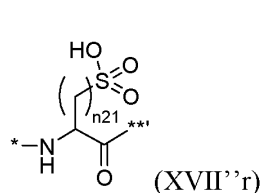
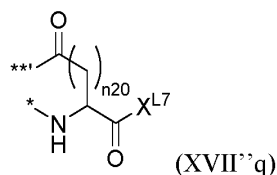
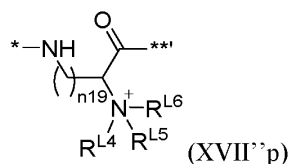
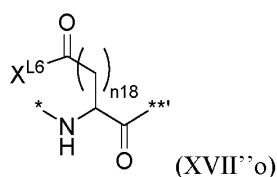
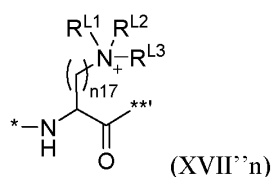
* indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

***' indicates covalent attachment to L₁.

20

15. The compound or salt of any one of claims 1 to 12, wherein each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷, Z⁸ and Z⁹ is independently a moiety represented by the following formula (XV''):





5

wherein,

n₁₂ is 0 to 2,

n₅ and n₆ are each independently 1 to 10,

n₇ and n₈ are each independently 0 to 4,

n₉, n₁₃, n₁₄, n₁₅, n₁₈, n₂₀ and n₂₁ are each independently 1 or 2,

10

n₁₀ and n₁₁ are each independently 0 or 1,

n₁₆ is 0 to 12,

n₁₇, n₁₉ and n₂₂ are each independently 1 to 4,

n₂₃ is 2 to 4,

X^{L3}, X^{L4} and X^{L5} are each independently =CH- or =N-,

15

X^{L6} and X^{L7} are each independently -OH or -NH₂,

R^{L1}, R^{L2}, R^{L3}, R^{L4}, R^{L5} and R^{L6} are each independently -H or a methyl group,

* indicates covalent attachment to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

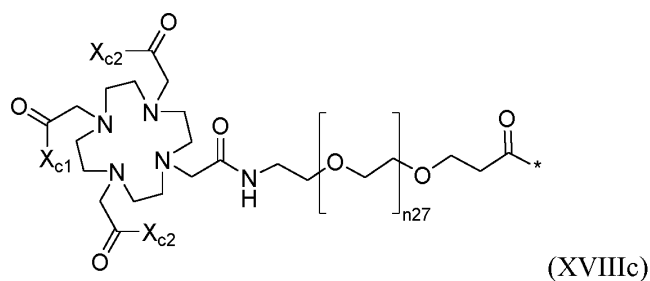
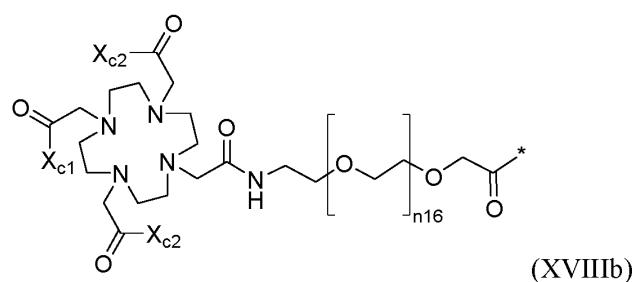
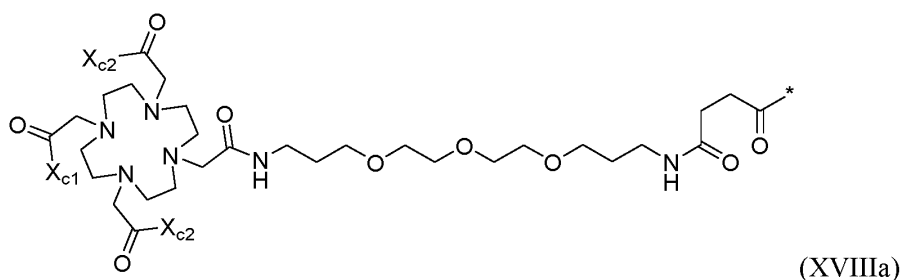
**' indicates covalent attachment to L.

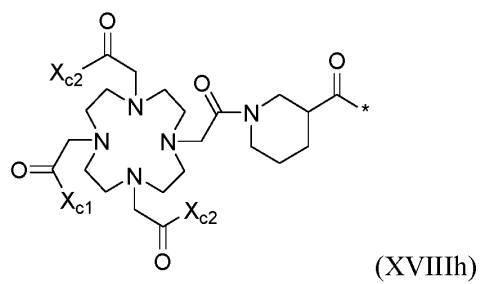
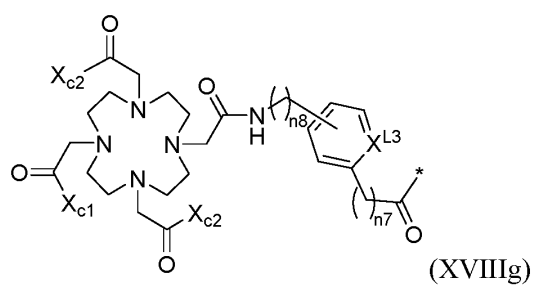
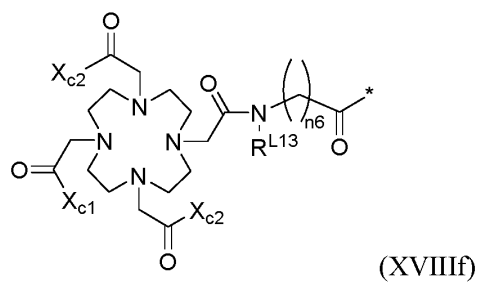
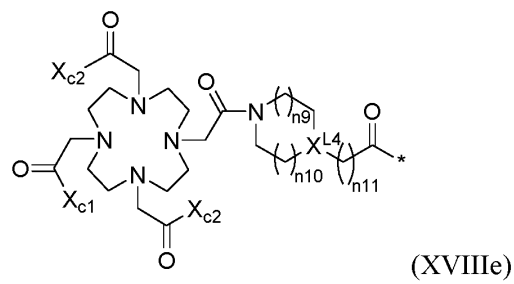
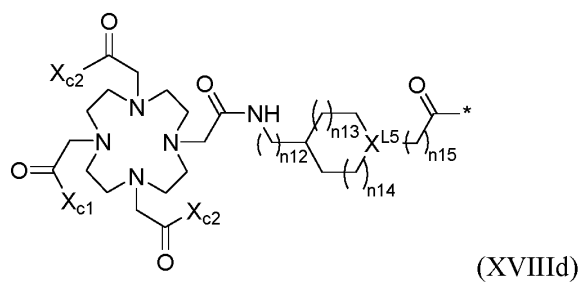
20

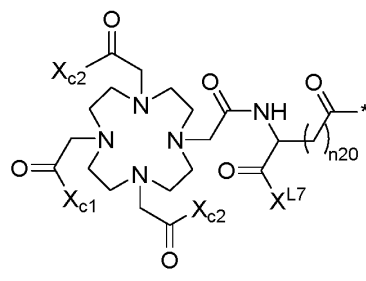
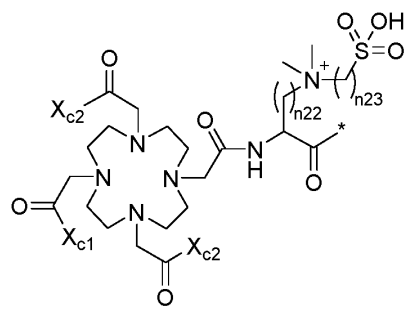
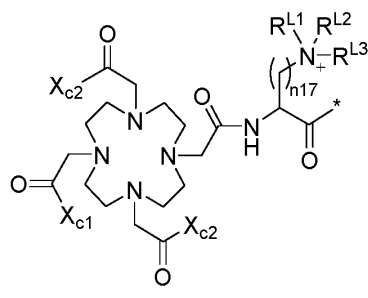
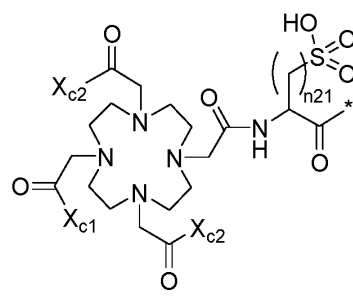
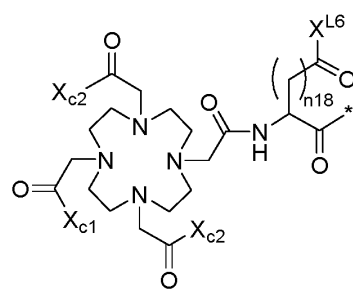
16. The compound or salt of any one of claims 1 to 15, wherein the radionuclide is selected from:

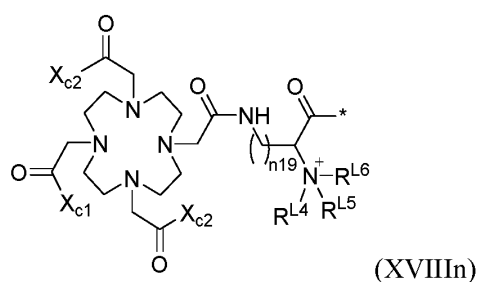
- (i) a diagnostically active radionuclide selected from the group consisting of Al-¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ^{94m}Tc, ^{99m}Tc, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ¹⁸F, ⁷⁶Br, ⁷⁷Br, ¹²³I, ¹²⁴I, and ¹²⁵I, preferably from the group consisting of Al-¹⁸F, ⁴⁴Sc, ⁶⁴Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ^{99m}Tc, ¹¹¹In, ²⁰³Pb, and more preferably from the group consisting of ⁶⁴Cu, ⁶⁸Ga, ¹¹¹In and ²⁰³Pb; and/or
- (ii) a therapeutically active radionuclide selected from the group consisting of ⁴⁷Sc, ⁶⁷Cu, ⁸⁹Sr, ⁹⁰Y, ¹¹¹In, ¹⁵³Sm, ¹⁴⁹Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ¹⁸⁶Re, ¹⁸⁸Re, ²¹²Pb, ²¹³Bi, ²²³Ra, ²²⁵Ac, ²²⁶Th, ²²⁷Th, ¹²⁵I, ¹³¹I, and ²¹¹At, preferably from the group consisting of ⁶⁷Cu, ⁹⁰Y, ¹⁴⁹Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²¹²Pb, ²¹³Bi, ²²⁵Ac, ²²⁷Th, and more preferably from the group consisting of ⁹⁰Y, ¹⁷⁷Lu, ²¹²Pb and ²²⁵Ac.

17. The compound or salt of any one of claims 1 to 16, wherein each group Z^{1a}, Z^{1b}, Z², Z³, Z⁴, Z⁵, Z⁶, Z⁷ and Z⁸ is independently a moiety represented by any one of the following formulae (XVIIIa) to (XVIIIo), and Z⁹ is a moiety of formula (XVIIIo):

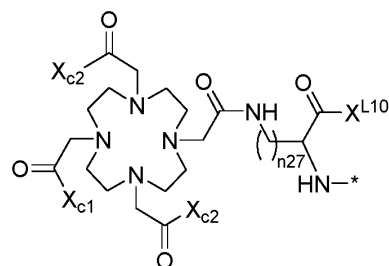








(XVIIIIn)



(XVIIIIo)

wherein,

X_{c1} , X_{c2} , X^{L6} , X^{L7} and X^{L10} are each independently selected from the group consisting of -OH and -NH₂, and

$n6$ is 1 to 10, and

$n7$ and $n8$ are each independently 0 to 4,

$n9$, $n13$, $n14$, $n15$, $n18$, $n20$ and $n21$ are each independently 1 or 2, and

$n10$ and $n11$ are each independently 0 or 1, and

$n12$ is 0 to 2,

$n16$ and $n27$ are each independently 0 to 12, and

$n17$, $n19$, $n22$ and $n27$ are each independently 1 to 4, and

$n23$ is 2 to 4, and

X^{L3} , X^{L4} and X^{L5} are each independently =N- or =CH-, and

R^{L1} , R^{L2} , R^{L3} , R^{L4} , R^{L5} , R^{L6} and R^{L13} are each independently -H or a methyl group, and

* indicates covalent attachment of the structures in formulae (XVIIIa) to (XVIIIo) to an

N atom of an amino group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11 or covalent attachment of the structure in formula (XVIIIo) to a carbonyl group of Xaa1, Xaa3, Xaa5, Xaa6, Xaa7, Xaa8, Xaa9, Xaa10 or Xaa11, and

the moiety represented by any one of the above formulae (XVIIIa) to (XVIIIIn) optionally comprises a radionuclide, the radionuclide being preferably selected from the group consisting of Al¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁴⁷Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁴Cu, ⁶⁷Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ⁹⁰Y, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵³Sm, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ²¹²Pb, ²¹³Bi, ²²⁵Ac, ²²⁶Th and ²²⁷Th.

18. The compound or salt of any one of claims 1 to 16, which is represented by any one of the following formulae:

- H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Cya-Thi-NH₂
5 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₂-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Har-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Asp-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys(Me)-Tyr-Asp-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
10 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Pcnf-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Guf-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-en
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Onf-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Off-NH₂
15 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Ser-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Thr-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe₃-Tyr-Ser-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
20 H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-KMe₃-Lys(DOTA)-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc-Asn-6Clw-Lys(DOTA)-Tyr-Cya-Thi-NH₂
H-Ida-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Nml-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
25 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NHMe
H-Pip-Trp-Cya-Npg-Orn(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Cya-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Nma-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
30 H-KMe₄-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-RMe₂-Tyr-Cya-Thi-NH₂

H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Kip-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egd-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 5 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Opy-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asn-Npg-Apc(DOTA)-Asn-6Clw-Lys-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Egg-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Orn-Tyr-Cya-Thi-NH₂
 10 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Ocf-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Mff-NH₂
 H-Pip-Trp-Cya-Npg-Apc(NOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(NODAGA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTAGA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 15 H-Pip-Trp-Cya-Npg-Apc(NOPO)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(BnTCMC)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-glu)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-Kzw)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 20 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-Brw6-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTAM)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Ala-Cya-Thi-NH₂
 25 H-Pip-Trp-Cya-Mnpg-Orn(PSC)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Nmg-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Gel-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Thr-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 30 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Thr-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-Brw6-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mgel-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Penox-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂
 H-Nmo(Me)-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe₃-Tyr-Cya-Thi-NH₂

H-Pip-Trp-Cya-Npg-Dab(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Mor-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Nmo-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Ser-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 5 H-Azp-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

wherein the DOTA, NOTA, PSC, DOTAGA, NOPO, BnTCMC or NODAGA moiety
 optionally comprises a radionuclide, the radionuclide being preferably selected from the
 10 group consisting of Al¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁴⁷Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁴Cu, ⁶⁷Cu, ⁶⁷Ga, ⁶⁸Ga,
⁸⁶Y, ⁸⁹Zr, ⁹⁰Y, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵³Sm, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ²¹²Pb, ²¹³Bi,
²²⁵Ac, ²²⁶Th and ²²⁷Th.

19. The compound or salt of any one of claims 1 to 18, which is represented by any one of
 15 the following formulae:

H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-RMe2-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Arg(Me)-Tyr-Cya-Thi-NH₂
 20 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Asp-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Pcnf-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-Kzw-Tyr-Cya-Thi-NH₂
 H-Nma-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Orn(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 25 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Lys(Me)-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(NOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(NODAGA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA-PPAc)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 30 H-Pip-Trp-Cya-Mnpg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-Brw6-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(PSC)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
 H-Pip-Trp-Cya-Mnpg-Orn(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂

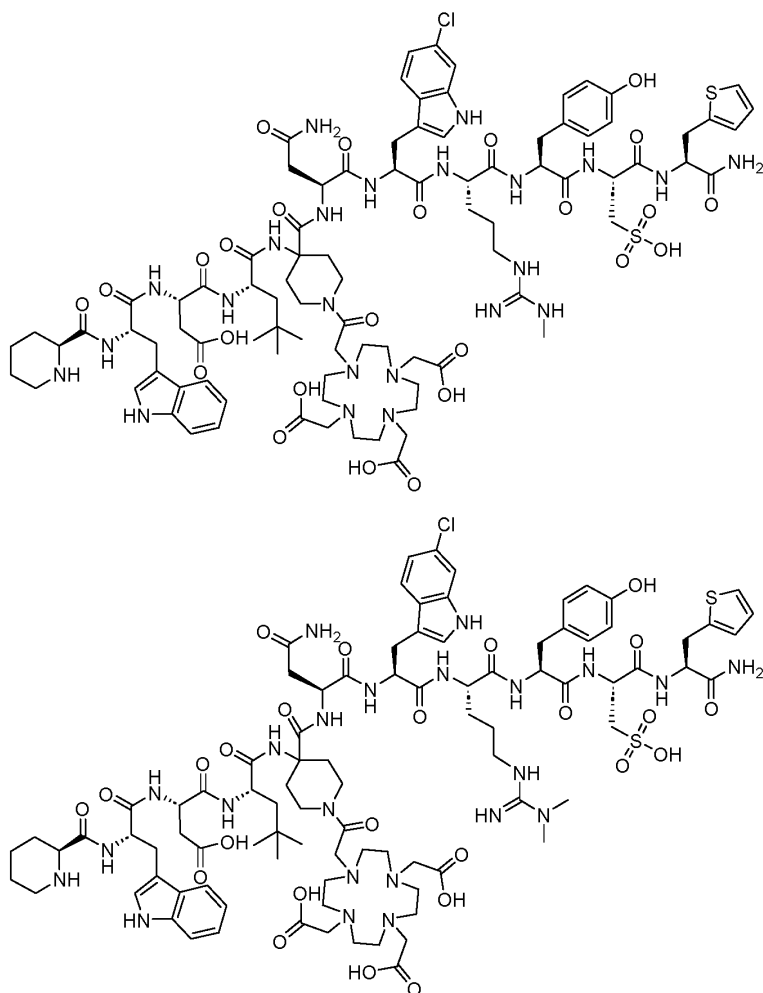
H-Pip-Trp-Cya-Gel-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Thr-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Dab(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Thi-NH₂
H-Pip-Trp-Cya-Npg-Apc(DOTA)-Asn-6Clw-KMe3-Tyr-Cya-Phe-NH₂

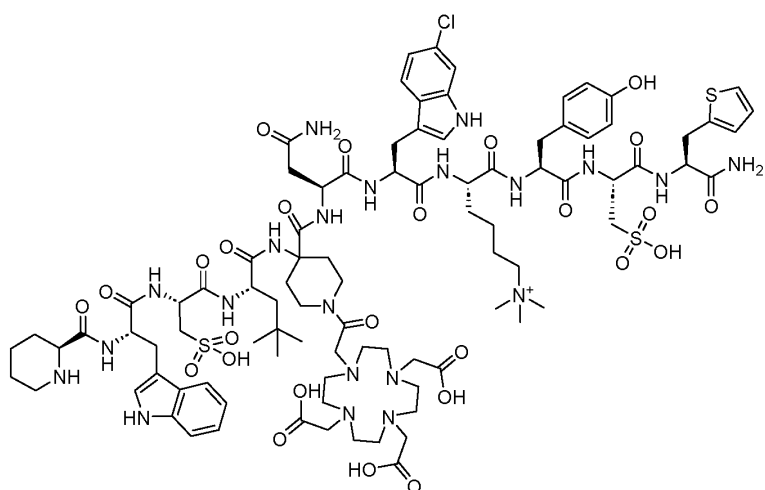
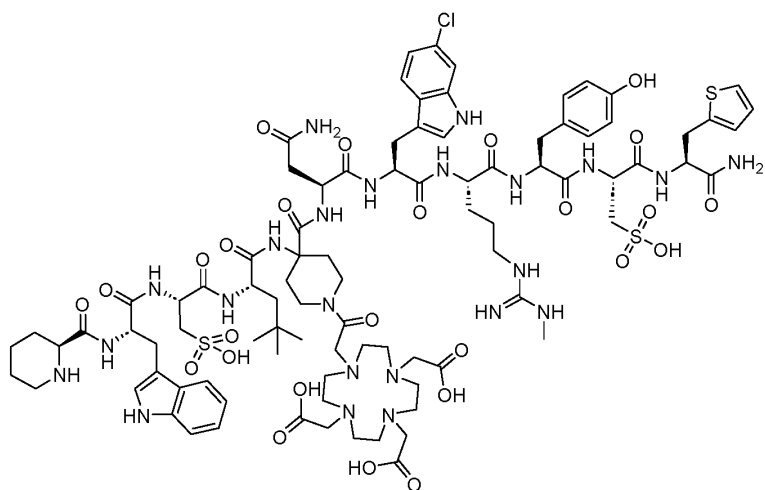
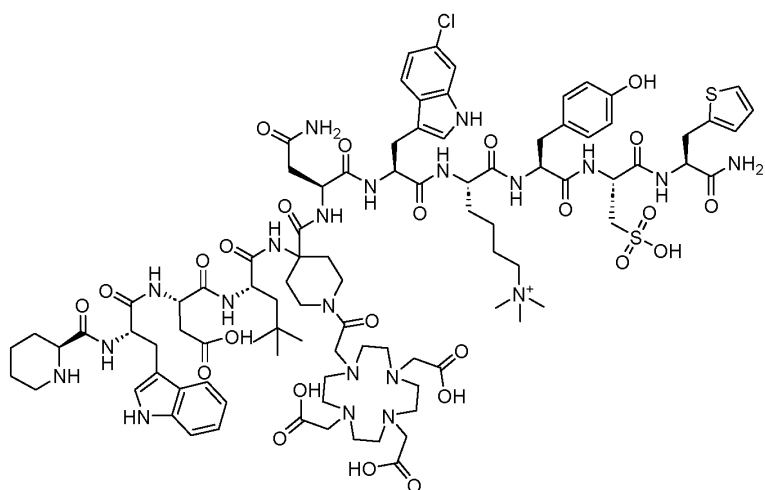
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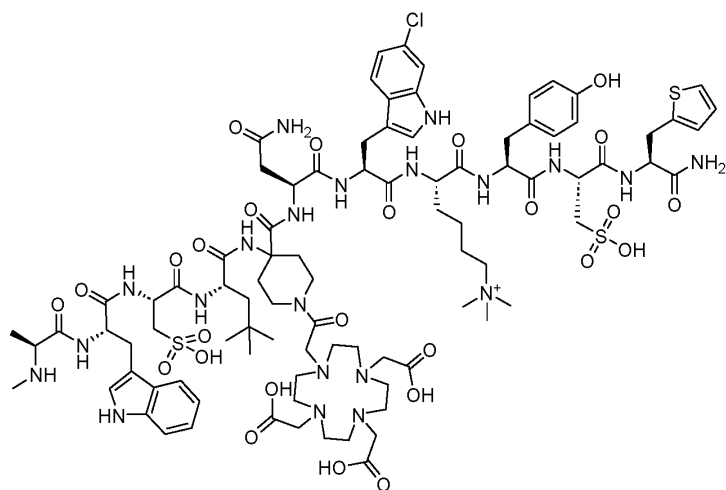
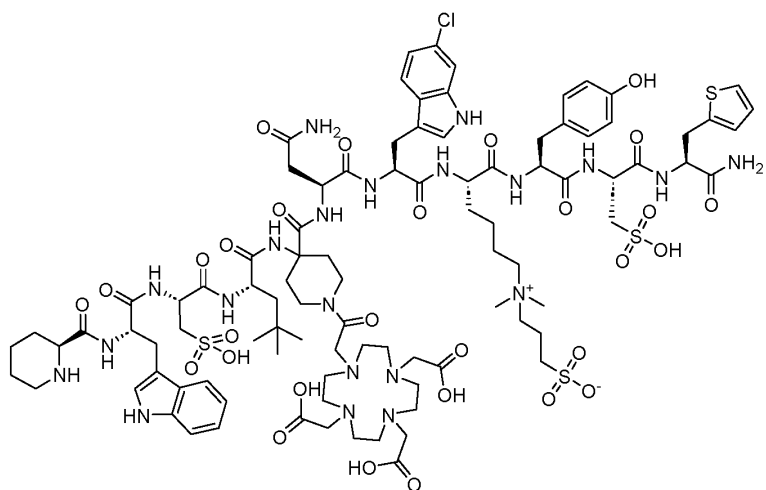
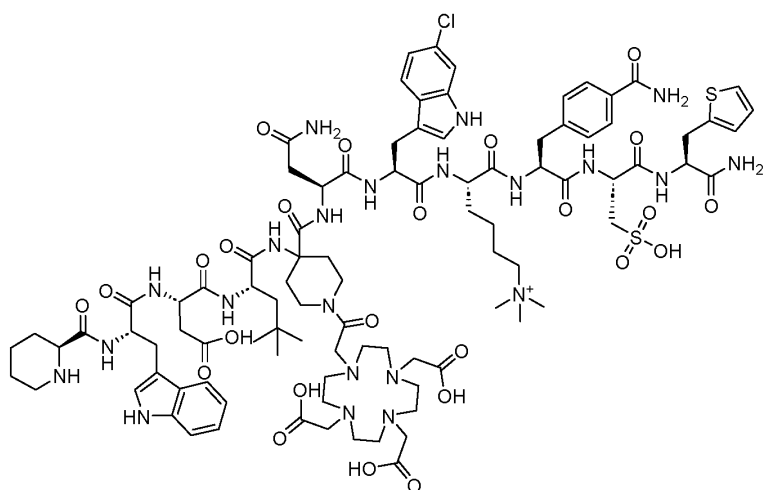
wherein the DOTA, NOTA, PSC or NODAGA moiety optionally comprises a radionuclide, the radionuclide being preferably selected from the group consisting of Al¹⁸F, ⁴³Sc, ⁴⁴Sc, ⁴⁷Sc, ⁵¹Mn, ⁵²Mn, ⁶⁴Cu, ⁶⁴Cu, ⁶⁷Cu, ⁶⁷Ga, ⁶⁸Ga, ⁸⁶Y, ⁸⁹Zr, ⁹⁰Y, ¹¹¹In, ¹⁴⁹Tb, ¹⁵²Tb, ¹⁵³Sm, ¹⁵⁵Tb, ¹⁶¹Tb, ¹⁷⁷Lu, ²⁰¹Tl, ²⁰³Pb, ²¹²Pb, ²¹³Bi, ²²⁵Ac, ²²⁶Th and ²²⁷Th.

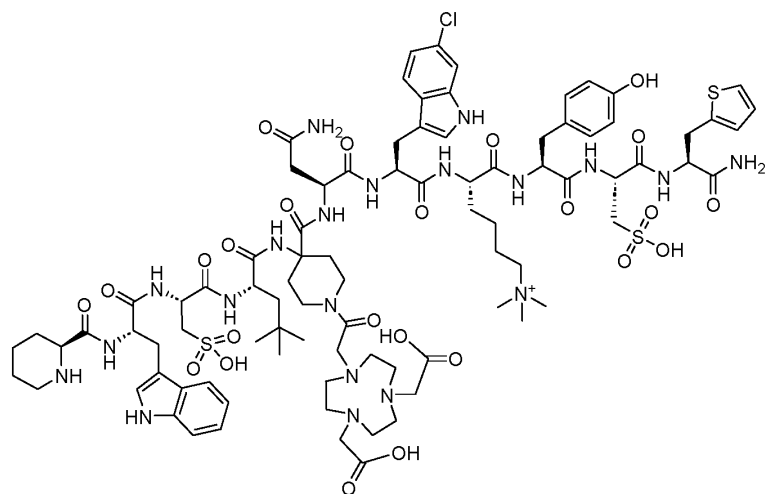
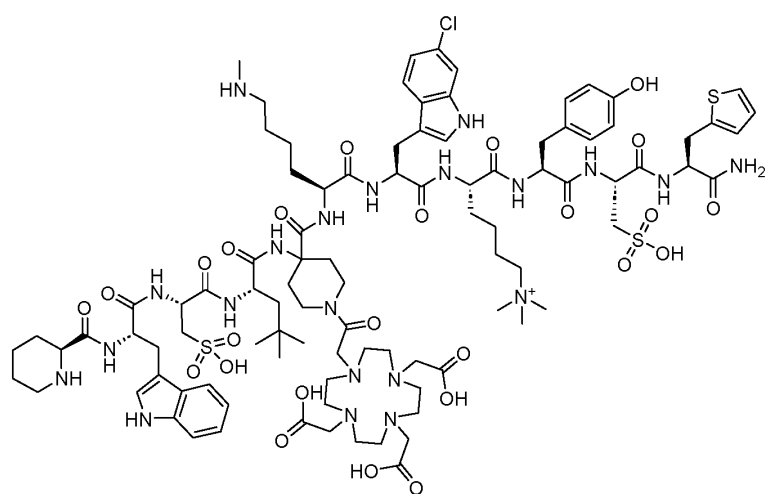
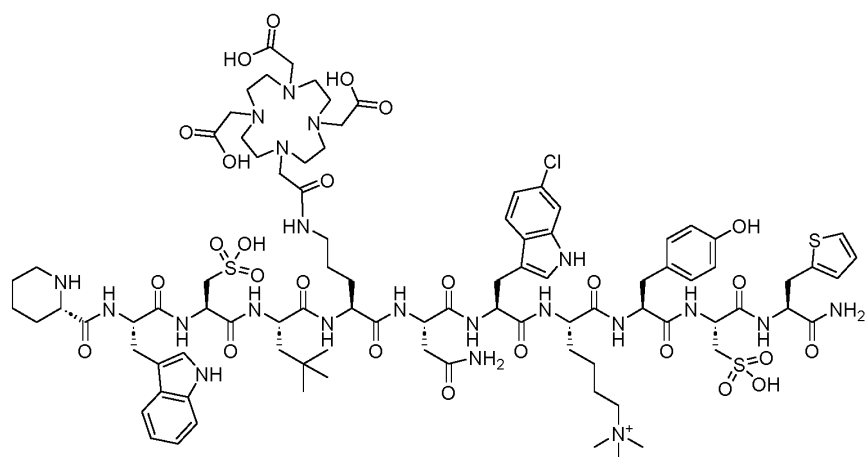
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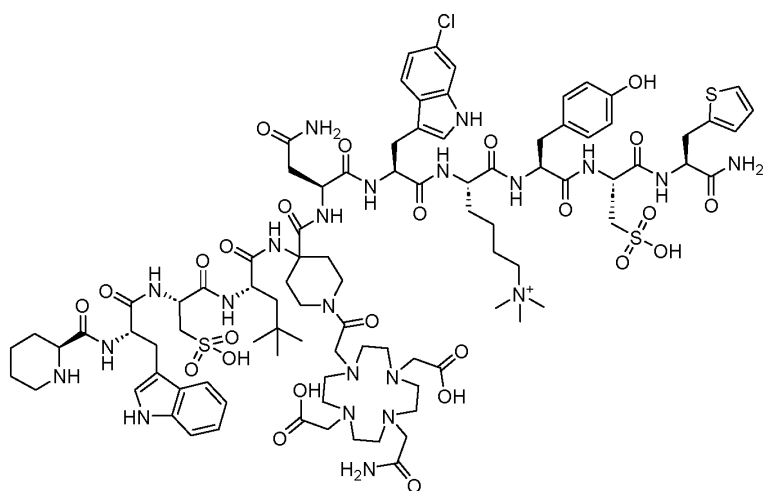
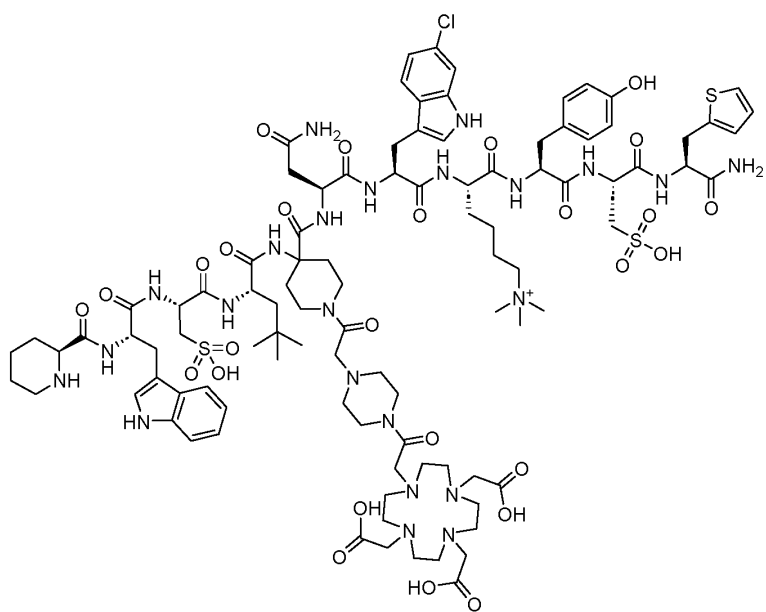
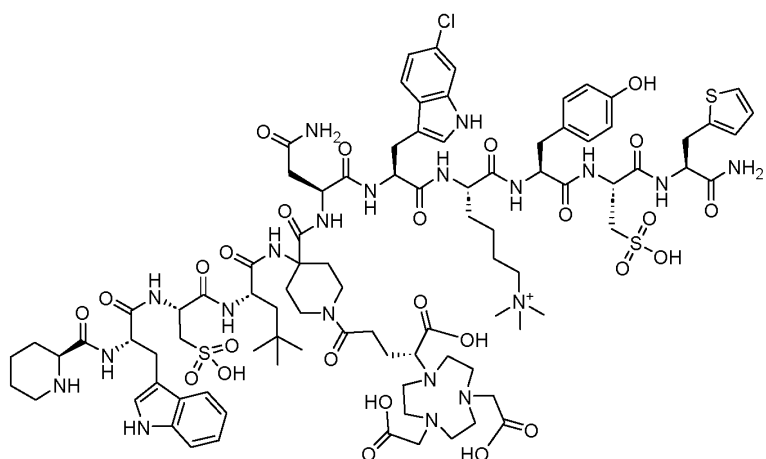
20. The compound or salt of any one of claims 1 to 19, which is any one selected from the following compounds:

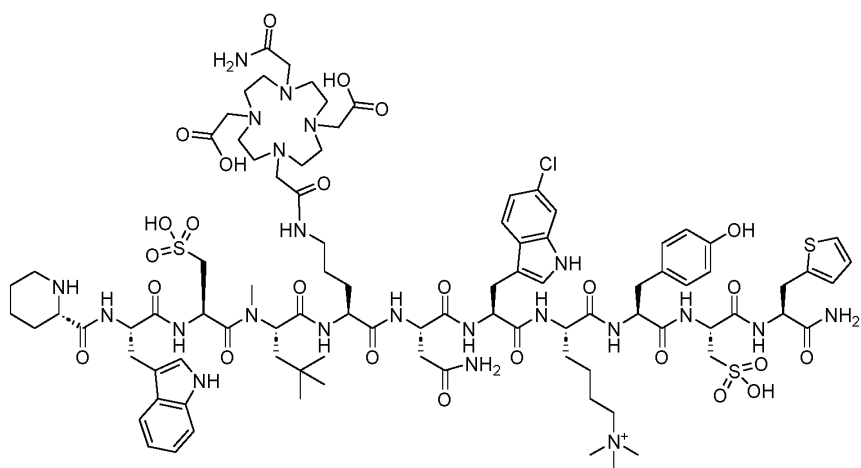


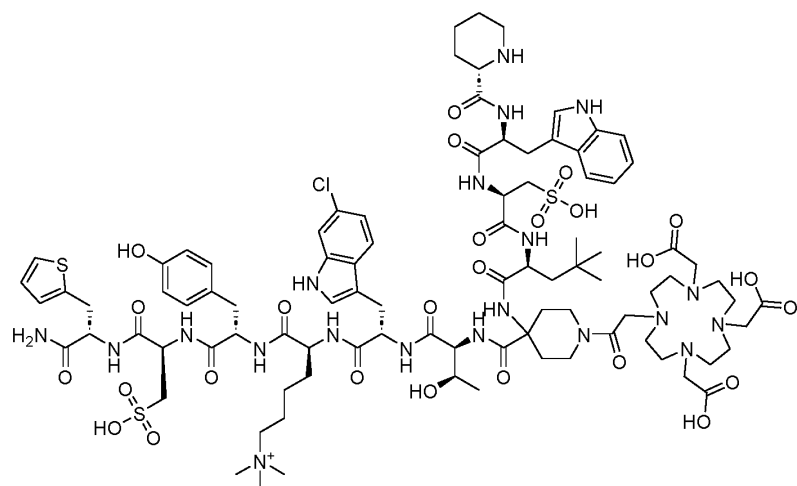
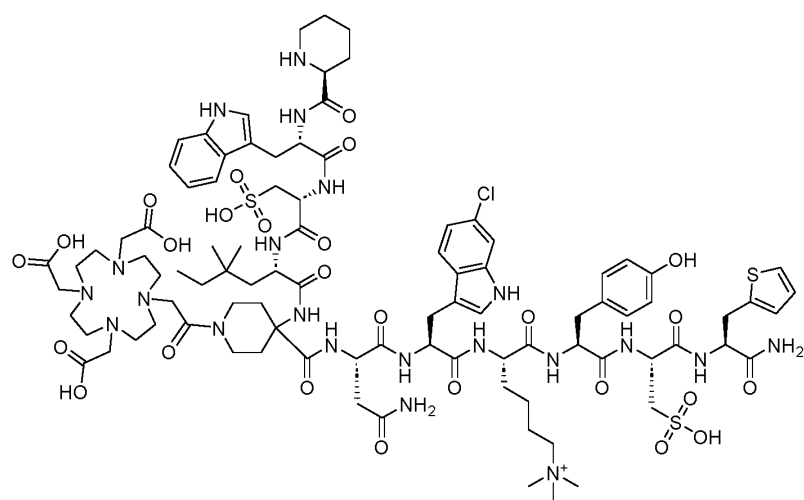
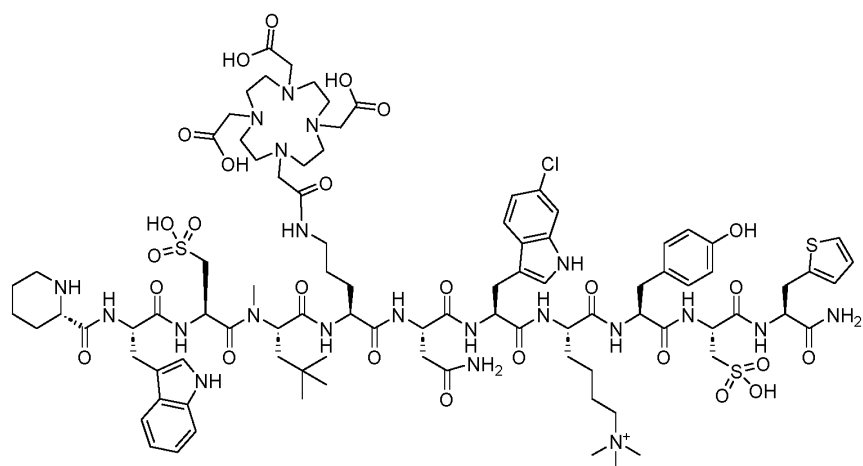


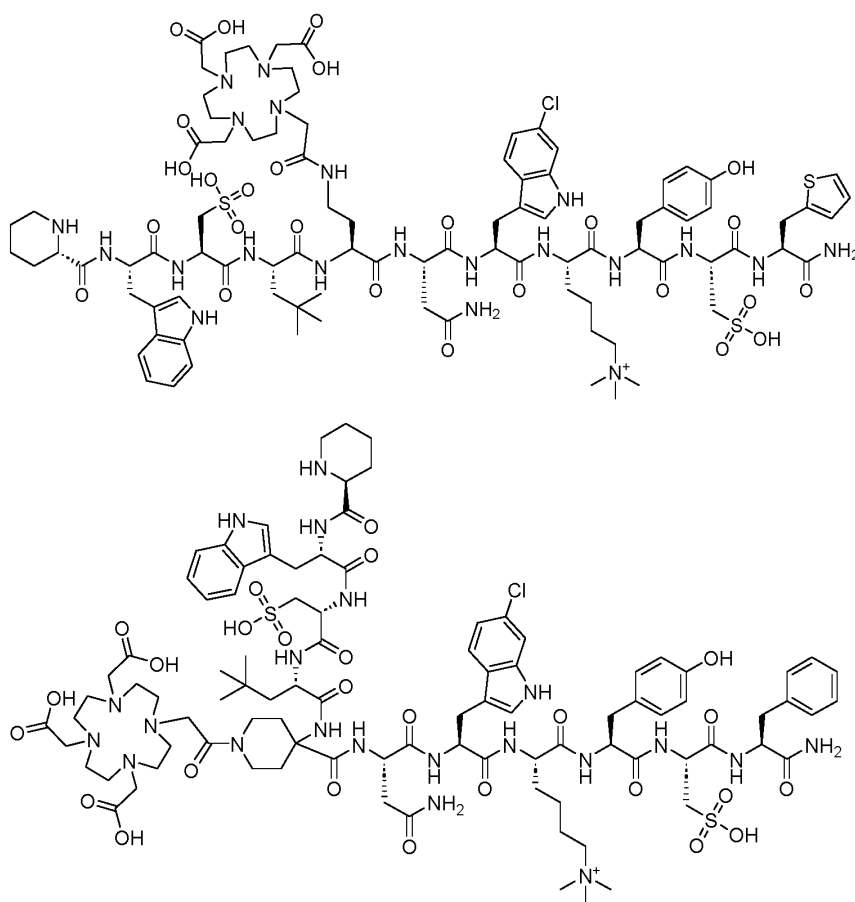












wherein the depicted compounds are preferably in complex with a radionuclide, which is preferably selected from the group consisting of Al^{18}F , ^{43}Sc , ^{44}Sc , ^{47}Sc , ^{51}Mn , ^{52}Mn , ^{64}Cu , ^{64}Cu , ^{67}Cu , ^{67}Ga , ^{68}Ga , ^{86}Y , ^{89}Zr , ^{90}Y , ^{111}In , ^{149}Tb , ^{152}Tb , ^{153}Sm , ^{155}Tb , ^{161}Tb , ^{177}Lu , ^{201}Tl , ^{203}Pb , ^{212}Pb , ^{213}Bi , ^{225}Ac , ^{226}Th and ^{227}Th .

21. Pharmaceutical composition comprising the compound or salt of any one of claims 1 to 20 and a pharmaceutically acceptable excipient.
22. The compound, salt or pharmaceutical composition of any one of claims 1 to 20 for use in a method of diagnosing and/or treating a disease, preferably cancer, and more preferably a P-cadherin expressing cancer.
23. The compound, salt or composition for use of claim 22, wherein the disease is cancer and said cancer is selected from the group consisting of ovarian cancer, colorectal cancer, cholangiocarcinoma, non-small cell lung cancer (NSCLC) including squamous NSCLC,

esophageal cancer, head-and-neck cancer including squamous cell carcinoma of head and neck (SCCHN), and tumors of the breast including triple negative breast cancer (TNBC), pancreatic cancer including pancreatic ductal adenocarcinoma (PDAC), endometrial cancer, cervical cancer, gastric cancer, and sarcoma, and preferably from the group consisting of ovarian cancer, colorectal cancer, esophageal cancer, head-and-neck cancer and breast cancer.