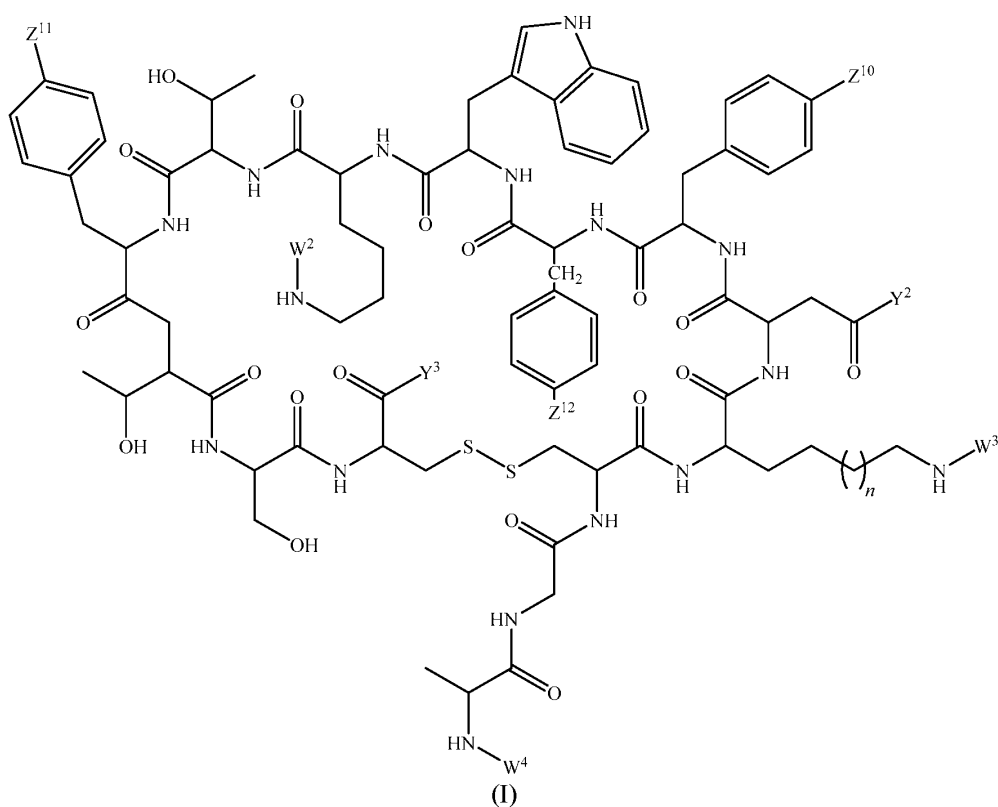


What is claimed is:

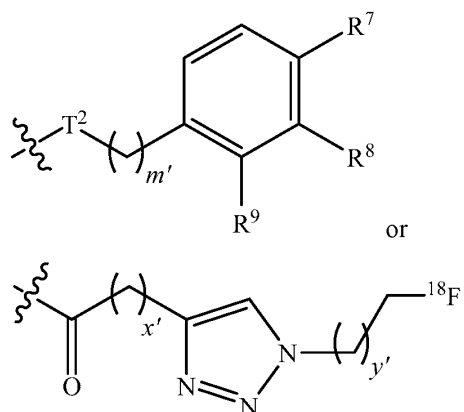
1. A compound that is a ^{18}F -labeled somatostatin receptor agonist according to Formula I



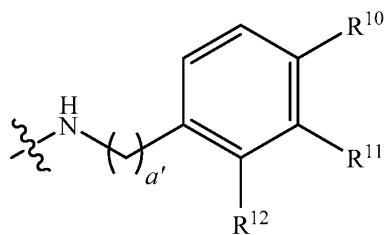
or a pharmaceutically acceptable salt and/or solvate thereof, wherein

Z^{10} and Z^{11} are each independently H or OH;

one of W^2 , W^3 , and W^4 is

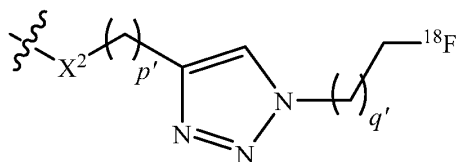


or one of Y^2 and Y^3 is



and the remaining W^2 , W^3 , W^4 are each independently H and the remaining Y^2 and Y^3 is OH or NH_2 ;

wherein T^2 is $-C(O)-$ or $-C(O)NH-$, one of R^7 , R^8 , and R^9 and one of R^{10} , R^{11} , and R^{12} is



and the remaining

two of R^7 , R^8 , and R^9 are each H and the remaining two of R^{10} , R^{11} , and R^{12} are each H;

X^2 is absent, O, S, or NH;

m' and a' are each independently 0, 1, 2, or 3;

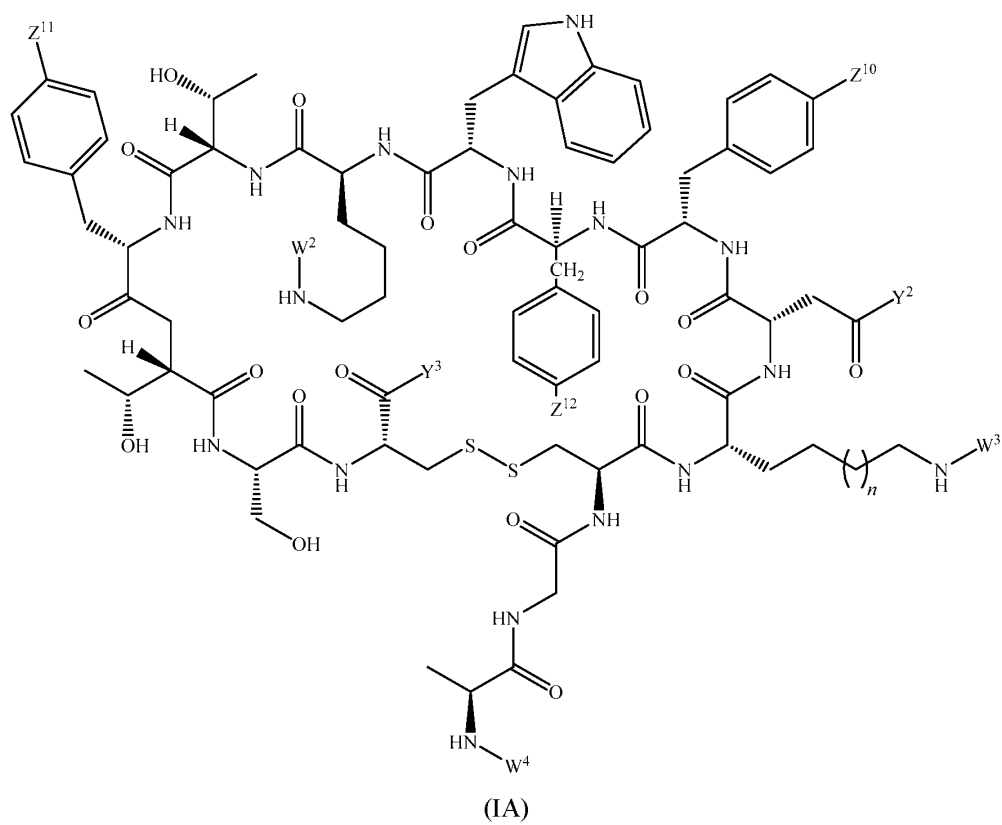
n is 0 or 1;

p' is 0, 1, 2, or 3, provided that when p' is 0 then X^2 is absent;

q' is 1 or 2; x' is 0, 1, 2, or 3; and

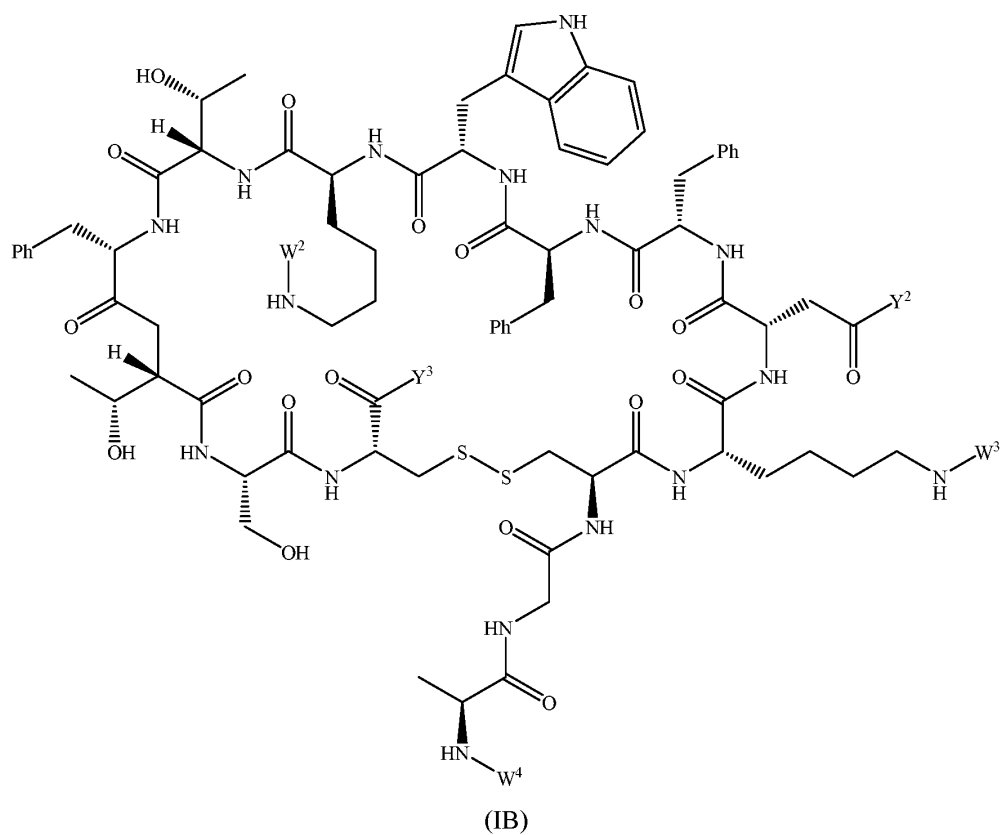
y' is 1 or 2.

2. The compound of claim 1, wherein the compound is of Formula IA



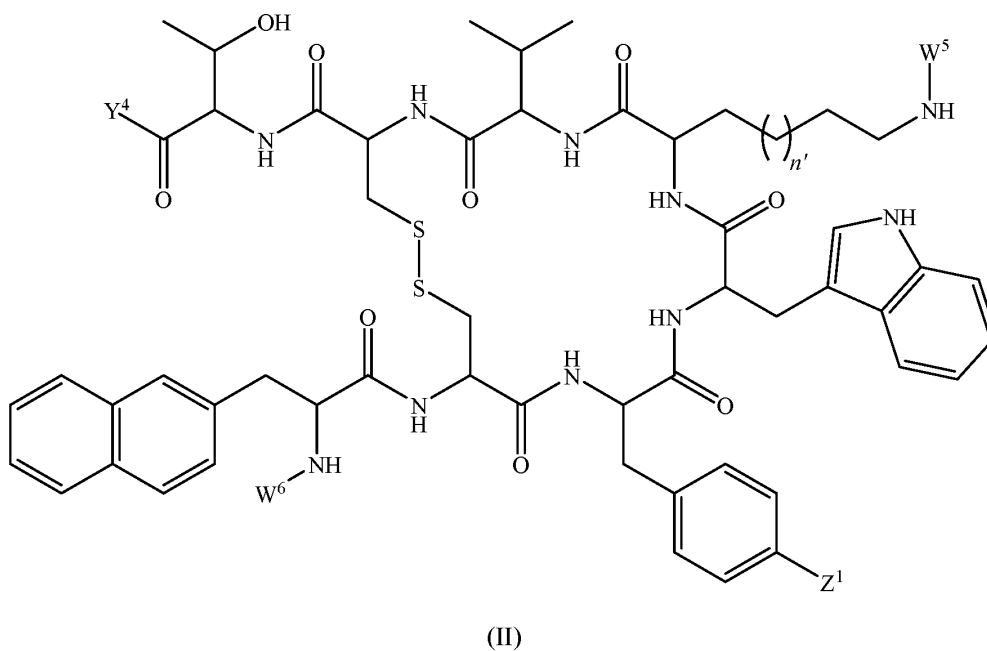
or a pharmaceutically acceptable salt and/or solvate thereof.

3. The compound of claim 1, wherein the compound is of Formula IB



or a pharmaceutically acceptable salt and/or solvate thereof.

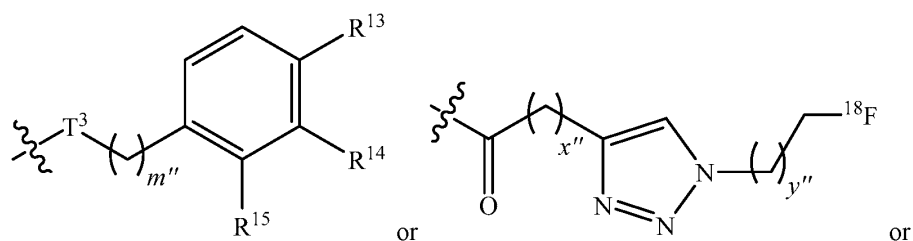
4. A compound that is a ^{18}F -labeled somatostatin receptor agonist according to Formula II



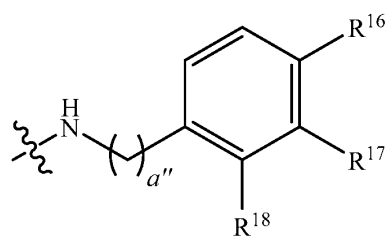
or a pharmaceutically acceptable salt and/or solvate thereof, wherein

Z^1 is H or OH;

one of W^5 and W^6 is



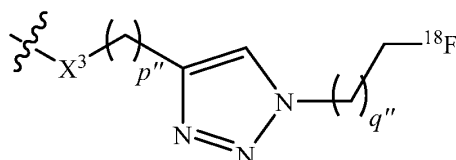
Y^4 is



and the remaining W^5 and W^6 are each

independently H and the remaining Y^4 (*i.e.*, if not the structure indicated above) is OH or NH_2 ;

wherein T³ is -C(O)- or -C(O)NH-, one of R¹³, R¹⁴, and R¹⁵ and one of R¹⁶, R¹⁷, and R¹⁸ is



R¹³, R¹⁴, and R¹⁵ are each H and the remaining two of R¹⁶, R¹⁷, and R¹⁸ are each H;

X³ is absent, O, S, or NH;

m'' and a'' are each independently 0, 1, 2, or 3;

n' is 0 or 1;

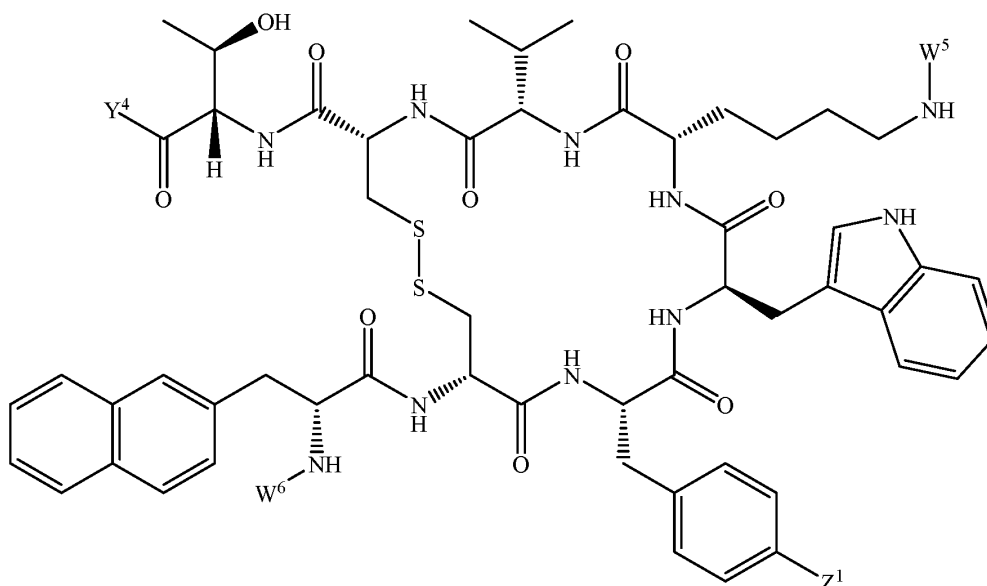
p'' is 0, 1, 2, or 3, provided that when p'' is 0 then X^3 is absent;

q'' is 1 or 2;

x'' is 0, 1, 2, or 3; and

y'' is 1 or 2.

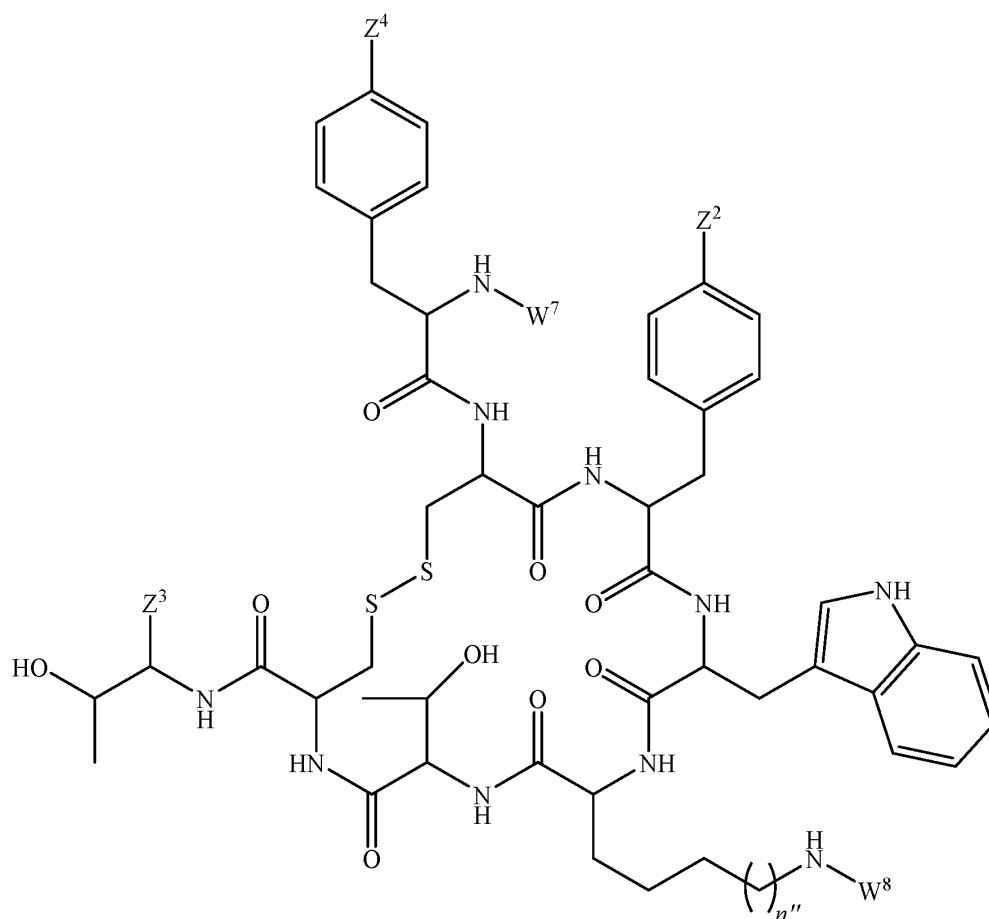
5. The compound of claim 4, wherein the compound is of Formula IIA



(IIA)

or a pharmaceutically acceptable salt and/or solvate thereof.

6. A compound that is a ^{18}F -labeled somatostatin receptor agonist according to Formula III



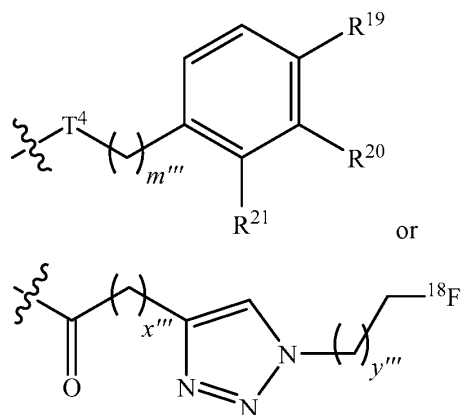
(III)

or a pharmaceutically acceptable salt and/or solvate thereof, wherein

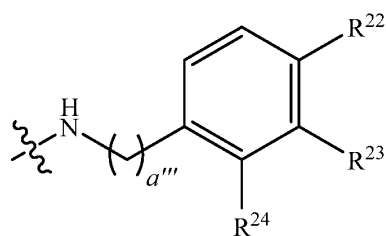
Z^2 and Z^4 are each independently H or OH;

Z^3 is $\text{C}(\text{O})\text{Y}^5$ or CH_2OH ;

one of W^7 and W^8 is



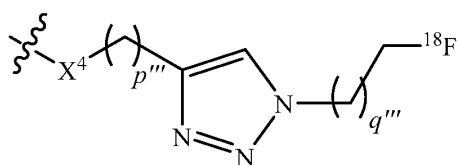
or Y^5 is



and the remaining W^7 and W^8 are each independently H and the remaining Y^5 (*i.e.*, if not the structure indicated above) is OH or NH_2 ; wherein

T^4 is $-C(O)-$ or $-C(O)NH-$;

one of R^{19} , R^{20} , and R^{21} and one of R^{22} , R^{23} , and R^{24} is



and the remaining

two of R^{19} , R^{20} , and R^{21} are each H and the remaining two of R^{22} , R^{23} , and R^{24} are each H;

X^4 is absent, O, S, or NH;

m''' and a''' are each independently 0, 1, 2, or 3;

n'' is 0 or 1;

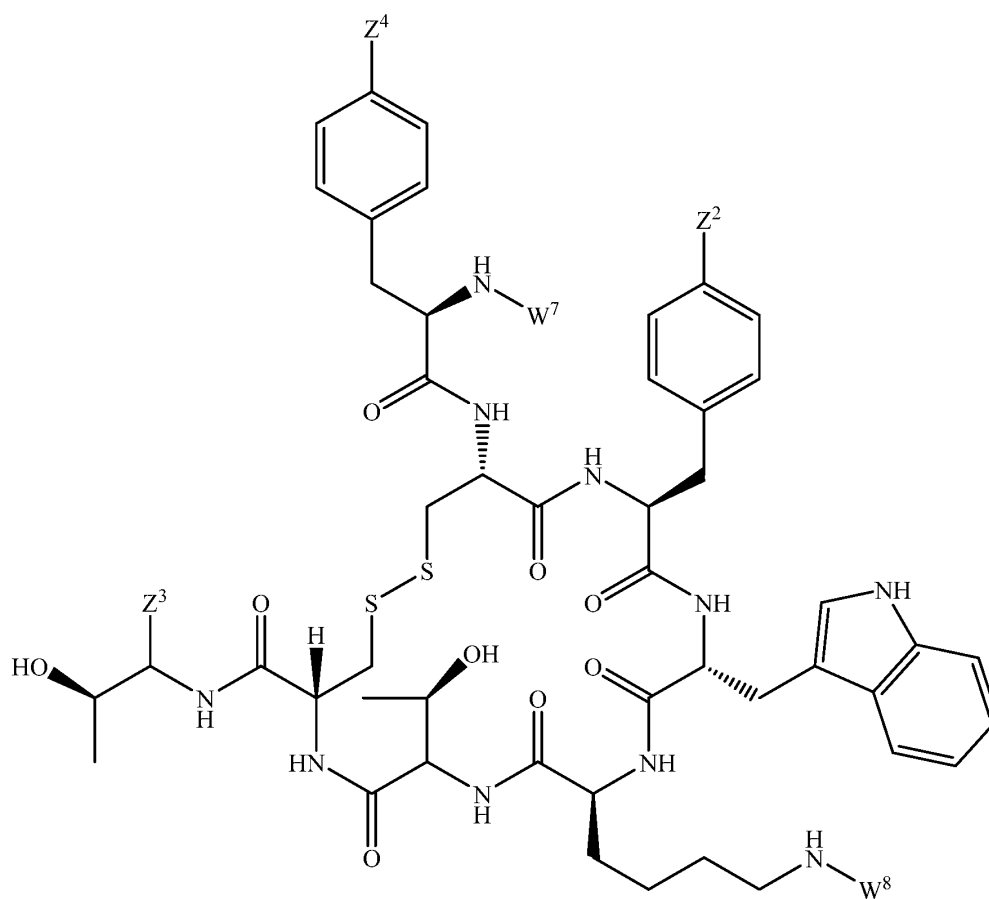
p''' is 0, 1, 2, or 3, provided that when p''' is 0 then X^3 is absent;

q''' is 1 or 2;

x''' is 0, 1, 2, or 3; and

y''' is 1 or 2.

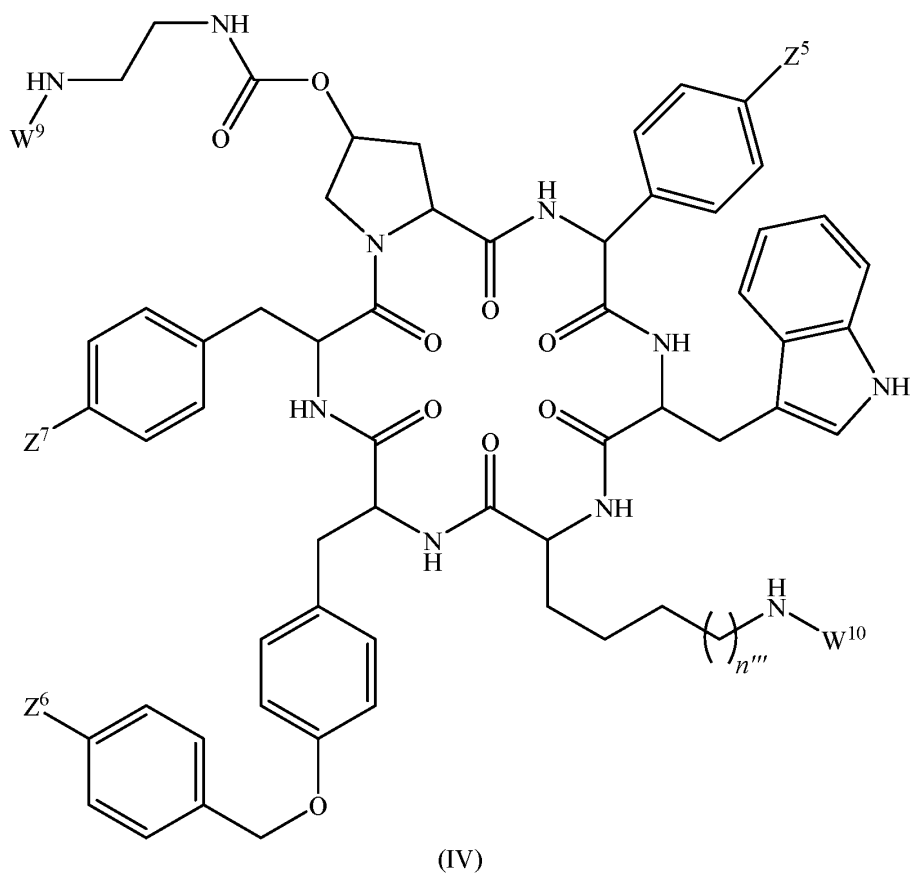
7. The compound of claim 6, wherein the compound is of Formula IIIA



(IIIA)

or a pharmaceutically acceptable salt and/or solvate thereof.

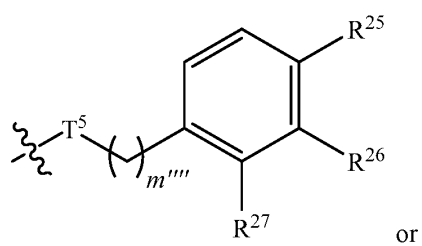
8. A compound that is a ^{18}F -labeled somatostatin receptor agonist according to Formula IV

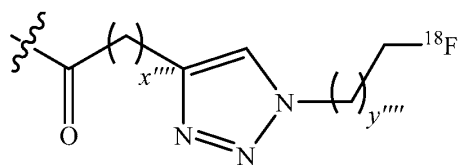


or a pharmaceutically acceptable salt and/or solvate thereof, wherein

Z^5 , Z^6 , and Z^7 are each independently H or OH;

one of W^9 and W^{10} is



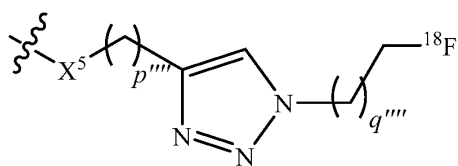


and the remaining one of W⁹ and

W¹⁰ is H, wherein

T⁵ is -C(O)- or -C(O)NH-;

one of R²⁵, R²⁶, and R²⁷ is



and the remaining

two of R²⁵, R²⁶, and R²⁷ are each H;

X⁵ is absent, O, S, or NH;

m'''' is 0, 1, 2, or 3;

n'''' is 0 or 1;

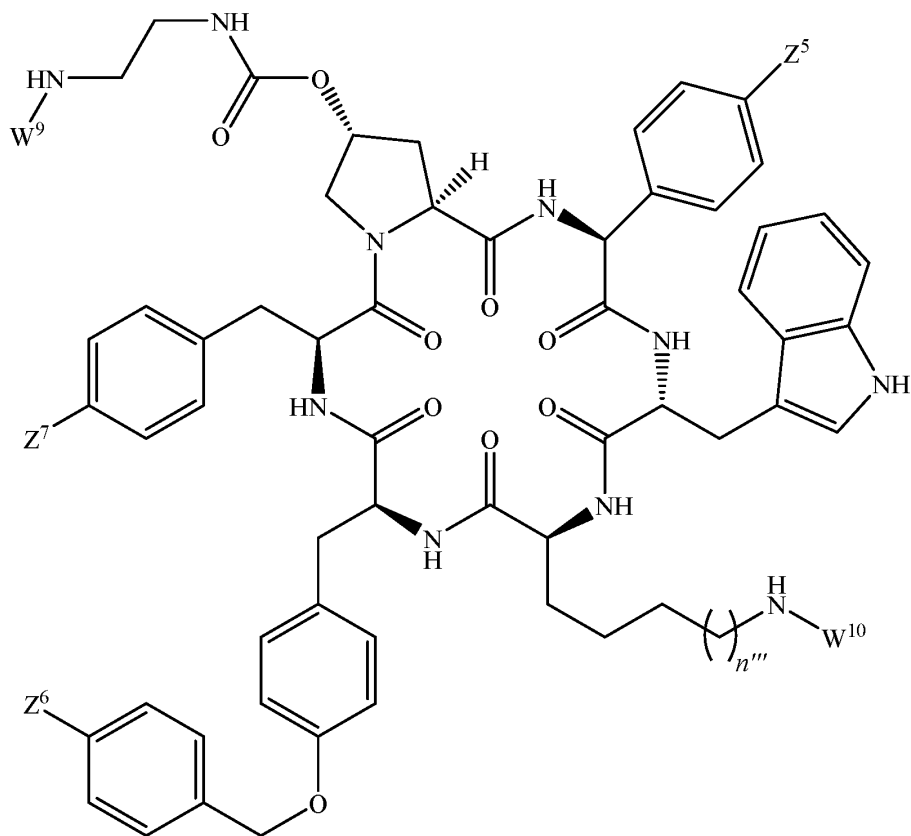
p'''' is 0, 1, 2, or 3, provided that when p'''' is 0 then X⁵ is absent;

q'''' is 1 or 2;

x'''' is 0, 1, 2, or 3; and

y'''' is 1 or 2.

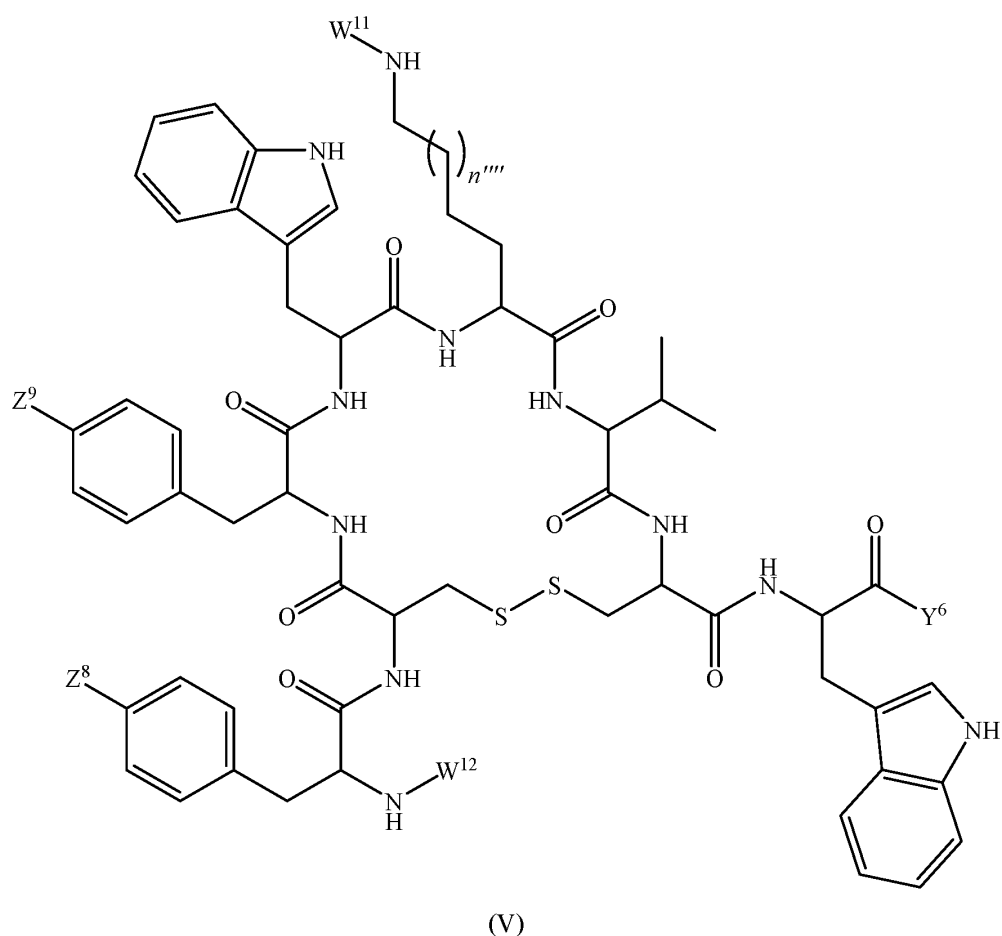
9. The compound of claim 8, wherein the compound is of Formula IVA



(IVA)

or a pharmaceutically acceptable salt and/or a solvate thereof.

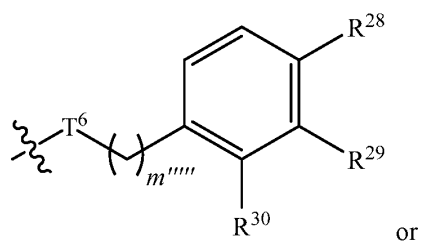
10. A compound that is a ^{18}F -labeled somatostatin receptor agonist according to Formula V

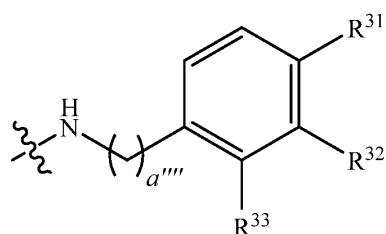
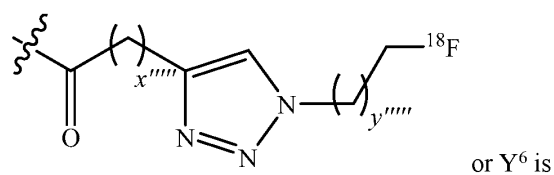


or a pharmaceutically acceptable salt and/or solvate thereof, wherein

Z^8 and Z^9 are each independently H or OH;

one of W^{11} and W^{12} is

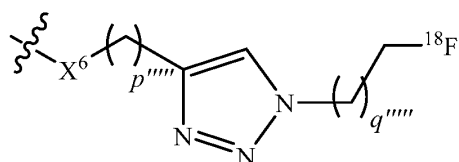




and the remaining W¹¹ and W¹² are each independently H and the remaining Y⁶ (*i.e.*, if not the structure indicated above) is OH or NH₂; wherein

T⁶ is -C(O)- or -C(O)NH-;

one of R²⁸, R²⁹, and R³⁰ and one of R³¹, R³², and R³³ is



and the remaining

two of R²⁸, R²⁹, and R³⁰ are each H and the remaining two of R³¹, R³², and R³³ are each H;

X⁶ is absent, O, S, or NH;

m'''' and a'''' are each independently 0, 1, 2, or 3;

n'''' is 0 or 1;

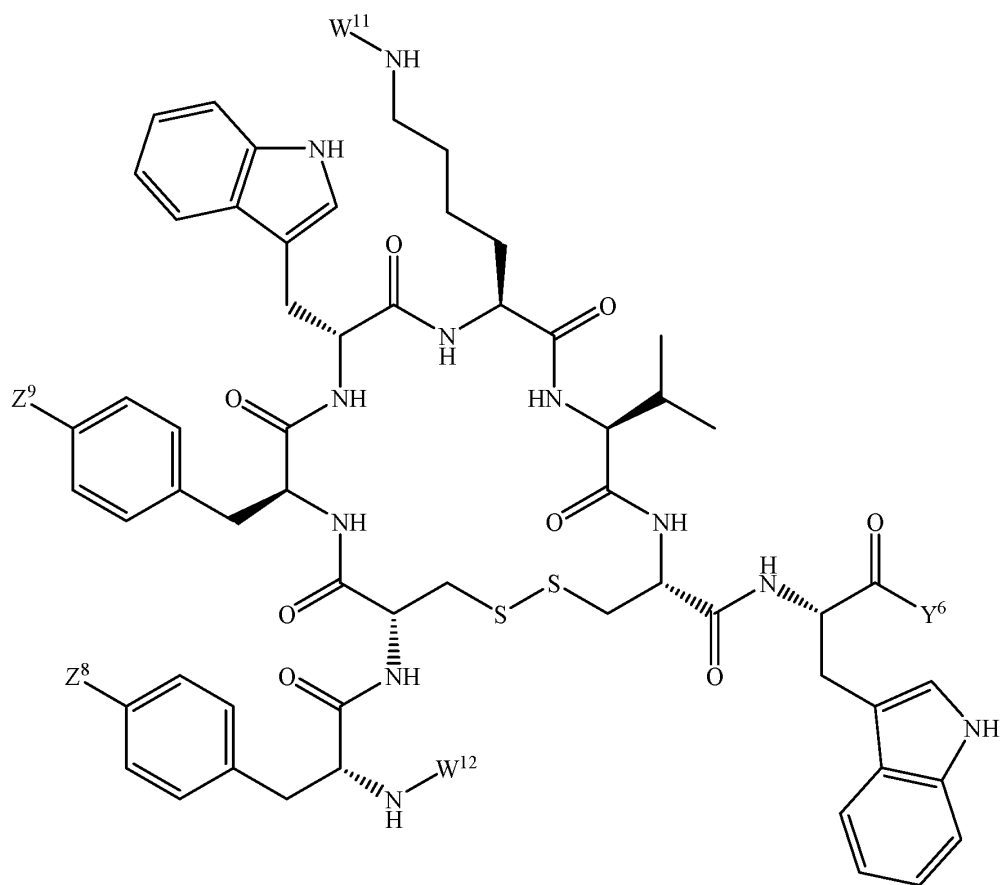
p'''' is 0, 1, 2, or 3, provided that when p'''' is 0 then X⁶ is absent;

q'''' is 1 or 2;

x'''' is 0, 1, 2, or 3; and

y'''' is 1 or 2.

11. The compound of claim 10, wherein the compound is of Formula VA

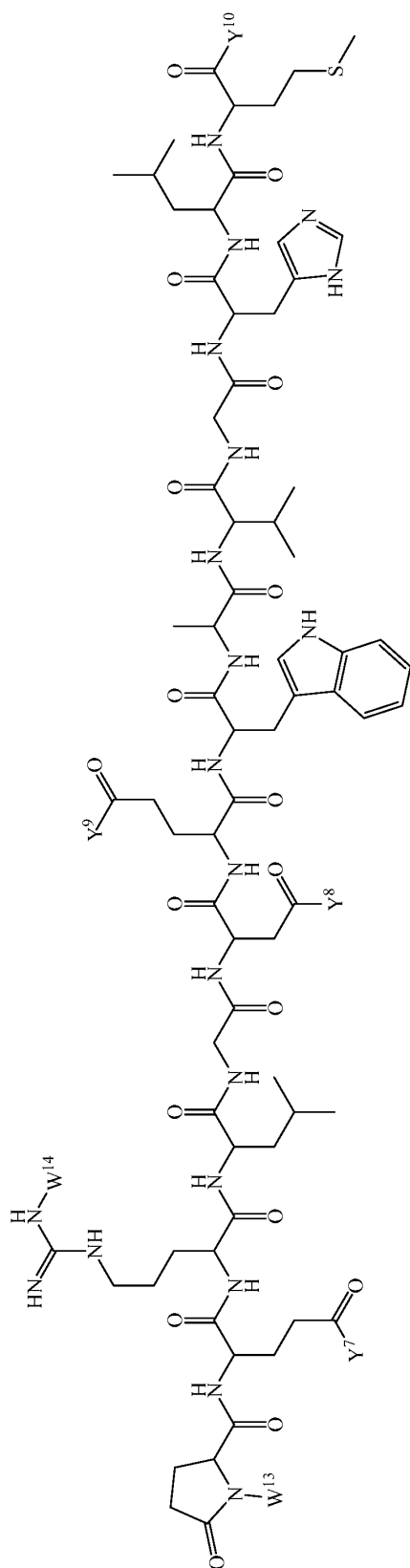


(VA)

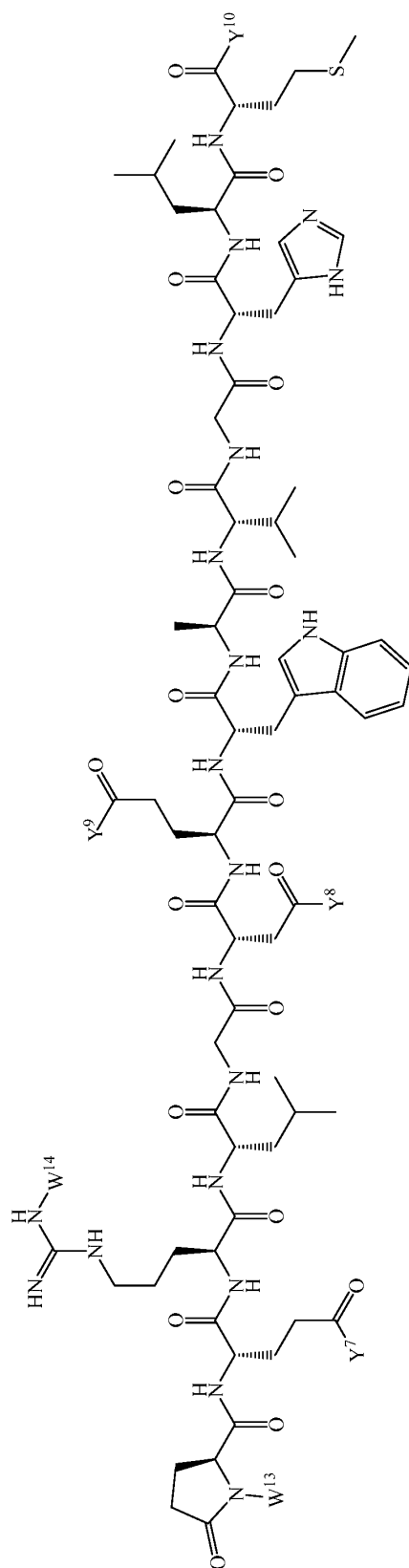
or a pharmaceutically acceptable salt and/or a solvate thereof.

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12. A compound that is a ^{18}F -labeled bombesin receptor agonist of Formula VI or Formula VIA



(VI)

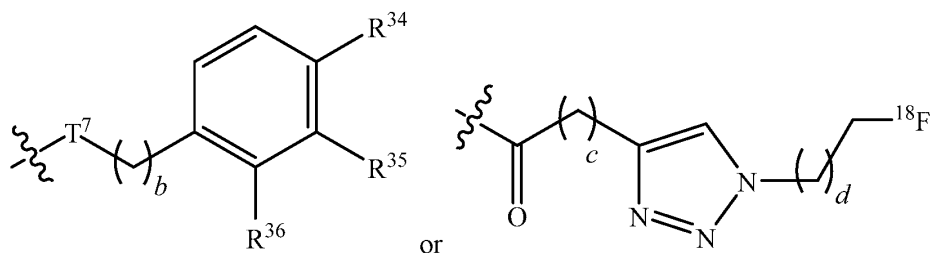


(VIA)

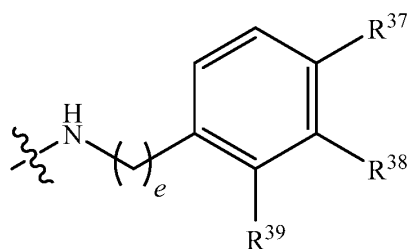
or a pharmaceutically acceptable salt and/or solvate thereof,

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where independently in each of Formulas VI and VIA one of W^{13} and W^{14} is



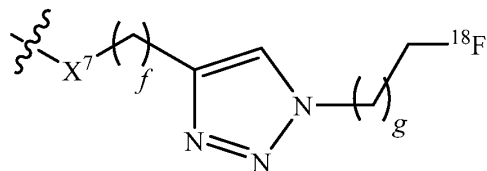
or one of Y^7 , Y^8 , Y^9 , and Y^{10} is



and the remaining W^{13} and W^{14} are each independently H and the remaining Y^7 , Y^8 , Y^9 , and Y^{10} (*i.e.*, if not the structure indicated above) is OH or NH_2 ; wherein

T^7 is $-C(O)-$ or $-C(O)NH-$;

one of R^{28} , R^{29} , and R^{30} and one of R^{31} , R^{32} , and R^{33} is



and the remaining two of R^{28} , R^{29} , and R^{30} are each H and the remaining two of R^{31} , R^{32} , and R^{33} are each H;

X^6 is absent, O, S, or NH;

b and e are each independently 0, 1, 2, or 3;

f is 0, 1, 2, or 3, provided that when f is 0 then X^7 is absent;

g is 1 or 2;

c is 0, 1, 2, or 3; and

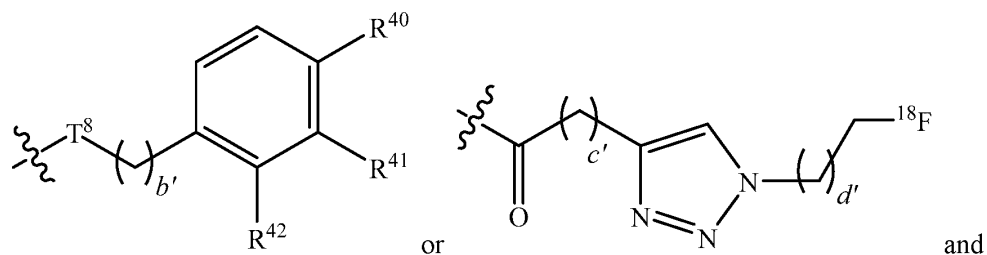
d is 1 or 2.

13. A ^{18}F -labeled seprase binding compound comprising

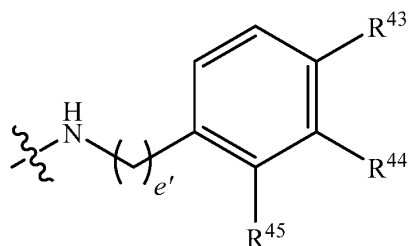
A

a seprase binding compound comprising a primary amine, secondary amine, NH_2 of a guanadinyl group, or NH_2 of an amidinyl group covalently bonded to W^{15} or a carboxylic acid or amide of the seprase binding compound that is modified to a $-\text{C}(\text{O})\text{Y}^{11}$ group, wherein

W^{15} is

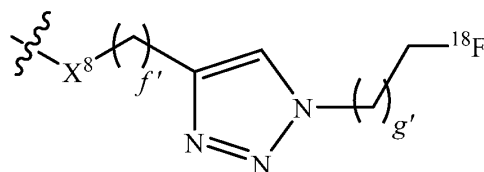


Y^{11} is



T^8 is $-\text{C}(\text{O})-$ or $-\text{C}(\text{O})\text{NH}-$;

one of R^{34} , R^{35} , and R^{36} and one of R^{37} , R^{38} , and R^{39} is



and the remaining two of R^{40} , R^{41} , and

R^{42} are each H and the remaining two of R^{43} , R^{44} , and R^{45} are each H;

X^8 is absent, O, S, or NH;

b' and e' are each independently 0, 1, 2, or 3;

f' is 0, 1, 2, or 3, provided that when f' is 0 then X^8 is absent;

g' is 1 or 2;

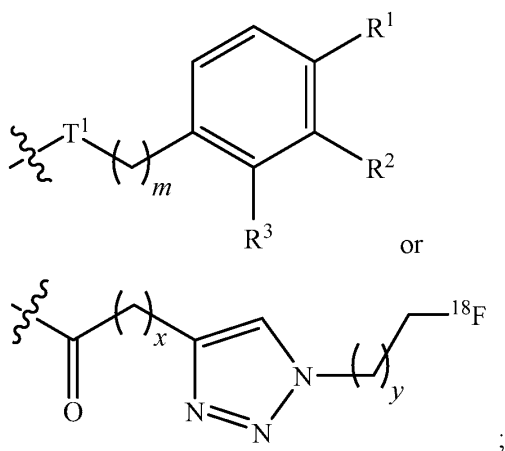
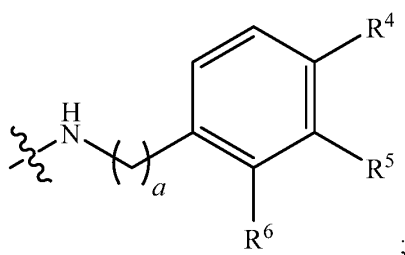
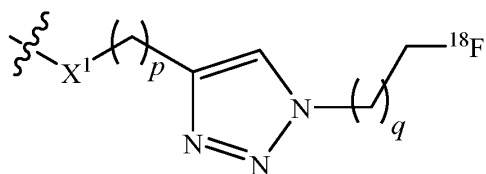
c' is 0, 1, 2, or 3; and

d' is 1 or 2.

A

14. A method comprising
administering a compound of any one of claims 1-13 to a subject; and
subsequent to the administering, detecting one or more of positron emission,
gamma rays from positron emission and annihilation, and Cerenkov
radiation due to positron emission.
15. The method of claim 14, wherein the method comprises administering an effective amount
of the compound to the subject.
16. The method of claim 14 or claim 15, wherein the subject is suspected of suffering from a
mammalian tissue expressing a somatostatin receptor, a bombesin receptor, seprase, or a
combination of any two or more thereof, when administered to a subject.
17. The method of claim 16, wherein the mammalian tissue comprises one or more of a growth
hormone producing tumor, a neuroendocrine tumor, a pituitary tumor, a vasoactive
intestinal peptide-secreting tumor, a small cell carcinoma of the lung, gastric cancer
tissue, pancreatic cancer tissue, a neuroblastoma, and a metastatic cancer.
18. The method of any one of claims 14-17, wherein administering the compound comprises
parenteral administration.
19. A method comprising modifying a peptide ligand to provide a ^{18}F -labeled peptide ligand,
wherein the modifying comprises one or both of
covalently bonding a primary amine, secondary amine, NH_2 of a guanadinyll group, or
 NH_2 of an amidinyll group of the peptide ligand to W^1 ; or
converting a carboxylic acid or amide of the peptide ligand to a $-\text{C}(\text{O})\text{Y}^1$ group;
wherein

A

W¹ isY¹ isT¹ is --C(O)-- or --C(O)NH-- ,one of R¹, R², and R³ and one of R⁴, R⁵, and R⁶ isand the remaining two of R¹,R², and R³ are each H and the remaining two of R⁴, R⁵, and R⁶ are each H;X¹ is absent, O, S, or NH;*m* and *a* are each independently 0, 1, 2, or 3;*n* is 1 or 2;*p* is 0, 1, 2, or 3, provided that when *p* is 0 then X¹ is absent;*q* is 1 or 2; *x* is 0, 1, 2, or 3; and*y* is 1 or 2.

A

20. A method of obtaining an image, the method comprising
administering an effective amount of a ^{18}F -labeled peptide ligand to a subject,
wherein the ^{18}F -labeled peptide ligand comprises a somatostatin receptor
agonist, a bombesin receptor agonist, or a seprase binding compound; and
subsequent to the administering, detecting one or more of positron emission,
gamma rays from positron emission and annihilation, and Cerenkov
radiation due to positron emission.
21. The method of claim 20, wherein the subject is suspected of suffering from a mammalian
tissue expressing a somatostatin receptor, a bombesin receptor, seprase, or a combination
of any two or more thereof, when administered to a subject.
22. The method of claim 21, wherein the mammalian tissue comprises one or more of a growth
hormone producing tumor, a neuroendocrine tumor, a pituitary tumor, a vasoactive
intestinal peptide-secreting tumor, a small cell carcinoma of the lung, gastric cancer
tissue, pancreatic cancer tissue, a neuroblastoma, and a metastatic cancer.
23. The method of any one of claims 20-22, wherein administering the ^{18}F -labeled peptide
ligand comprises parenteral administration.