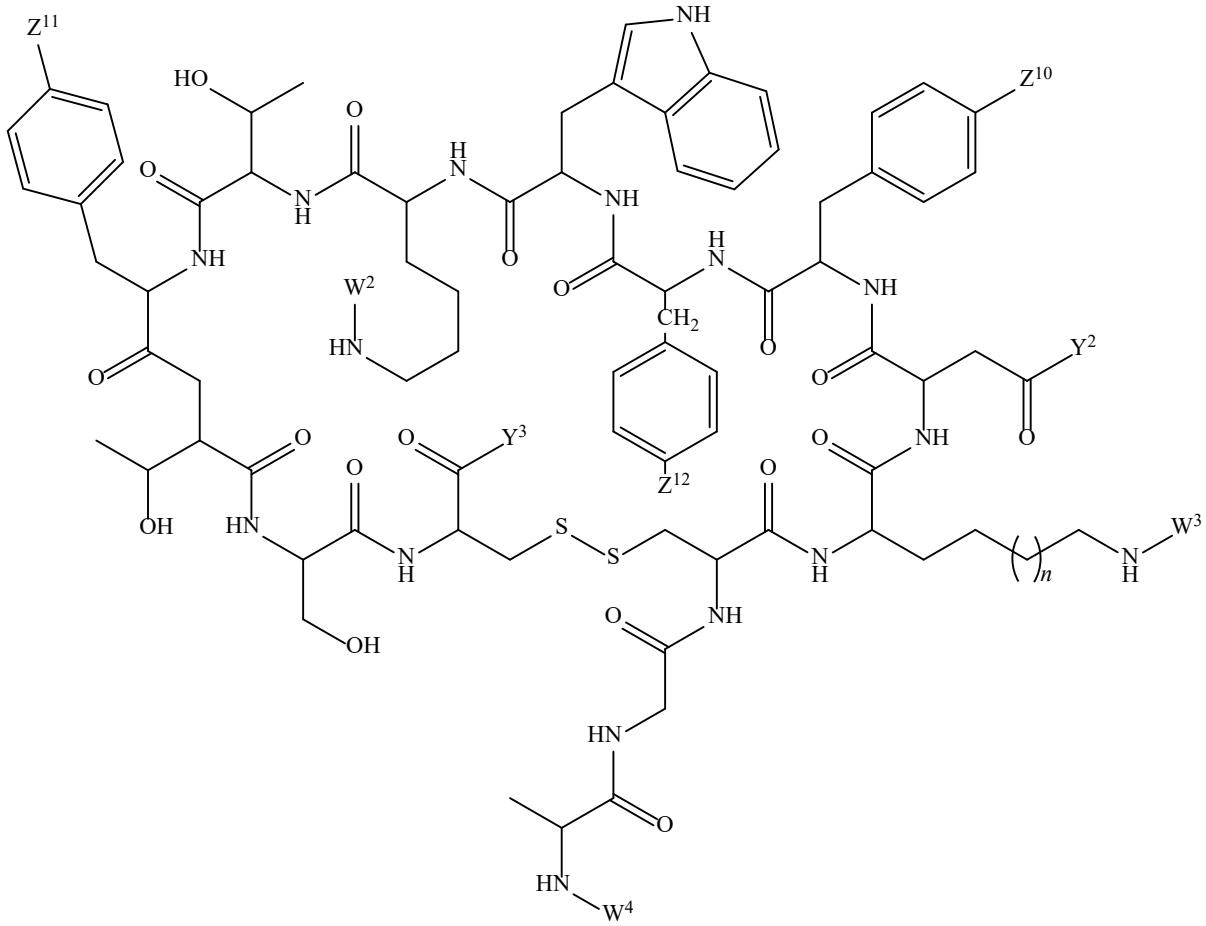
What is claimed is:

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

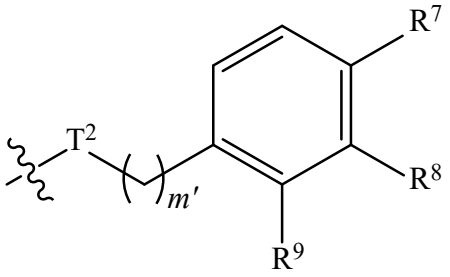


(I)

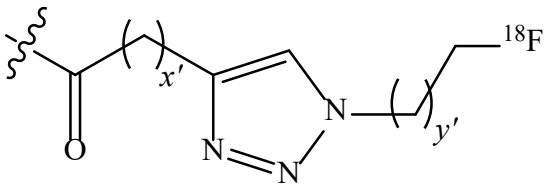
or a pharmaceutically acceptable salt and/or solvate thereof, wherein

Z^{10} and Z^{11} are each independently H or OH; and Z^{12} is H;

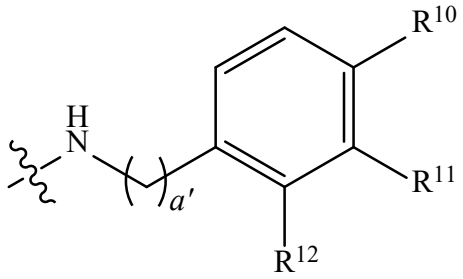
one of W^2, W^3, and W^4 is



or

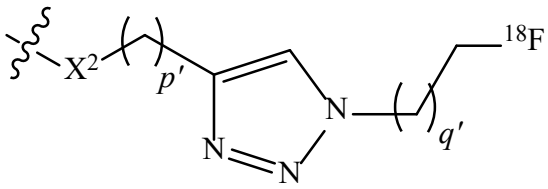


or one of Y^2 and Y^3 is



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;

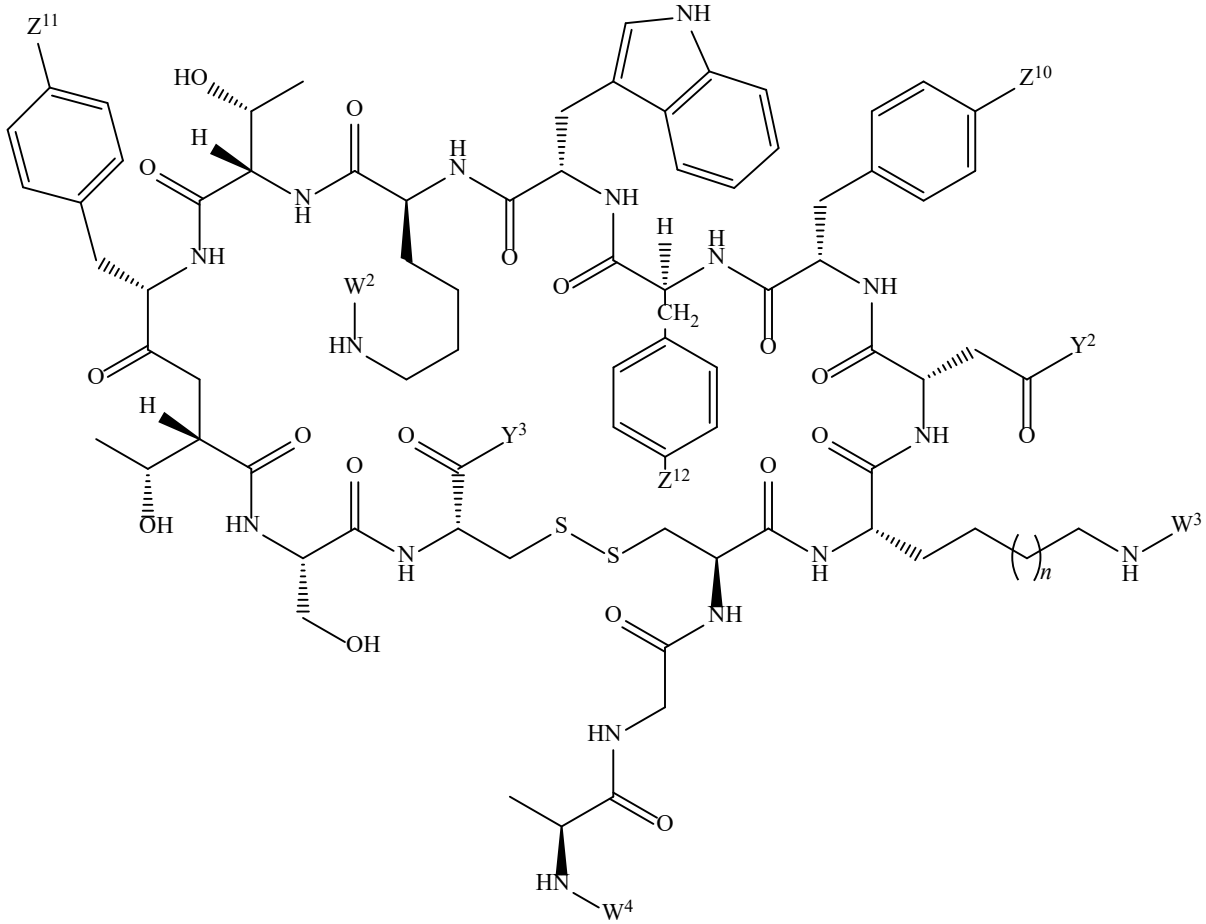
n is 0 or 1;

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.

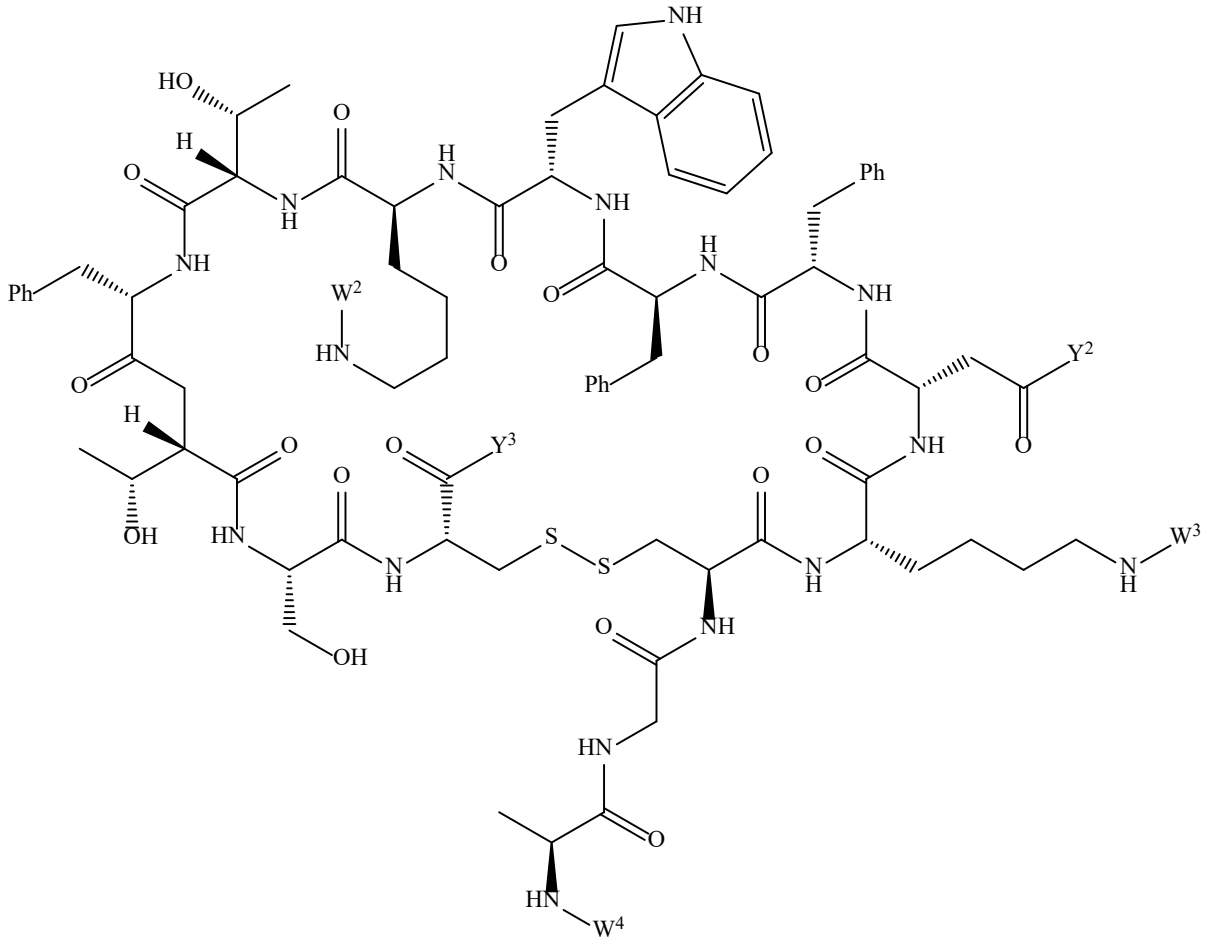
2. The compound of claim 1, wherein the compound is of Formula IA



(IA)

or a pharmaceutically acceptable salt and/or solvate thereof.

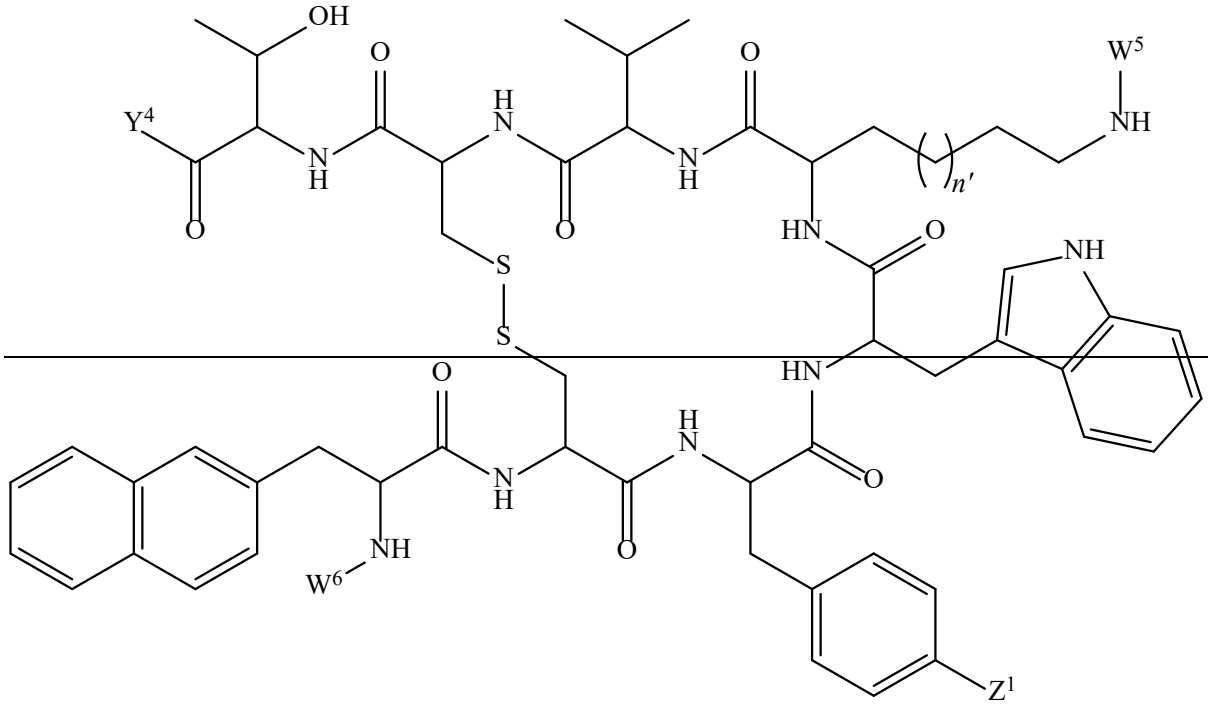
3. The compound of claim 1, wherein the compound is of Formula IB



(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

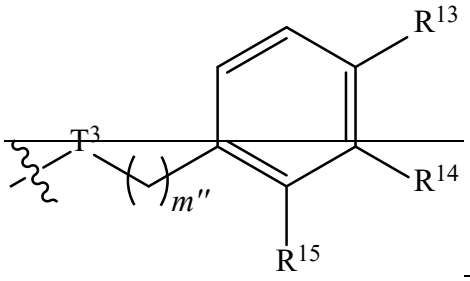


(II)

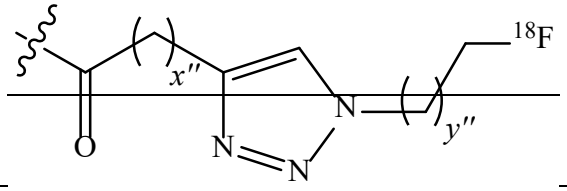
or a pharmaceutically acceptable salt and/or solvate thereof, wherein

Z^1 is H or OH;

one of W^5 and W^6 is

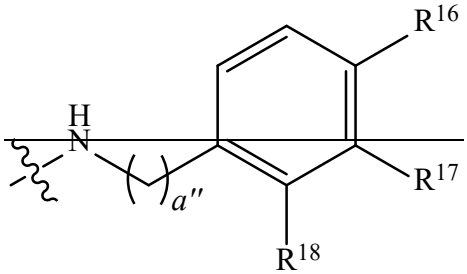


or



or

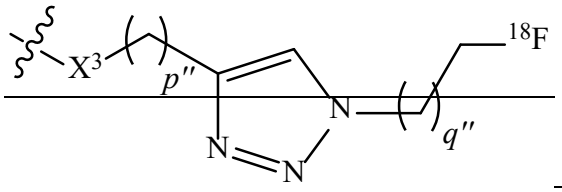
Y^4 is



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 T^3 is C(O) or C(O)NH , one of R^{13}, R^{14}, and R^{15} and one of R^{16}, R^{17}, and R^{18} is~~



~~and the remaining two of R^{13}, R^{14}, and R^{15} are each H and the remaining two of R^{16}, R^{17}, and R^{18} are each H;~~

~~X^3 is absent, O, S, or NH;~~

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

~~*n'* is 0 or 1;~~

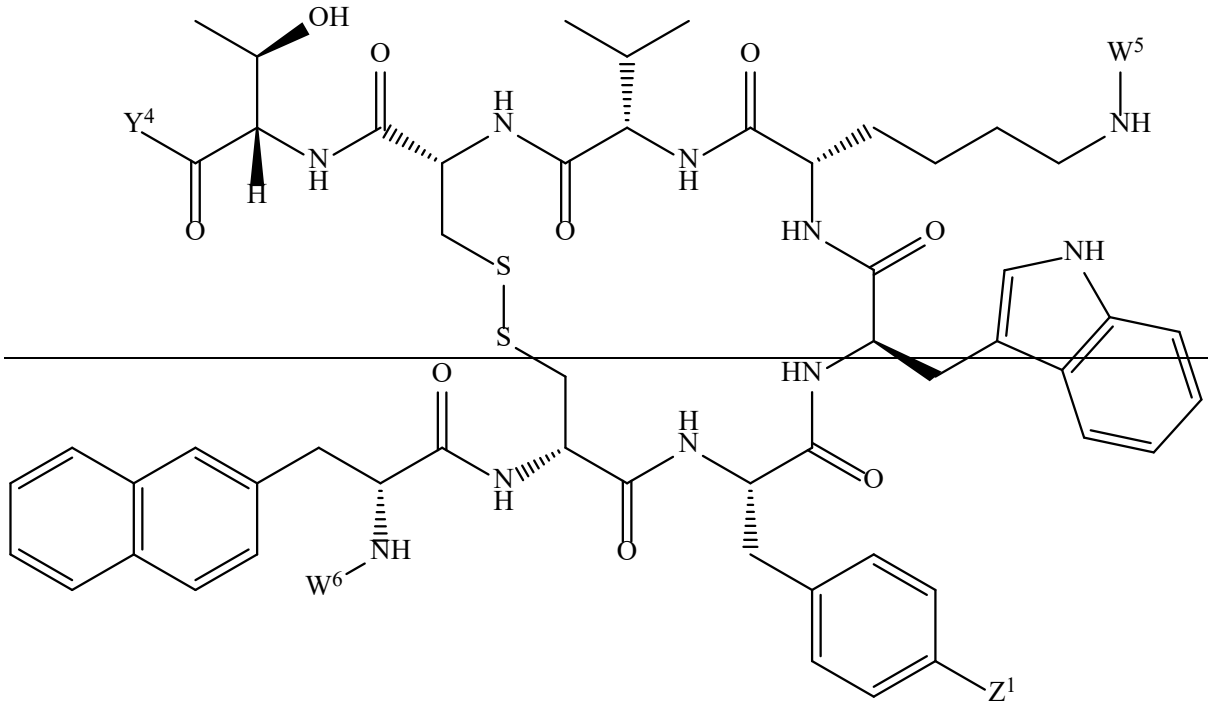
~~*p''* is 0, 1, 2, or 3, provided that when *p''* is 0 then X^3 is absent;~~

~~*q''* is 1 or 2;~~

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

~~*y''* is 1 or 2.~~

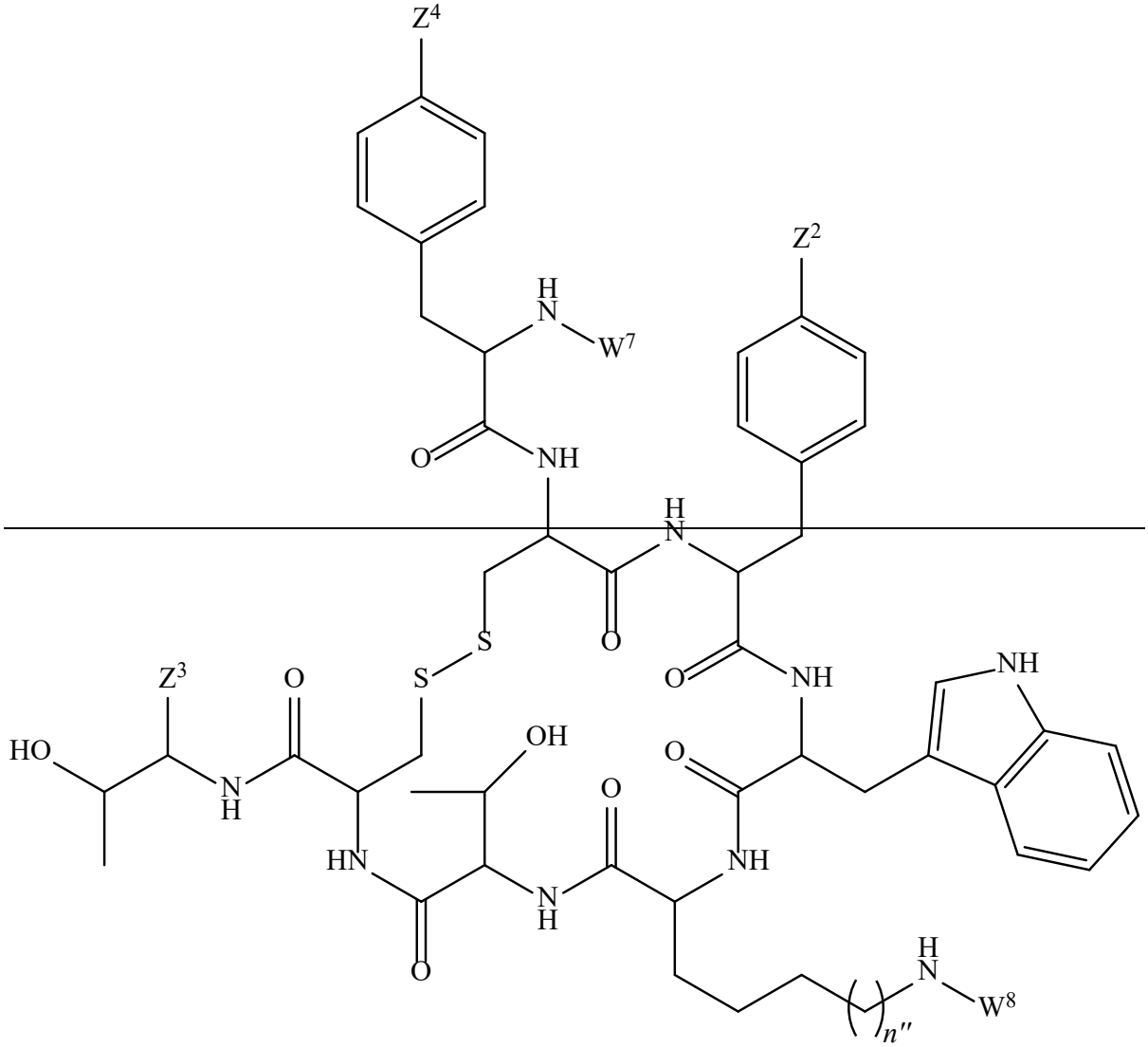
~~5. The compound of claim 4, whererin the compound is of Formula IIA~~



~~(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~~



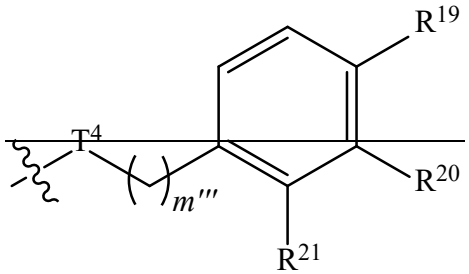
~~(III)~~

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

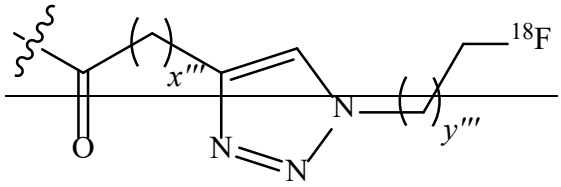
~~Z^2 and Z^4 are each independently H or OH;~~

~~Z^3 is $C(O)Y^5$ or CH_2OH;~~

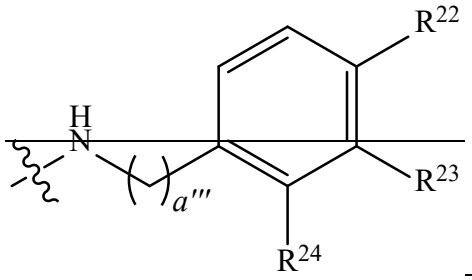
~~one of W^7 and W^8 is~~



~~or~~



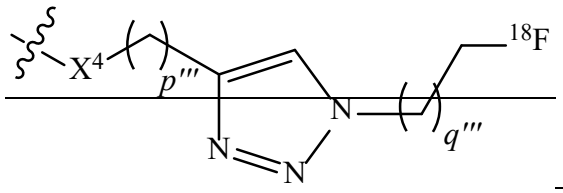
~~or Y^5 is~~



~~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;~~

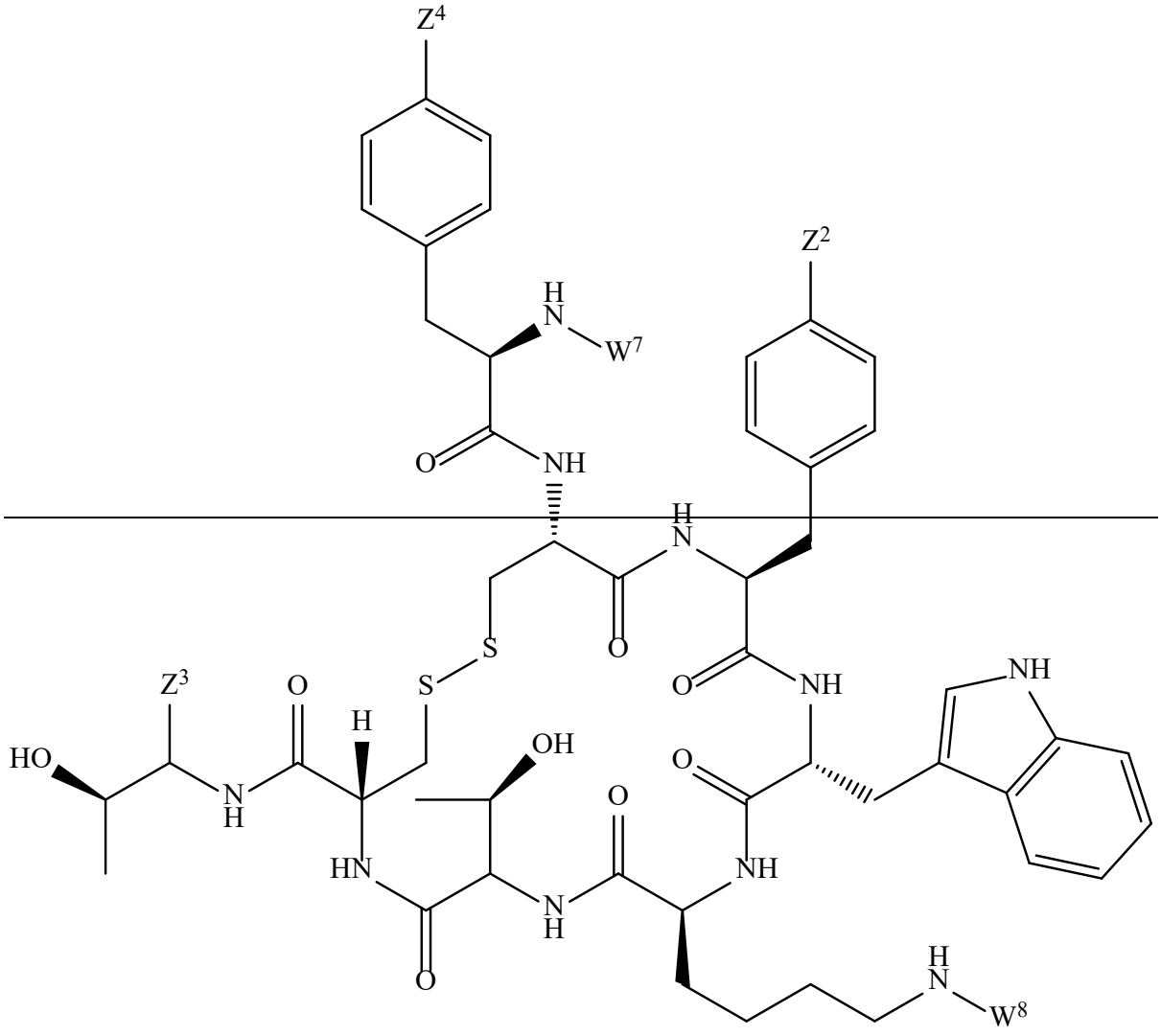
~~*p'''* is 0, 1, 2, or 3, provided that when *p'''* is 0 then X^3 is absent;~~

~~*q'''* is 1 or 2;~~

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

~~*y’’’* is 1 or 2.~~

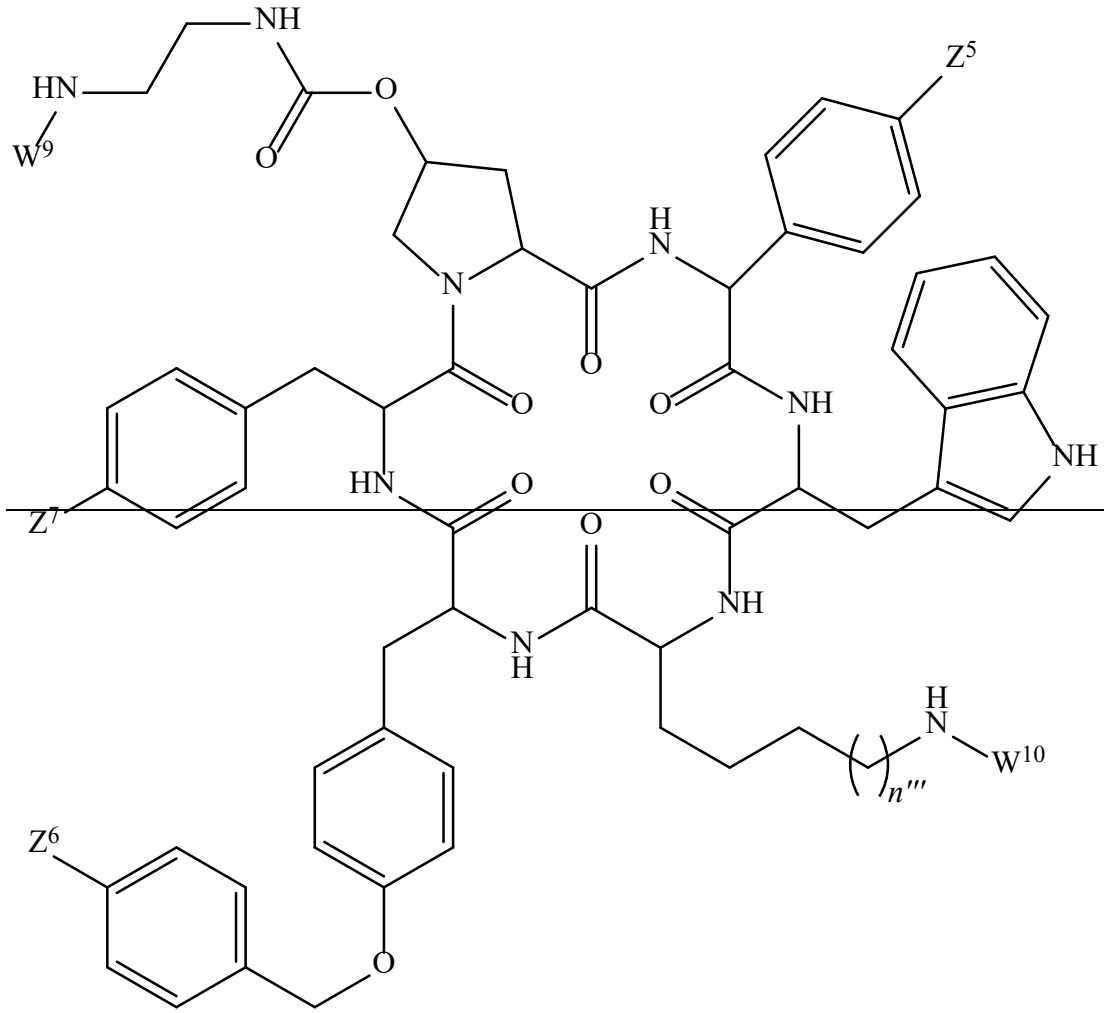
~~7. The compound of claim 6, wherein the compound is of Formula IIIA~~



~~(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~~

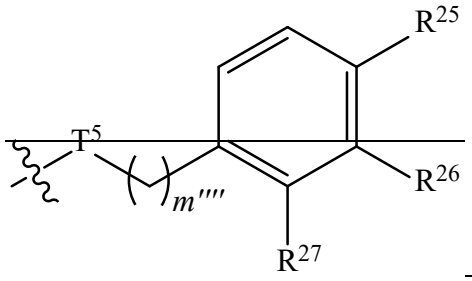


~~(IV)~~

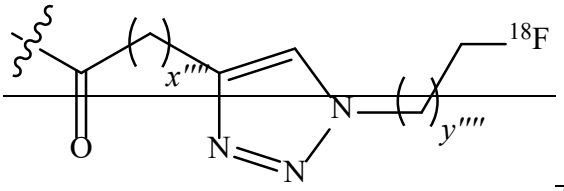
~~or a pharmaceutically acceptable salt and/or solvate thereof, wherein~~

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

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



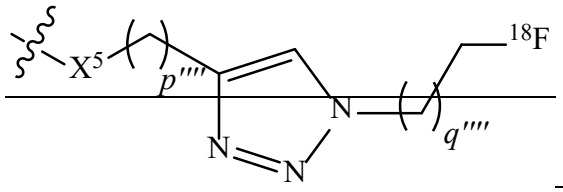
~~or~~



~~and the remaining one of W^9 and W^{10} is H, wherein~~

~~T^5 is C(O) or C(O)NH ;~~

~~one of R^{25}, R^{26}, and R^{27} is~~



~~and the remaining two of R^{25}, R^{26}, and R^{27} are each H;~~

~~X^5 is absent, O, S, or NH;~~

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

~~*n'''* is 0 or 1;~~

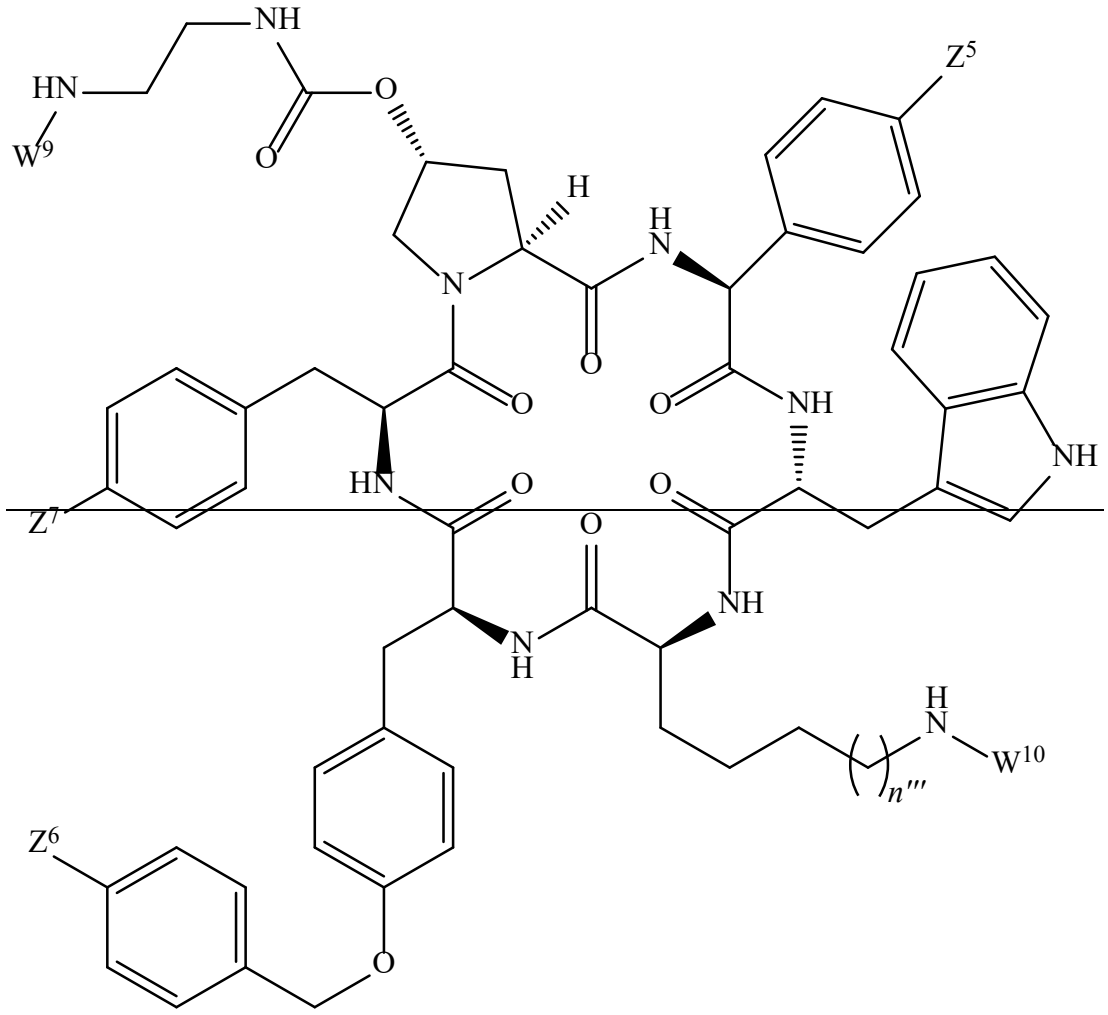
~~*p''''* is 0, 1, 2, or 3, provided that when *p''''* is 0 then X^5 is absent;~~

~~*q''''* is 1 or 2;~~

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

~~*y''''* is 1 or 2.~~

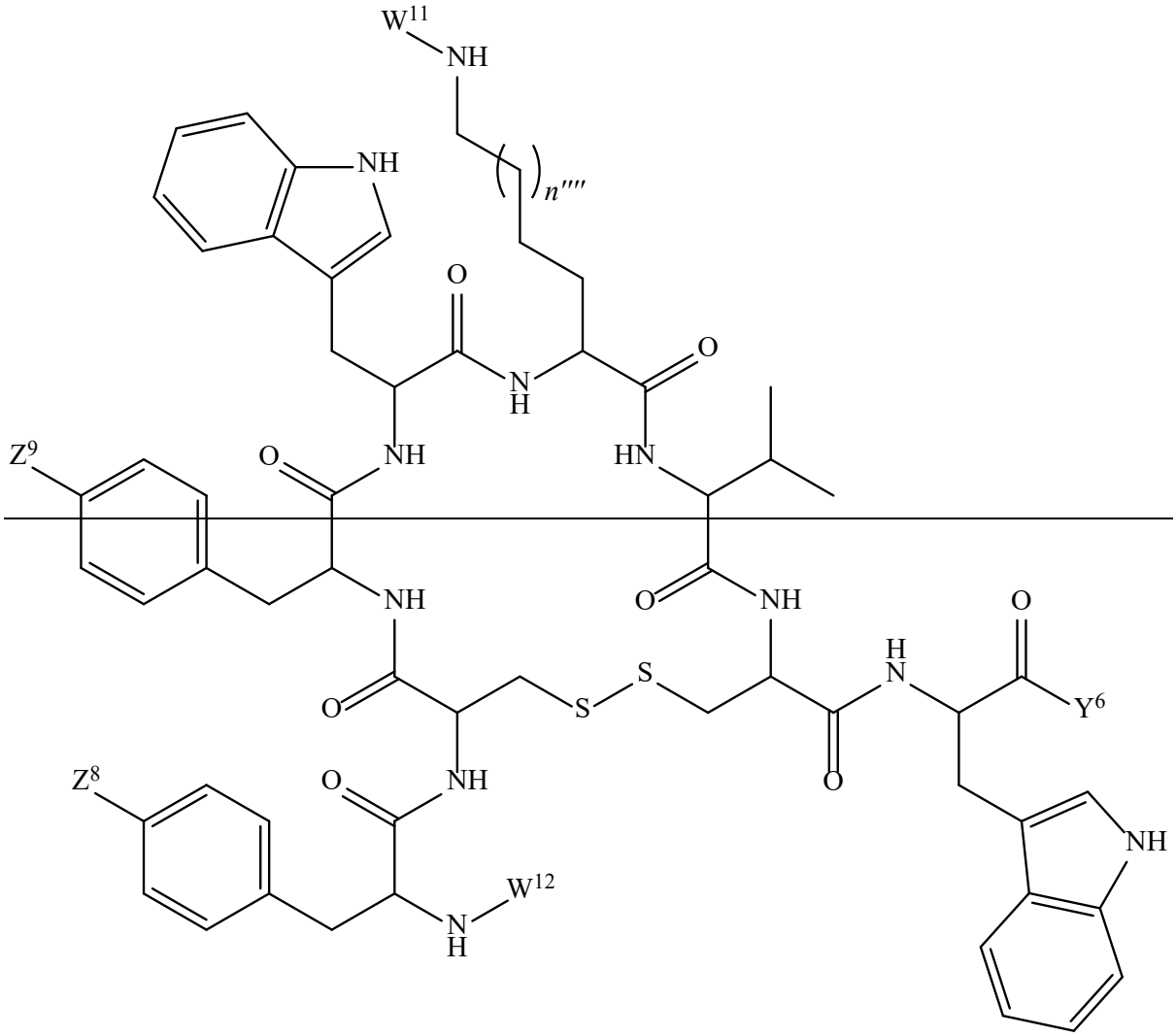
~~9. The compound of claim 8, wherein the compound is of Formula IVA~~



~~(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

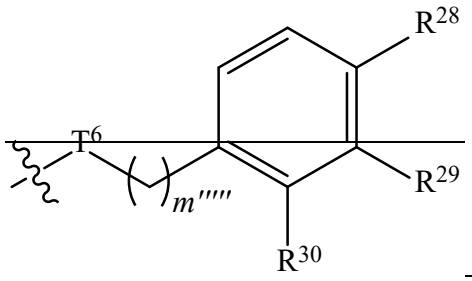


(V)

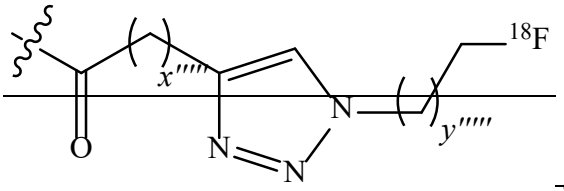
or a pharmaceutically acceptable salt and/or solvate thereof, wherein

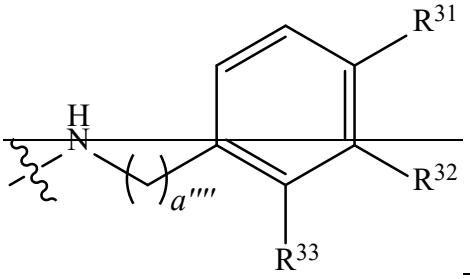
Z^8 and Z^9 are each independently H or OH;

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



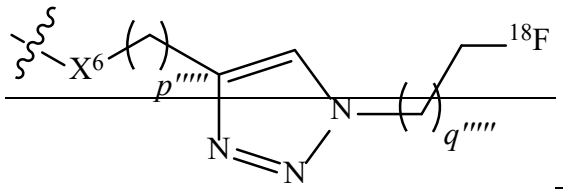
or

~~~~ ~~or Y^6 is~~

~~~~ ~~and the remaining W^{11} and W^{12} are each independently H and the remaining Y^6 (*i.e.*, if not the structure indicated above) is OH or NH_2; wherein~~

~~T^6 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;~~

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

~~*n''''* is 0 or 1;~~

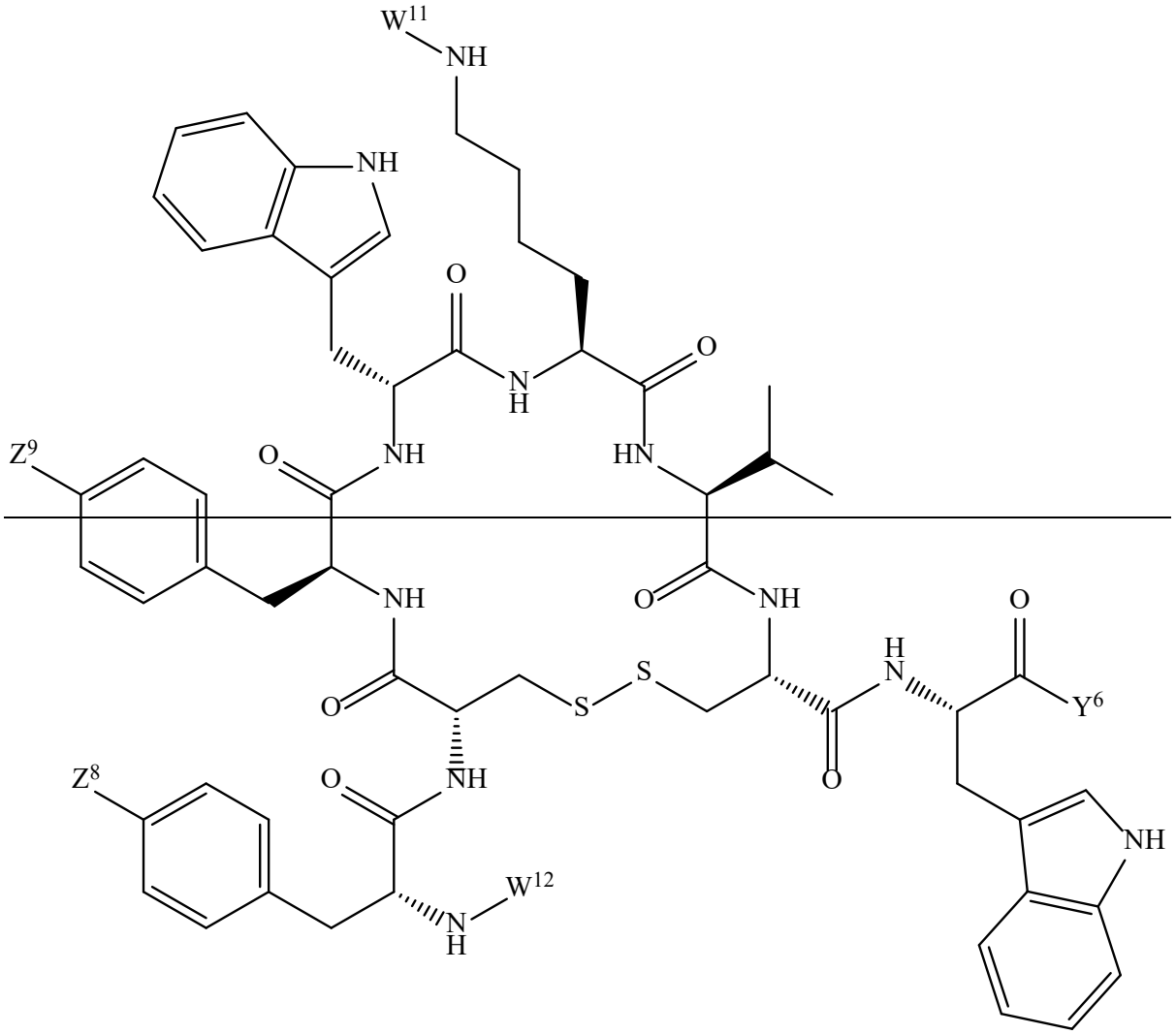
~~*p'''''* is 0, 1, 2, or 3, provided that when *p'''''* is 0 then X^6 is absent;~~

~~*q'''''* is 1 or 2;~~

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

~~*y'''''* is 1 or 2.~~

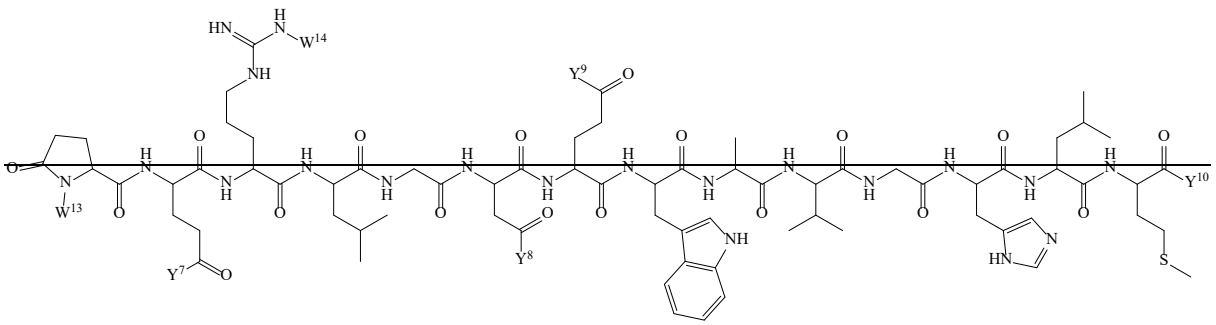
~~11. The compound of claim 10, wherein the compound is of Formula VA~~



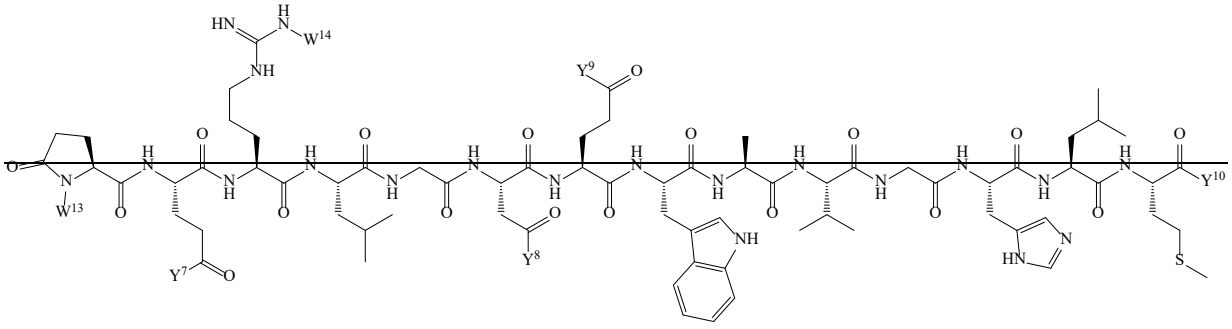
~~(VA)~~

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

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



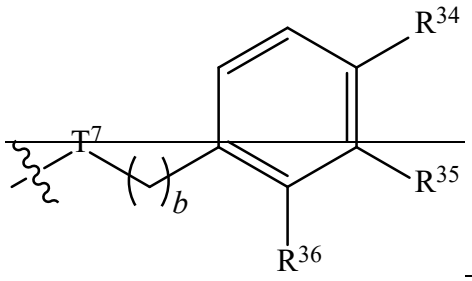
~~(VI)~~



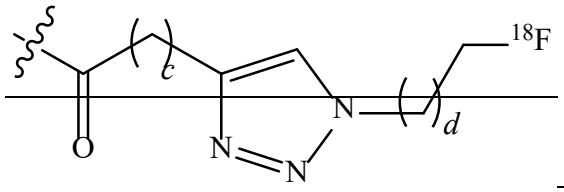
~~(VIA)~~

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

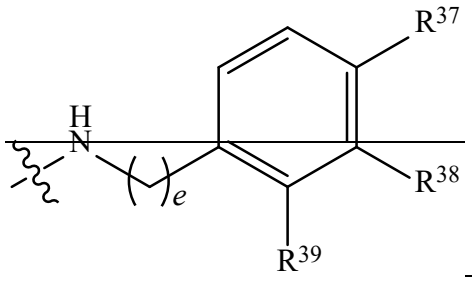
~~where independently in each of Formulas VI and VIA one of W^{13} and W^{14} is~~



~~or~~



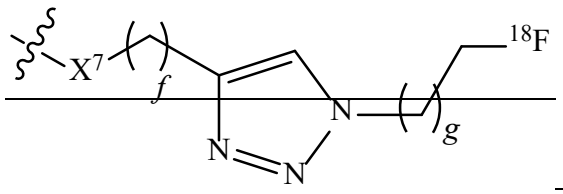
~~or one of Y^{7}, Y^{8}, Y^{9}, and Y^{10} is~~



~~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 *c* 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;~~

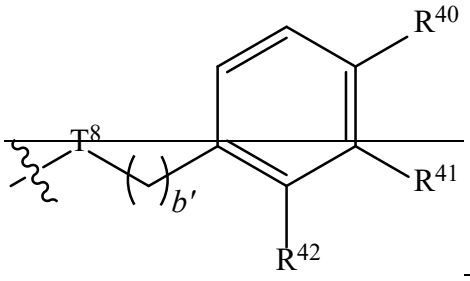
~~*e* is 0, 1, 2, or 3; and~~

~~*d* is 1 or 2.~~

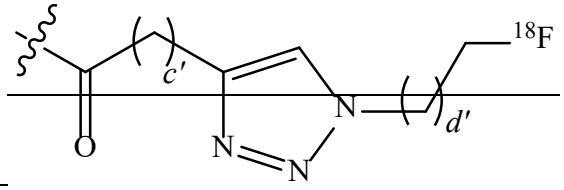
~~13. A ^{18}F-labeled seprase binding compound comprising~~

~~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 $C(O)Y^{11}$ group, wherein~~

~~W^{15} is~~

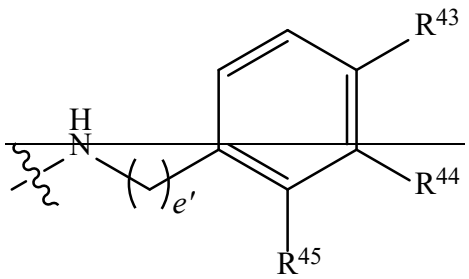


~~or~~



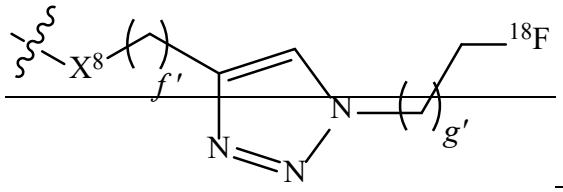
~~and~~

~~Y^{11} is~~



~~T^8 is C(O) or C(O)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 *c'* 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;~~

~~*e'* is 0, 1, 2, or 3; and~~

~~*d'* is 1 or 2.~~

4. A compound of any one of claims 1-3, or a pharmaceutically acceptable salt and/or solvate thereof, for use in therapy.

5. Use of a compound of any one of claims 1-3, or a pharmaceutically acceptable salt and/or solvate thereof, in the manufacture of a medicament for imaging disorders associated with a mammalian tissue, wherein the compound of any one of claims 1-3, or a pharmaceutically acceptable salt and/or solvate thereof, is to be administered to a subject.

6~~14~~. The use of claim 5, wherein the imaging of the disorders associated with the mammalian tissue further comprises ~~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.

7~~15~~. The use of claim 5 or claim 6, ~~The method of claim 14,~~ wherein the compound of any one of claims 1-3, or a pharmaceutically acceptable salt and/or solvate thereof, ~~the method comprises~~ is to be administered~~ing~~ to the subject in an effective amount of the compound ~~to the subject~~.

8~~16~~. The ~~method~~ use of any one of claims 5-7, ~~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 the compound of any one of claims 1-3 is administered to the~~a~~ subject.

9~~17~~. The use ~~method~~ of any one of claims 5-8,~~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.

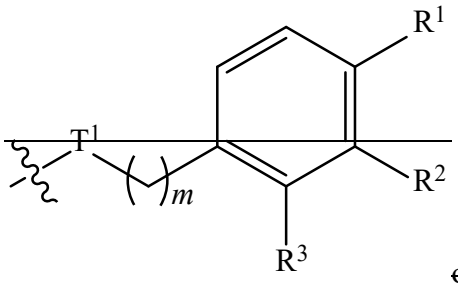
10~~18~~. The use ~~method~~ of any one of claims~~-~~ 5-9~~14-17~~, wherein ~~administering~~ the compound is to be administered by ~~comprises~~ parenteral administration.

~~19. A method comprising modifying a peptide ligand to provide a ^{18}F-labeled peptide ligand, wherein the modifying comprises one or both of~~

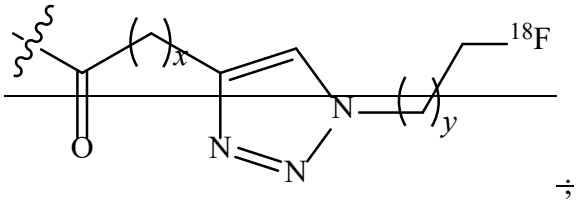
~~covalently bonding a primary amine, secondary amine, NH_2 of a guanadinyl group, or NH_2 of an amidinyl group of the peptide ligand to W^1; or~~

~~converting a carboxylic acid or amide of the peptide ligand to a $-C(O)Y^1$ group; wherein~~

~~W^1 is~~

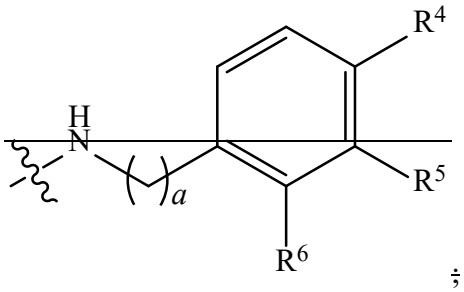


~~or~~



~~;~~

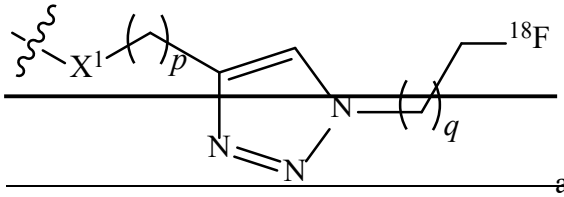
~~Y^1 is~~



~~;~~

~~T^1 is C(O) or C(O)NH ,~~

~~one of R^1, R^2, and R^3 and one of R^4, R^5, and R^6 is~~



~~and the remaining two of R^1, R^2, and R^3 are each H and the remaining two of R^4, R^5, and R^6 are each H;~~

~~X^1 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 X^1 is absent;~~

~~*q* is 1 or 2; *x* is 0, 1, 2, or 3; and~~

~~*y* is 1 or 2.~~

~~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.~~