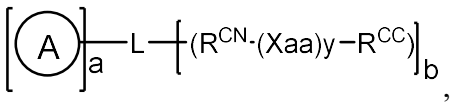
CLAIMS

1. An agent having the structure of:

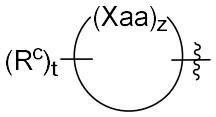


or a pharmaceutically acceptable salt thereof, wherein:

the agent inhibits, kills, or removes a cell infected by SARS-CoV-2

each of a and b is 1;

A is chosen from ABT, AT, and PT;

ABT is an antibody binding moiety that has the structure: R^c–(Xaa)z– or  , wherein t is an integer from 1 to 20, and z is an integer from 1 to 50;

AT is an antibody moiety that is immunoglobulin G (IgG), a derivative of IgG, pooled IgG, or intravenous immune globulin (IVIG);

PT is independently a partner moiety selected from a diagnostic agent or detectable moiety;

L is a linker moiety;

each Xaa is independently an amino acid or an amino acid analog;

y is 5-50;

R^{CN} and R^{CC} are independently R^C;

each R^C is independently $-L^a-R'$;

each L^a is independently a covalent bond, or an optionally substituted bivalent group selected from C_1-C_{50} aliphatic or C_1-C_{50} heteroaliphatic having 1-5 heteroatoms, wherein one or more methylene units of the aliphatic or heteroaliphatic group are optionally and independently replaced with $-C(R')_2-$, −Cy−, −O−, −S−, −S−S−, −N(R')−, −C(O)−, −C(S)−, −C(NR')−, −C(O)N(R')−, −N(R')C(O)N(R')−, −N(R')C(O)O−, −S(O)−, $-S(O)_2-$, $-S(O)_2N(R')-$, −C(O)S−, or −C(O)O−;

each −Cy− is independently an optionally substituted bivalent monocyclic, bicyclic, or polycyclic group, wherein each monocyclic ring is independently selected from a C_{3-20} cycloaliphatic ring, a C_{6-20} aryl ring, a 5-20 membered heteroaryl ring having 1-10 heteroatoms, and a 3-20 membered heterocyclyl ring having 1-10 heteroatoms;

each R' is independently −R, −C(O)R, $-CO_2R$, or $-SO_2R$; and

each R is independently −H, or an optionally substituted group selected from C_{1-30} aliphatic, C_{1-30} heteroaliphatic having 1-10 heteroatoms, C_{6-30} aryl, C_{6-30} arylaliphatic, C_{6-30} arylheteroaliphatic having 1-10 heteroatoms, 5-30 membered heteroaryl having 1-10 heteroatoms, and 3-30 membered heterocyclyl having 1-10 heteroatoms, or

two R groups are optionally and independently taken together to form a covalent bond, or

two or more R groups on the same atom are optionally and independently taken together with the atom they are attached to form an optionally substituted, 3-30 membered, monocyclic, bicyclic or polycyclic ring having, in addition to the atom, 0-10 heteroatoms; or

two or more R groups on two or more atoms are optionally and independently taken together with their intervening atoms to form an optionally substituted, 3-30 membered, monocyclic, bicyclic, or polycyclic ring having, in addition to the intervening atoms, 0-10 heteroatoms;

wherein –(Xaa)y− is or comprises:

$-(Xaa^{T0})y0-(Xaa^{T1})y1-Xaa^{T2}-(Xaa^{T3})y3-Xaa^{T4}-(Xaa^{T5})y5-(Xaa^{T6})y6-(Xaa^{T7})y7-(Xaa^{T8})y8-Xaa^{T9}-(Xaa^{T10})y10-(Xaa^{T11})y11-(Xaa^{T12})y12-$, wherein:

y0 is an integer from 0 to 20;

each Xaa^{T0} is independently an amino acid or an amino acid analog;

y1 is 0, 1, or 2;

each Xaa^{T1} is independently an amino acid or an amino acid analog;

Xaa^{T2} is an amino acid or an amino acid analog whose side chain comprises 3 or more non-hydrogen atoms;

y3 is an integer from 0 to 10;

each of Xaa^{T3} is independently an amino acid or an amino acid analog;

each of Xaa^{T4} and Xaa^{T9} is independently an amino acid or an amino acid analog, wherein Xaa^{T4} is optionally connected to Xaa^{T9} through a linker;

y5 is an integer from 0 to 10;

each Xaa^{T5} is independently an amino acid or an amino acid analog;

y6 is 0, 1, or 2;

each Xaa^{T6} is independently an amino acid or an amino acid analog;

y7 is 0 or 1;

Xaa^{T7} is a negatively-charged amino acid or a negatively-charged amino acid analog;

y8 is an integer from 0 to 10;

each Xaa^{T8} is independently an amino acid or an amino acid analog;

y10 is an integer from 0 to 10;

each of Xaa^{T10} is independently an amino acid or an amino acid analog;

y11 is 1, 2, 3, 4, or 5;

each Xaa^{T11} is independently an amino acid or an amino acid analog;

y12 is an integer from 0 to 20; and

each Xaa^{T12} is independently an amino acid or an amino acid analog.

2. The agent of claim 1, wherein each of Xaa^{T0}, Xaa^{T1}, Xaa^{T2}, Xaa^{T3}, Xaa^{T4}, Xaa^{T5}, Xaa^{T6}, Xaa^{T7}, Xaa^{T8}, Xaa^{T9}, Xaa^{T10}, Xaa^{T11}, and Xaa^{T12} is independently an amino acid having the structure of formula **A-I**:

$$-N(R^{a1})-L^{a1}-C(R^{a2})(R^{a3})-L^{a2}-CO- \text{ (A-I)},$$

wherein:

each of R^{a1}, R^{a2}, and R^{a3} is independently $-L^{a}-R'$;

each of L^{a1} and L^{a2} is independently L^{a};

each L^{a} is independently a covalent bond, or an optionally substituted bivalent group selected from C_1-C_{20} aliphatic or C_1-C_{20} heteroaliphatic having 1-5 heteroatoms, wherein one or more methylene units of the aliphatic or heteroaliphatic group are optionally and independently replaced with $-C(R')_2-$, $-Cy-$, $-O-$, $-S-$, $-S-S-$, $-N(R')-$, $-C(O)-$, $-C(S)-$, $-C(NR')-$, $-C(O)N(R')-$, $-N(R')C(O)N(R')-$, $-N(R')C(O)O-$, $-S(O)-$, $-S(O)_2-$, $-S(O)_2N(R')-$, $-C(O)S-$, or $-C(O)O-$;

each $-Cy-$ is independently an optionally substituted bivalent monocyclic, bicyclic, or polycyclic group, wherein each monocyclic ring is independently selected from a C_{3-20} cycloaliphatic ring, a C_{6-20} aryl ring, a 5-20 membered heteroaryl ring having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, and a 3-20 membered heterocyclyl ring having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon;

each R' is independently $-R$, $-C(O)R$, $-CO_2R$, or $-SO_2R$; and

each R is independently $-H$, or an optionally substituted group selected from C_{1-30} aliphatic, C_{1-30} heteroaliphatic having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, C_{6-30} aryl, C_{6-30} arylaliphatic, C_{6-30} arylheteroaliphatic having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, 5-30 membered heteroaryl having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, and 3-30 membered heterocyclyl having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, or

two R groups are optionally and independently taken together to form a covalent bond, or

two or more R groups on the same atom are optionally and independently taken together with the atom to form an optionally substituted, 3-30 membered, monocyclic, bicyclic or polycyclic ring having, in addition to the atom, 0-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon; or

two or more R groups on two or more atoms are optionally and independently taken together with their intervening atoms to form an optionally substituted, 3-30 membered, monocyclic, bicyclic or polycyclic ring having, in addition to the intervening atoms, 0-10 heteroatoms independently

selected from oxygen, nitrogen, sulfur, phosphorus and silicon.

3. The agent of claim 1 or 2, wherein

y0 is 0, y1 is 1 or 2; and −(Xaa^{T1})y1− is or comprises a dipeptide or an amino acid that is suitable for forming a turn;

−Xaa^{T2}− is or comprises an amino acid having the structure of formula A-I, wherein R^{a2} is hydrophobic, neutral or negatively charged and is a group −L^{a}−R', wherein L^{a} is an optionally substituted bivalent group selected from C_3-C_{10} aliphatic or C_3-C_{10} heteroaliphatic having 1-5 heteroatoms, wherein one or more methylene units of the group are optionally and independently replaced with −C(R')$_2$−, −O−, −S−, −N(R')−, −C(O)−, −C(S)−, −C(NR')−, −S(O)−, or −S(O)$_2$−;

y3 is 1-10;

Xaa^{T4} is connected to Xaa^{T9} through a linker, wherein the linker is L^{a} and is bonded to a backbone carbon atom of Xaa^{T4} and a backbone carbon atom of Xaa$^{T9;}$ wherein L^{a} is or comprises −CH_2−CH_2−, −O−, −S− or −S−S−;

−(Xaa^{T5})y5− is or comprises YNK and −(Xaa^{T5})y5− is connected to an antibody moiety or an antibody binding moiety optionally through a linker bound to the lysine (K) amino acid in −(Xaa^{T5})y5;

y5 is 0 and −(Xaa^{T6})y6− is or comprises a D-Ser;

y6 is 1 or 2;

y7 is 1 and comprises -COOH or y7 is 0;

−(Xaa^{T8})y8− is or comprises GTI or −G−Xaa^{T8}−IT−Xaa^{T8}−, wherein each Xaa^{T8} is independently an alpha amino acid;

y10 is 3 or 4;

−(Xaa^{T11})y11− is or comprises L-Ala, D-Ala, Aib, Gly, or negatively charged; or

a combination thereof.

4. The agent of any one of claims 1 to 3, wherein

y1 is 0;

−(Xaa^{T1})y1− is or comprises L-proline, D-proline, a proline derivative, L-serine, D-serine, glycine, L-pseudoproline, or D-psuedoproline;

−(Xaa^{T1})y1− is or comprises an amino acid having the structure of formula A-I, wherein R^{a1} and R^{a2} are taken together with their intervening atoms to form an optionally substituted, saturated or partially unsaturated, 3-6 membered, monocyclic or bicyclic ring having, in addition to the intervening atoms, 0-1 heteroatoms selected from oxygen, nitrogen, and sulfur; or

−(Xaa^{T1})y1− is or comprises a L-proline.

5. The agent of claim 3, wherein L^a $-Xaa^{T2}-$ is $-CH_2-CH_2-CH_2-$ or $-CH_2-O-CH_2-$, or $-CH_2-S-CH_2-$, R' is optionally substituted phenyl, or a combination thereof.

6. The agent of any one of the preceding claims, wherein

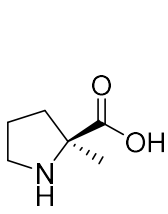
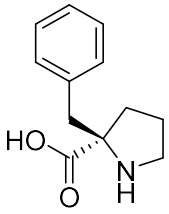
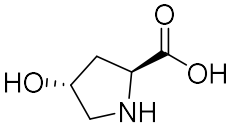
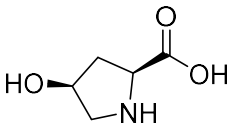
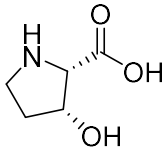
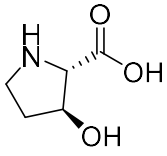
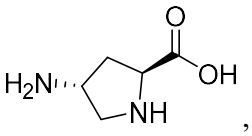
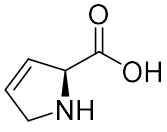
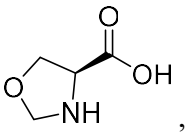
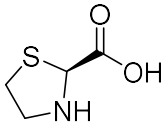
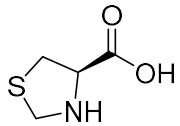
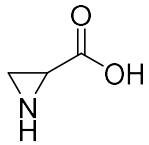
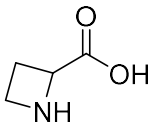
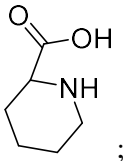
$-(Xaa^{T6})y6-$ is or comprises a dipeptide or an amino acid that is suitable for forming a turn;

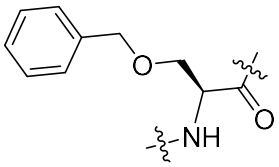
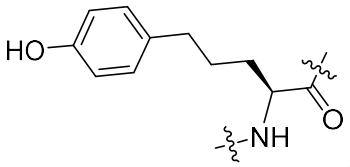
$-(Xaa^{T6})y6-$ is or comprises L-proline, D-proline, a proline derivative, L-serine, D-serine, glycine, L-pseudoproline, or D-psuedoproline;

$-(Xaa^{T6})y6-$ is or comprises an amino acid that comprises or is further substituted with $-L^a-COOH$; or

a combination thereof.

7. The agent of the preceding claims, wherein

$-(Xaa^{T1})y1-$ is or comprises  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  , or  ;

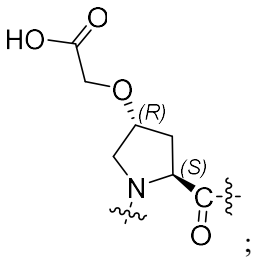
$-Xaa^{T2}-$ is  or  ;

$-(Xaa^{T2})y2-$ is or comprises AVAD;

$-(Xaa^{T3})y3-$ is or comprises TF, TFLL, or TFLLKY;

Xaa^{T4} is Cys;

$-(Xaa^{T6})y6-$ is or comprises a D-Ser,



−(Xaa^{T6})y6− is or comprises has the structure ;

Xaa^{T7} is D or E;

−(Xaa^{T8})y8− is or comprises GTI−Xaa^{T8}−;

Xaa^{T4} and Xaa^{T9} are independently Cys and form a disulfide bond −S−S−;

−(Xaa^{T10})y10− is or comprises AV; or

a combination thereof.

8. The agent of claim 1 or 2, wherein

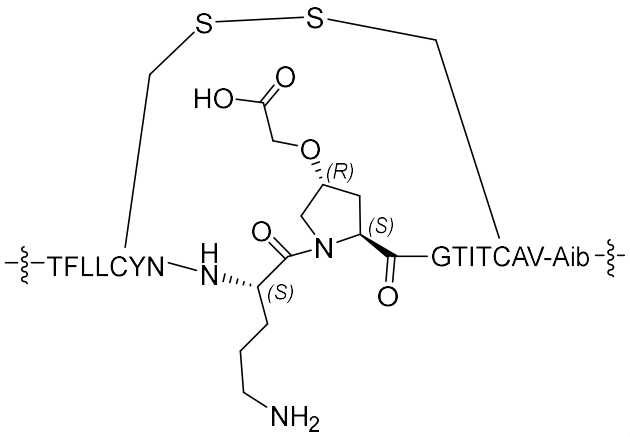
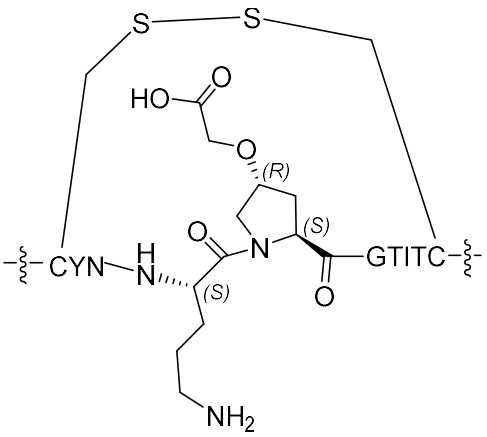
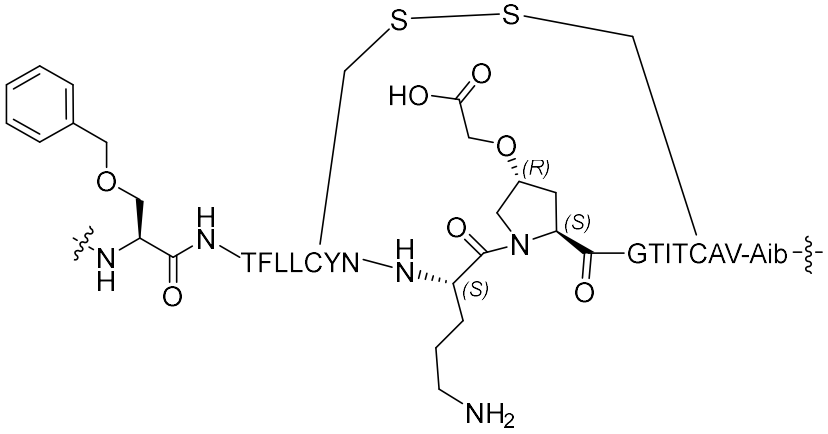
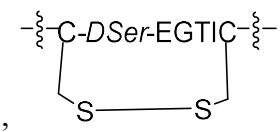
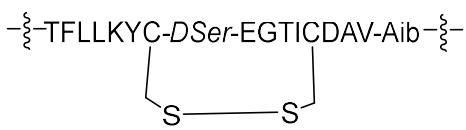
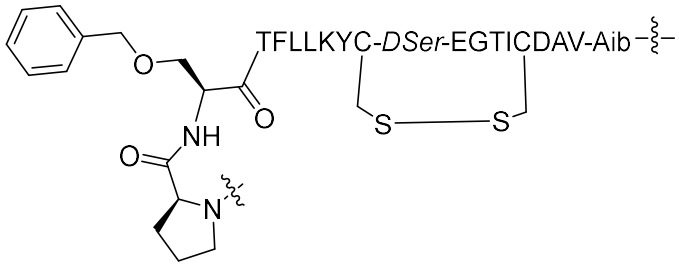
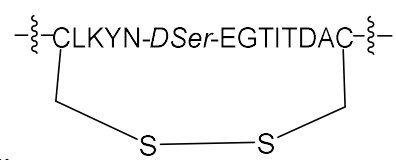
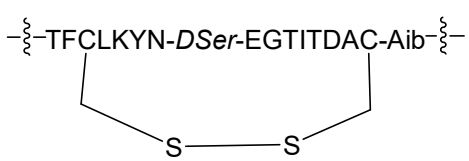
−(Xaa)y− is or comprises IEEQAKTFLDKFNHEAEDLFYQS;

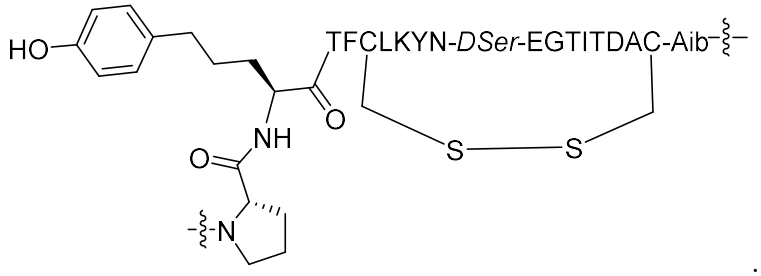
−(Xaa)y− is or comprises DISGINASVVNIQKEIDRLNEVAKNLNESLIDLQEL, or a fragment thereof;

−(Xaa)y− is or comprises a sequence selected from, or a sequence designed based on a sequence selected from:

Number	Sequence
P1	FKLPLGI*N*(K)ITNFRAILTAF*S*(L)
P2	PT*T*(K)FMLKYDENGTITDAVDC
P3	VLYNST*F*(S)FSTFKCYGVSATK
P4	PALNCYWPL*N*(K)DYGFYTTSGI
P5	RDVSD*F*(I)TDSVRDPKTSEILD
P6	YQDVNCTDV*S*(P)TAIHADQLTP
P7	SNNTIAIPTNF*S*(L)ISITTEVM
P8	QYGSFC*T*(A)QLNRALSGIA*A*(V)EQ
P9	GIGV*T*(A)QNVLYENQKQIANQF
P10	IQ*K*(E)EIDRLNEVAKNLNESLI

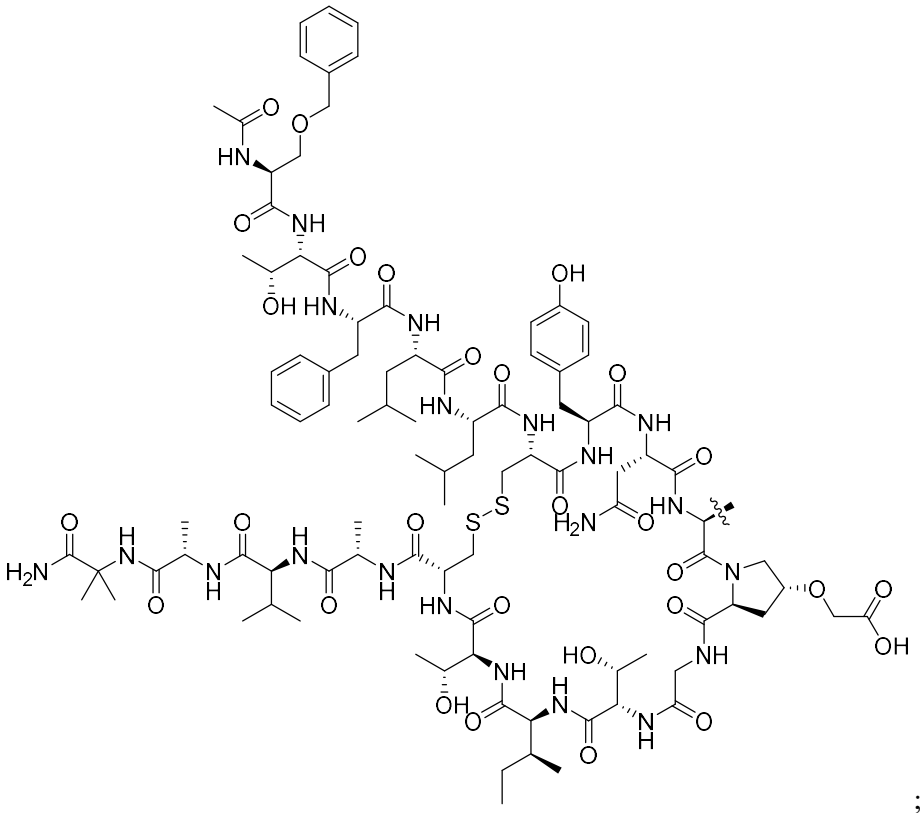
;−(Xaa)y− is or comprises


S
S
HO
O
O
(R)
(S)
O
N
H
N
TFLLCYN
GTITCAV-Aib
(S)
O
NH2
,

S
S
HO
O
O
(R)
(S)
O
N
H
N
CYN
GTITC
(S)
O
NH2
,

S
S
HO
O
O
(R)
(S)
O
N
H
N
H
N
TFLLCYN
GTITCAV-Aib
(S)
O
NH2
,

C-DSer-EGTIC
S
S
,

TFLLKYC-DSer-EGTICDAV-Aib
S
S
,

TFLLKYC-DSer-EGTICDAV-Aib
O
O
NH
O
N
S
S
,.

CLKYN-DSer-EGTITDAC
S
S
,

TFCLKYN-DSer-EGTITDAC-Aib
S
S
, or

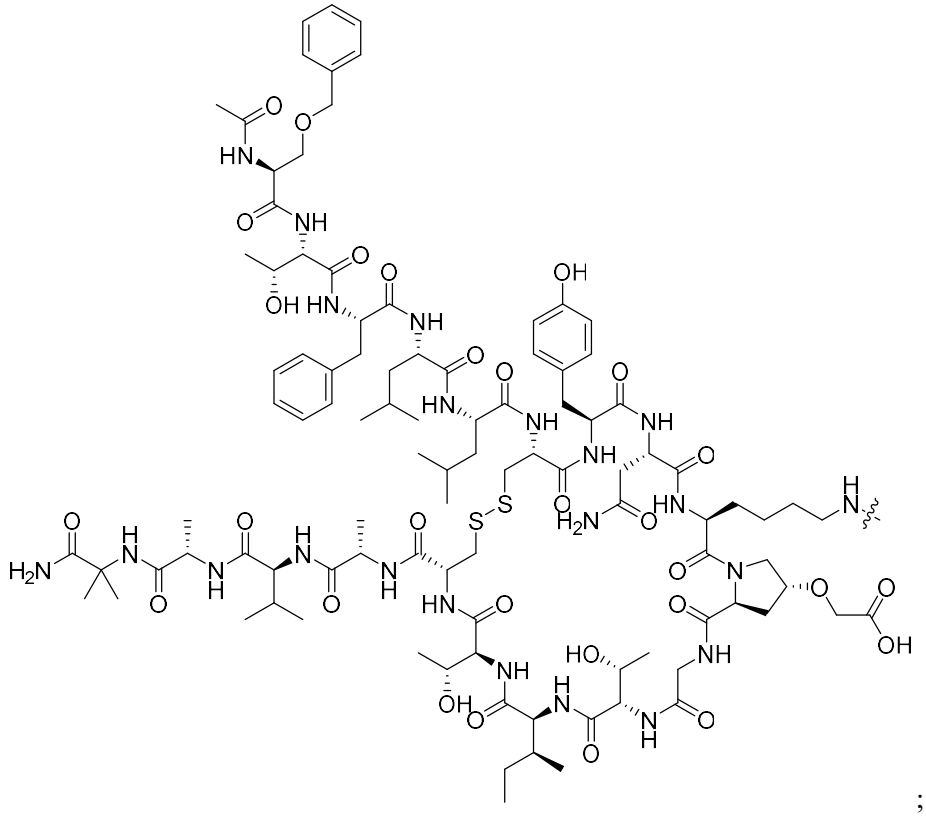


.

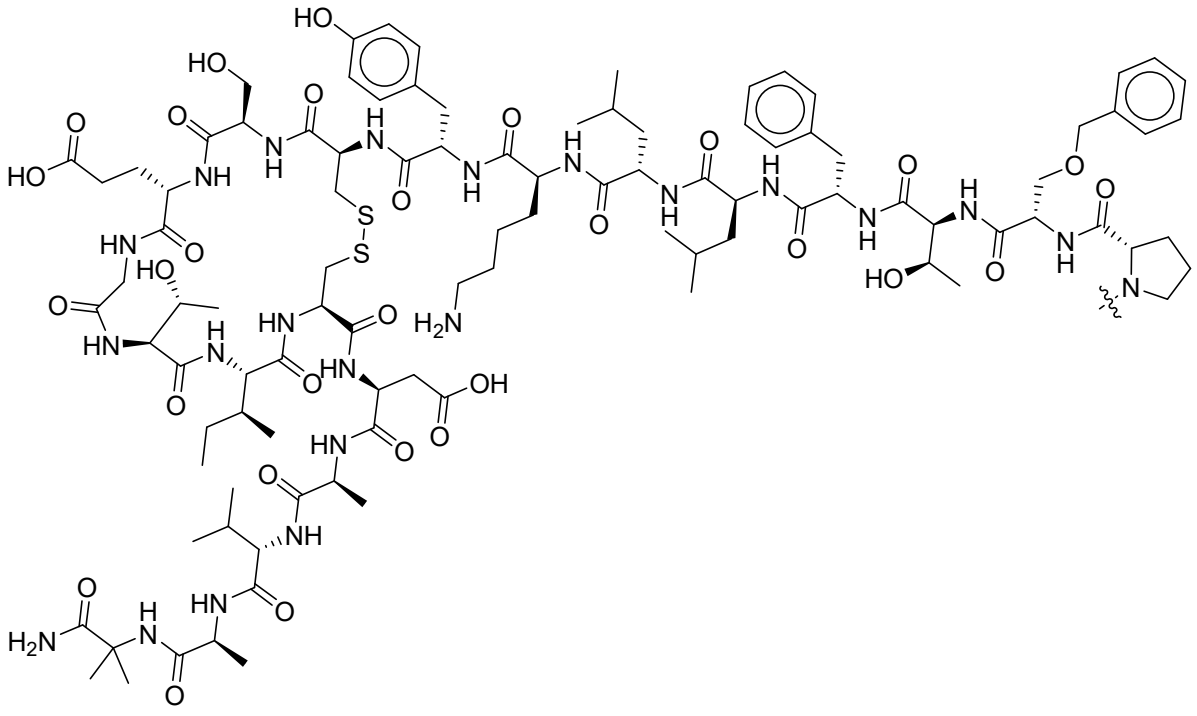
9. The agent of claim 1 or 2, wherein –(Xaa)y−R^{CC} is or comprises



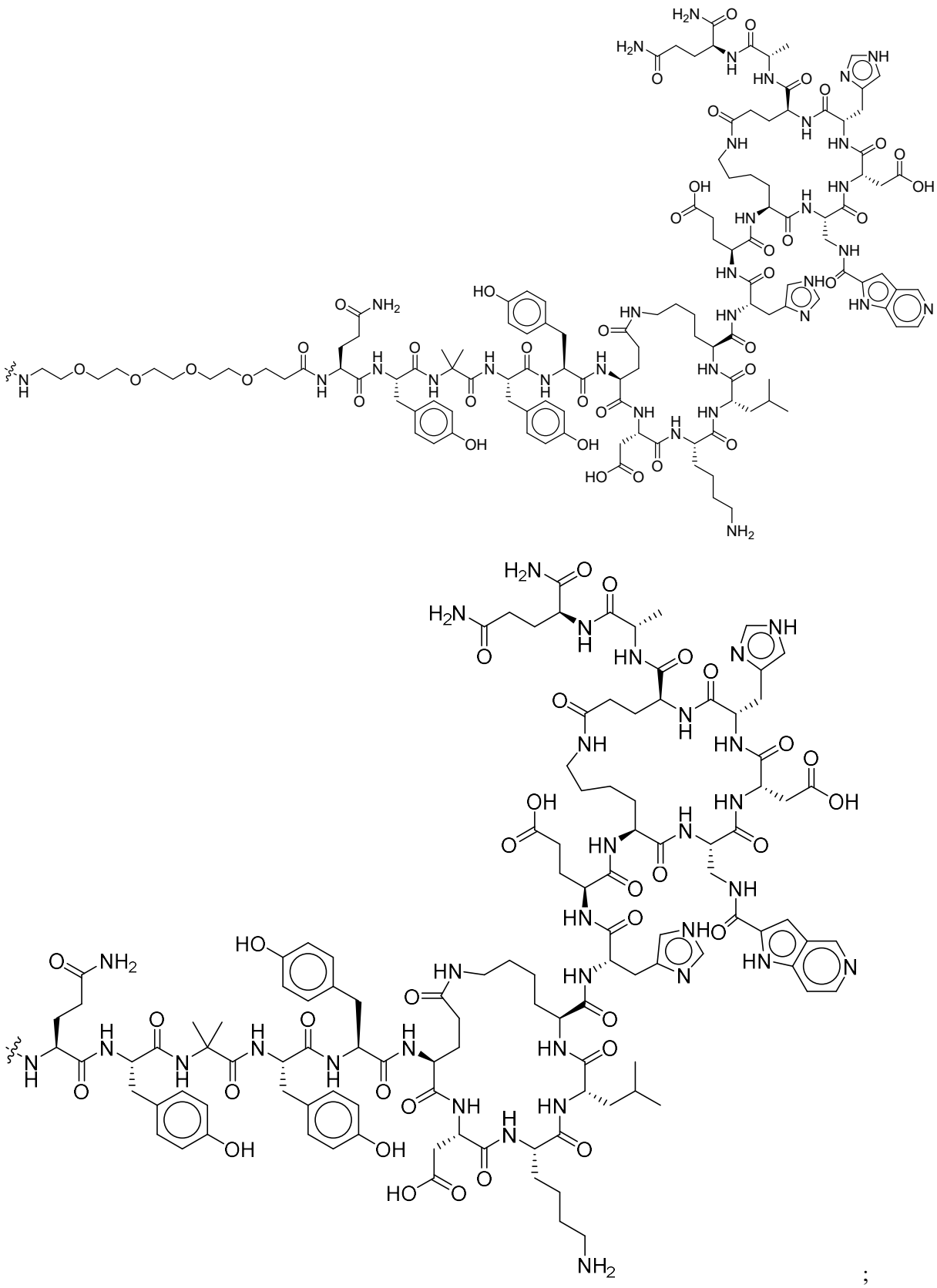
;



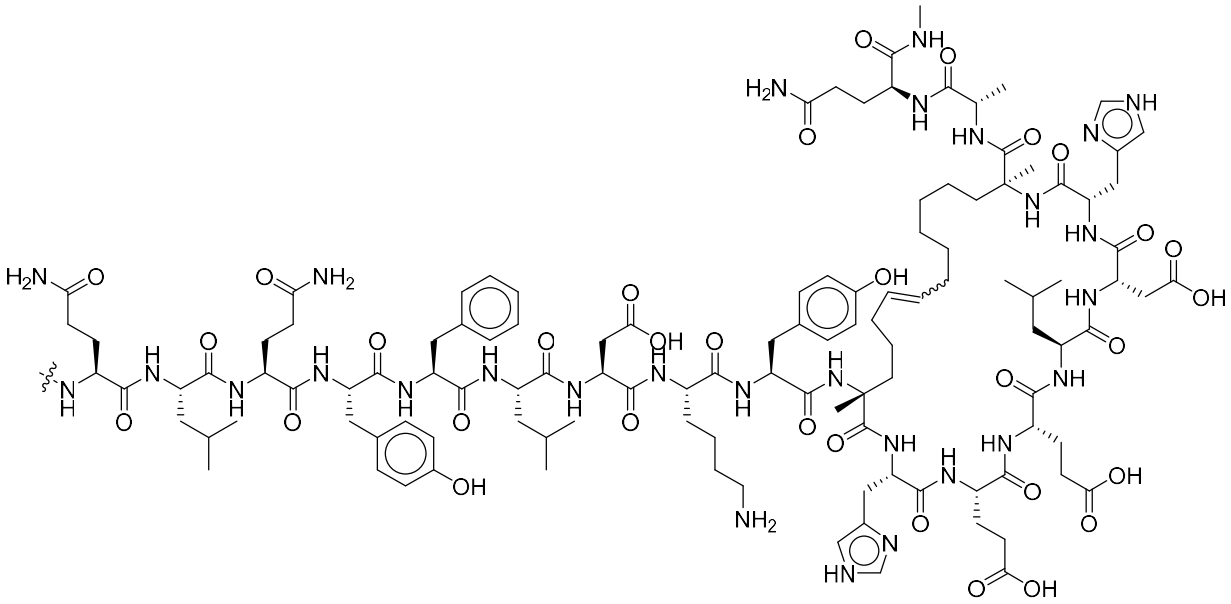
;

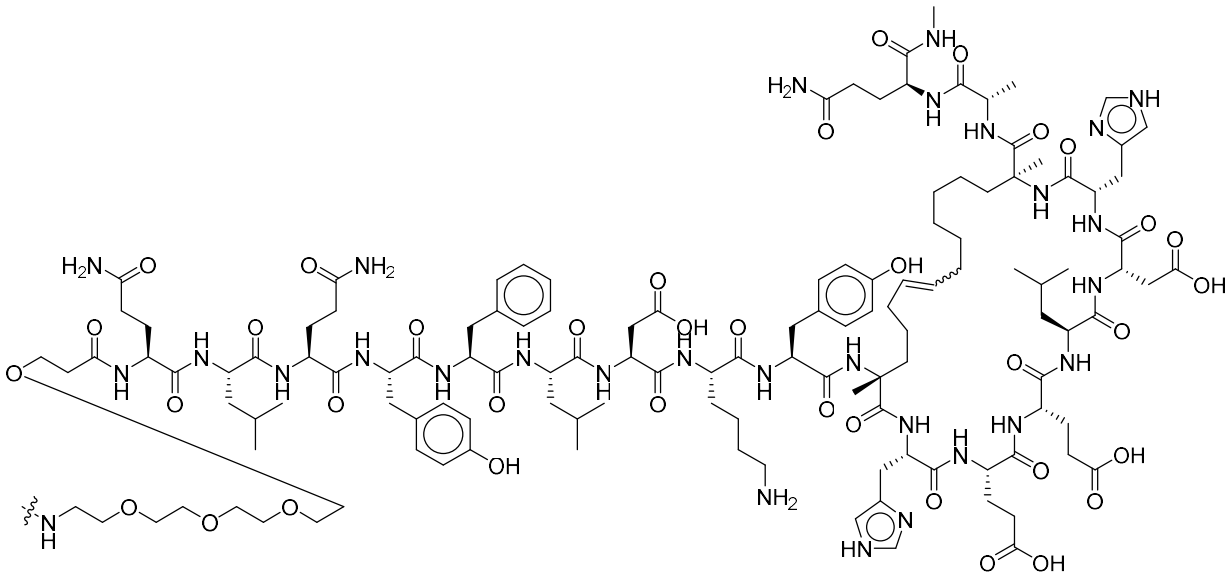


;

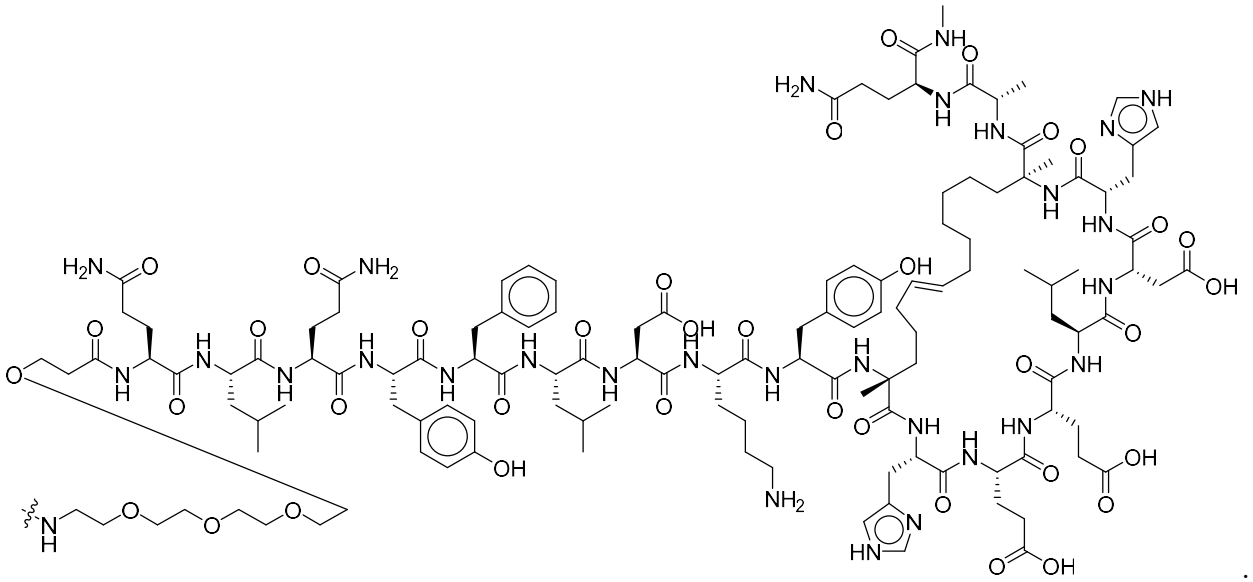


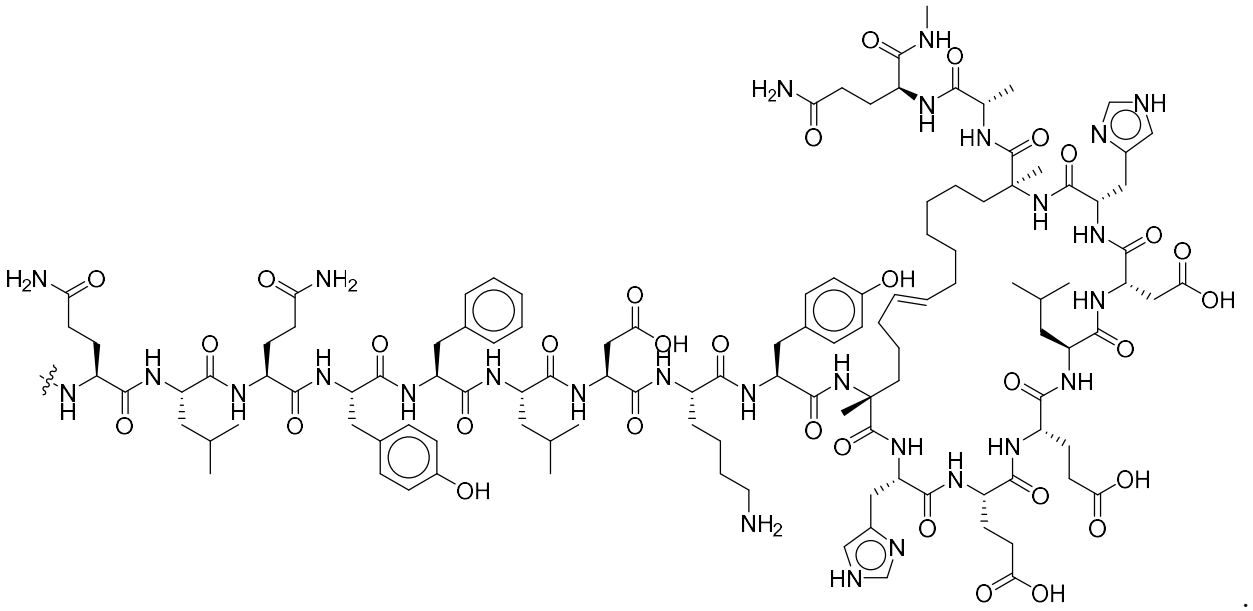
;





;





10. The agent of any one of the preceding claims, wherein the linker moiety comprises one or more −[$(CH_2)_2$−O]m− groups, wherein m is an integer from 7 to 12.

11. The agent of any one of the preceding claims, wherein the agent comprising a single A that is an antibody binding moiety.

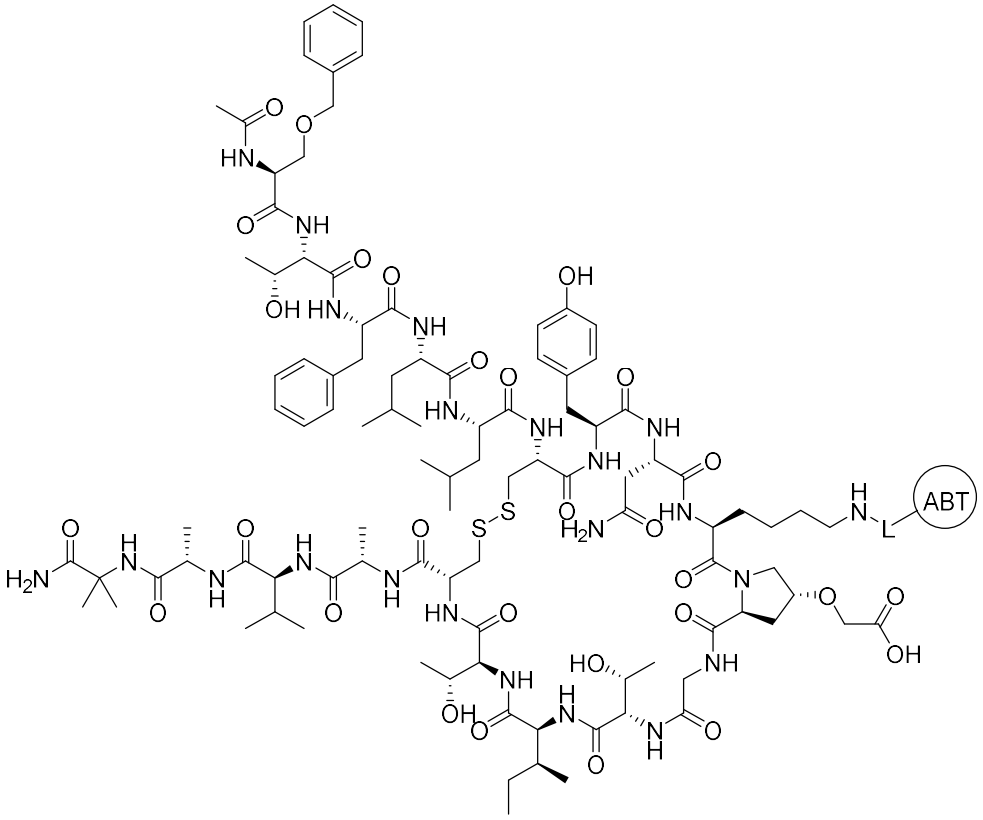
12. The agent of any one of the preceding claims, wherein

the antibody binding moiety comprises or has the structure selected from A-1 to A-50; or

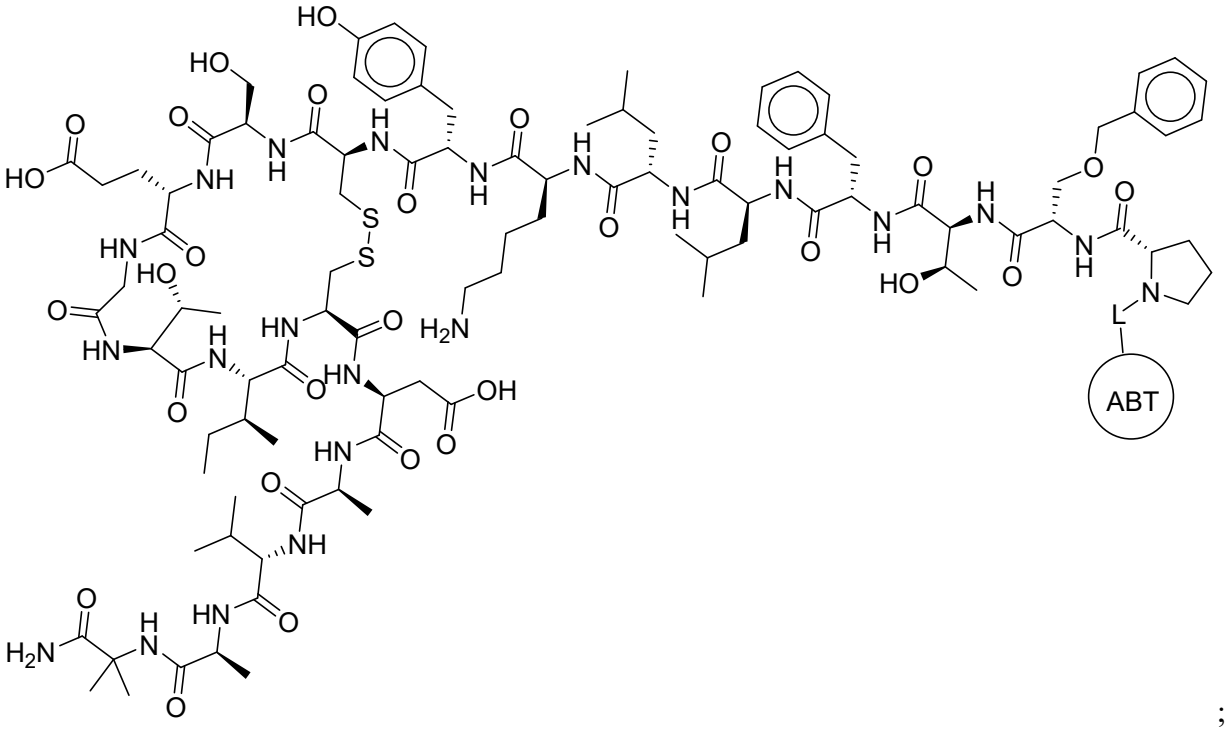
the antibody binding moiety comprises or has the amino acid sequence DCAWHLGELVWCT,

wherein the two cystein amino acids are linked by a −S−S−.

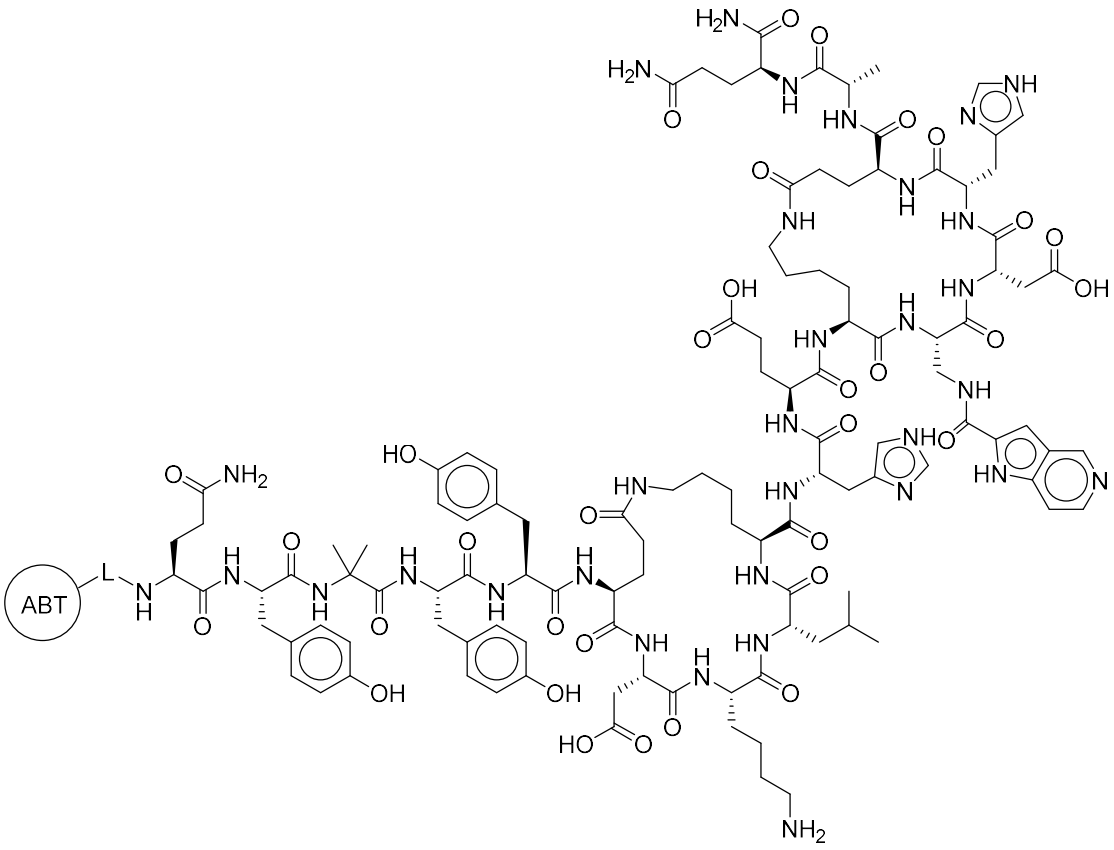
13. The agent of claim 1, 2, or 12, wherein the agent has the structure:



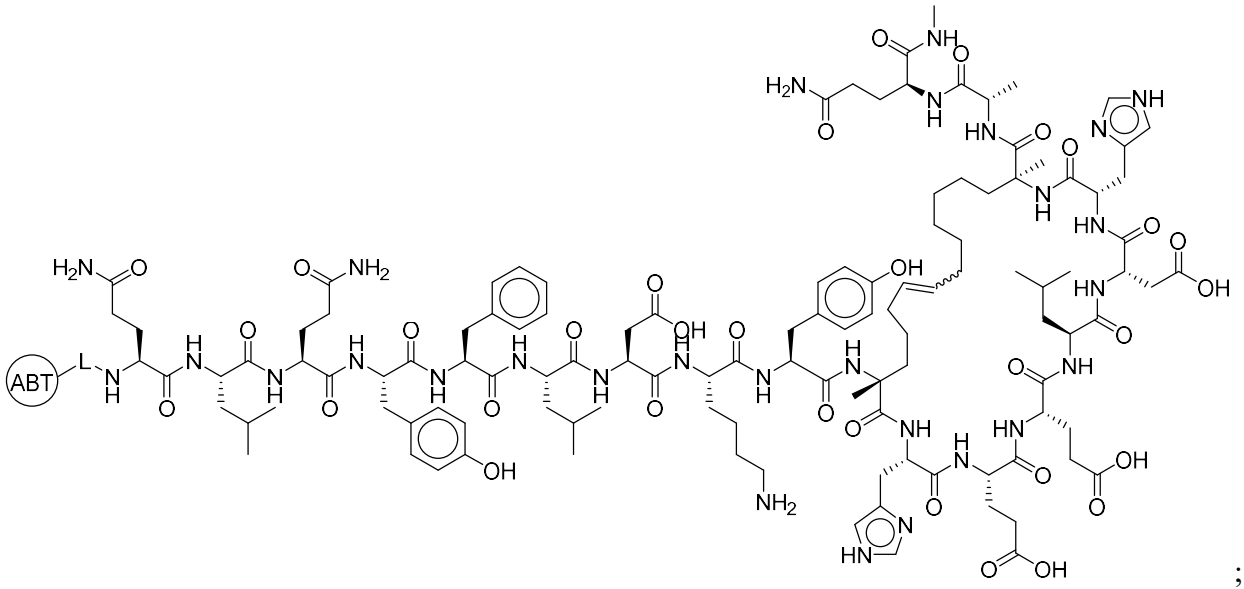
;


ABT

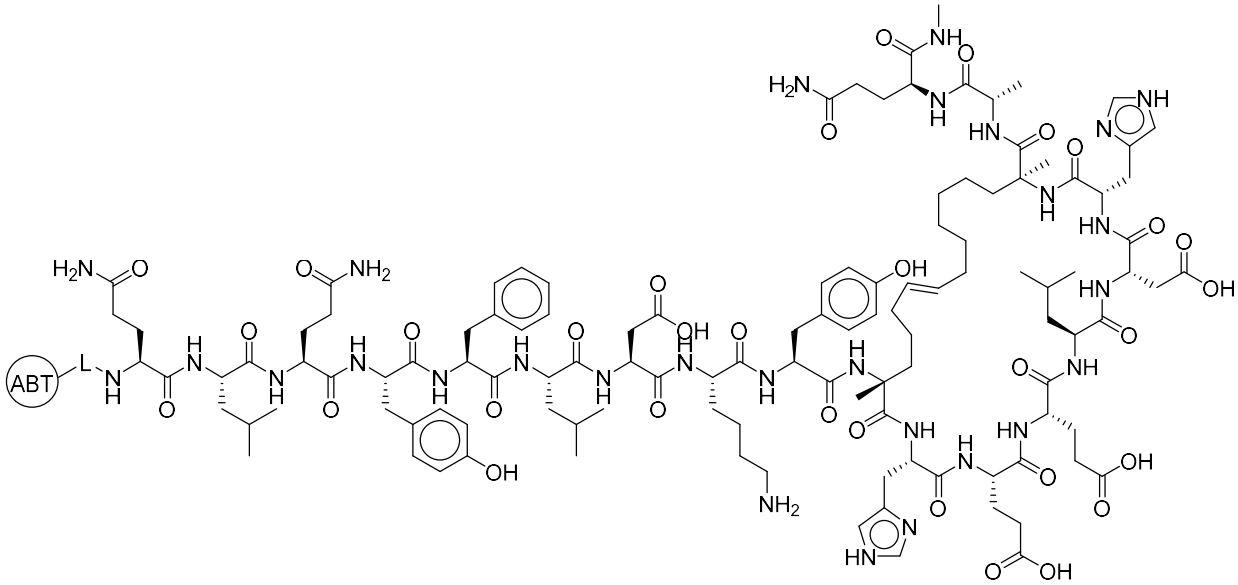
;

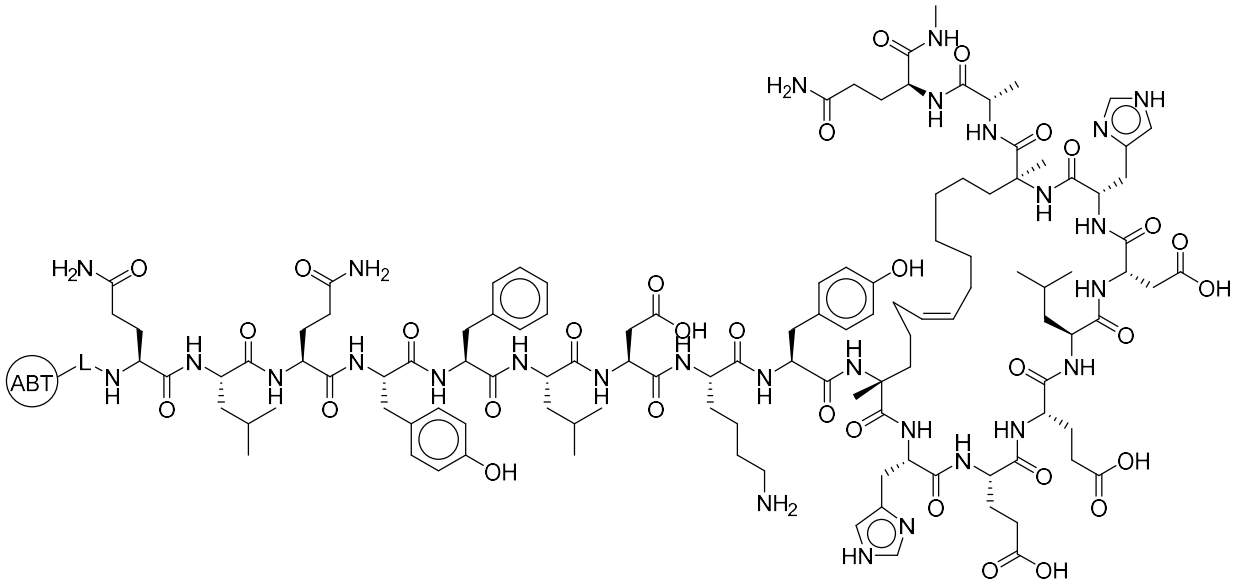

ABT

;

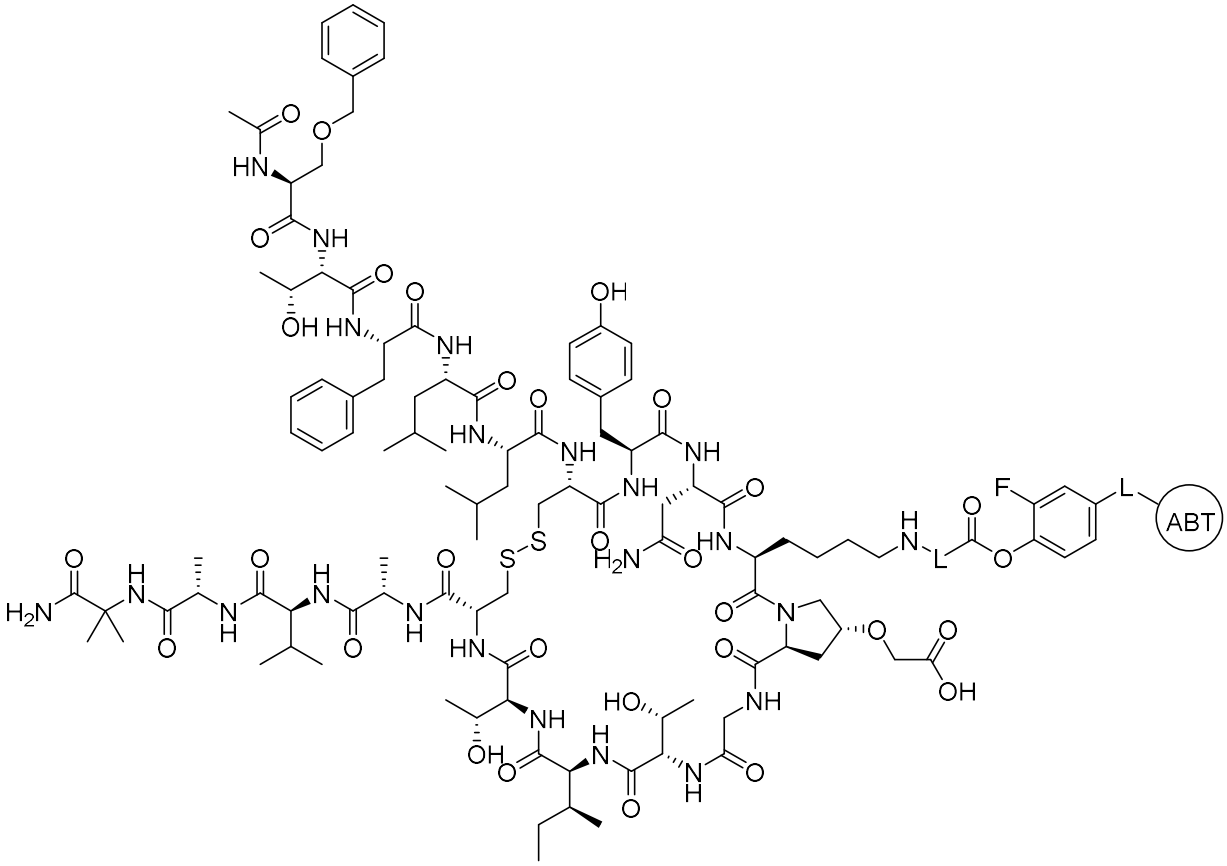


;

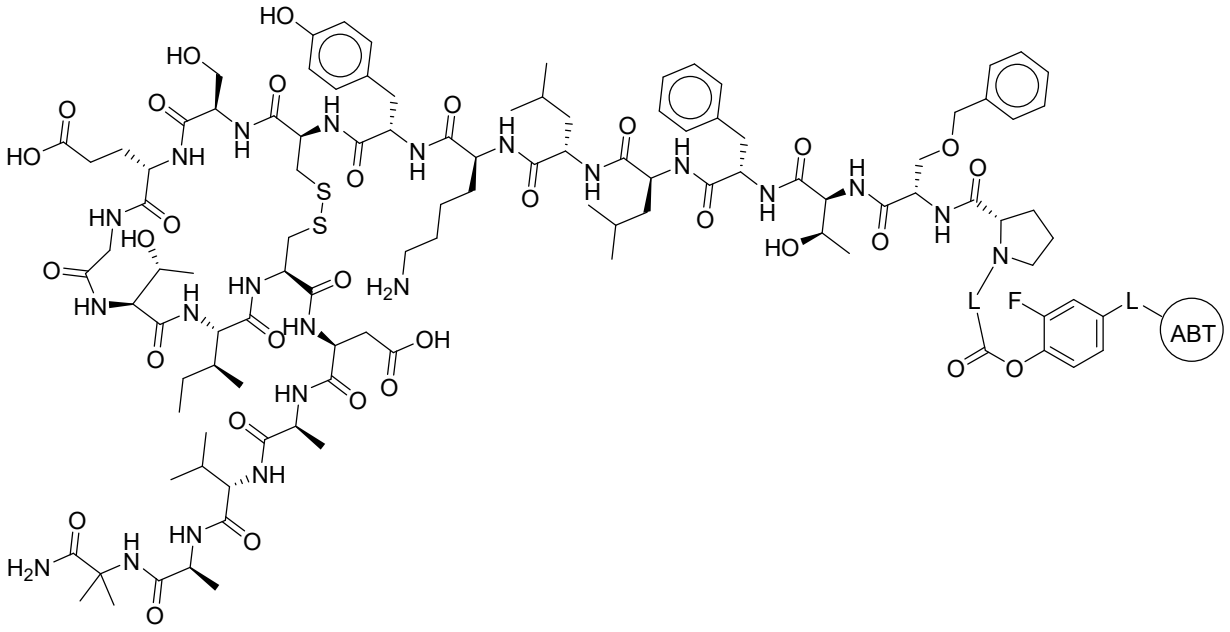




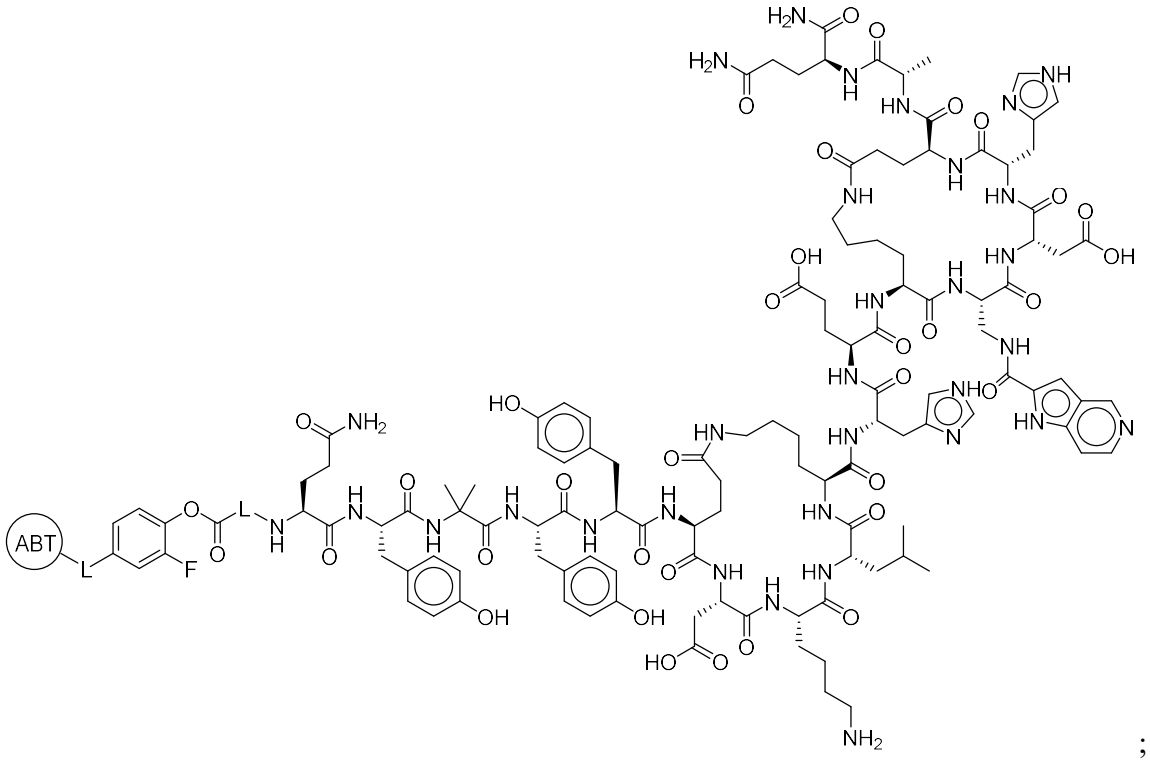
;



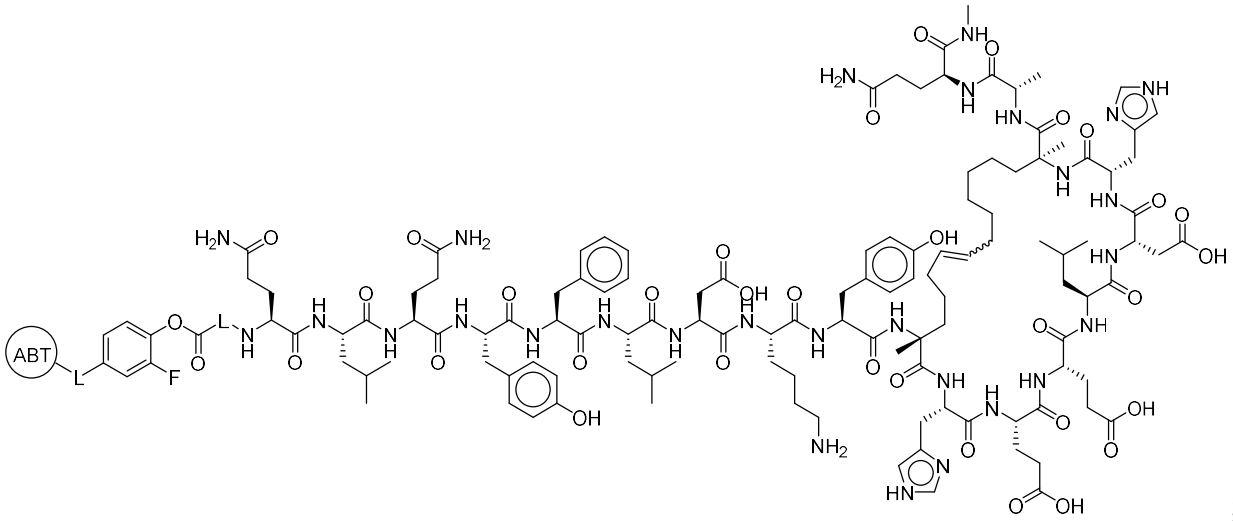
;.


HO
HO
O
HO
O
NH
O
N
H
O
N
H
O
S
S
HN
O
HO
O
HN
O
HN
O
H
N
O
HN
O
O
NH
HN
O
O
NH
H2N
O
HN
O
OH
O
HN
O
O
NH
HN
O
H2N
O
H
N
O
O
O
N
H
O
N
H
O
N
H
O
N
H
O
HO
O
N
H
O
N
H
O
O
N
L
F
L
ABT
O
O

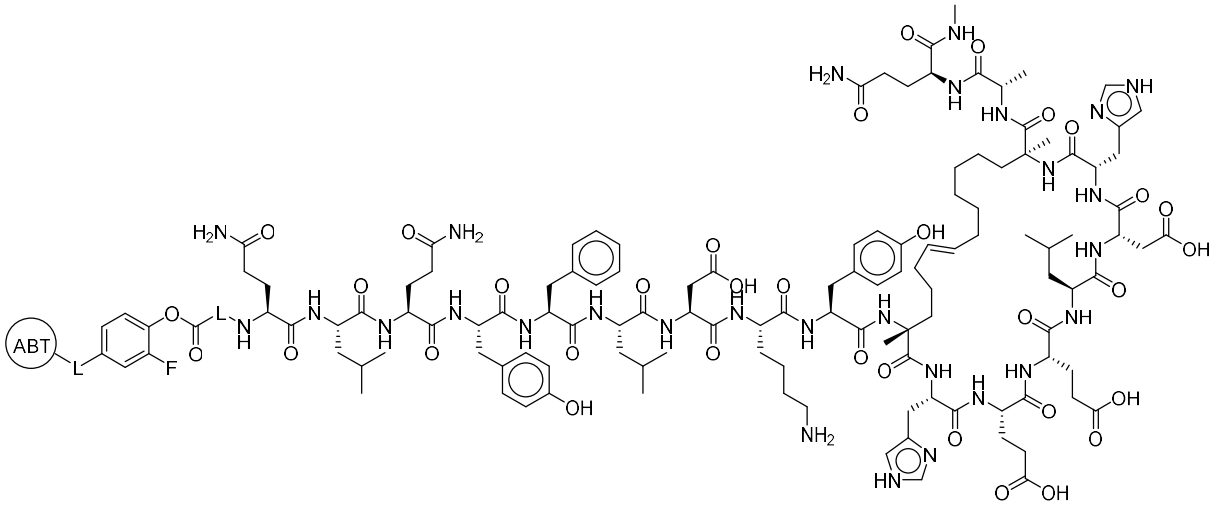
;


H2N
O
H2N
O
O
N
H
HN
O
O
NH
N
NH
O
N
H
O
NH
HN
O
O
OH
HN
O
OH
O
HN
O
N
H
O
HN
O
O
NH
HN
O
NH
O
HO
N
HN
HN
N
HN
O
O
HN
O
HN
O
O
NH
HN
O
HO
O
NH
N
H
O
O
NH2
O
N
H
O
N
H
O
N
H
O
N
H
O
HO
O
N
H
O
NH
HN
O
O
NH2
ABT
L
F
O
O
L
OH
OH
OH

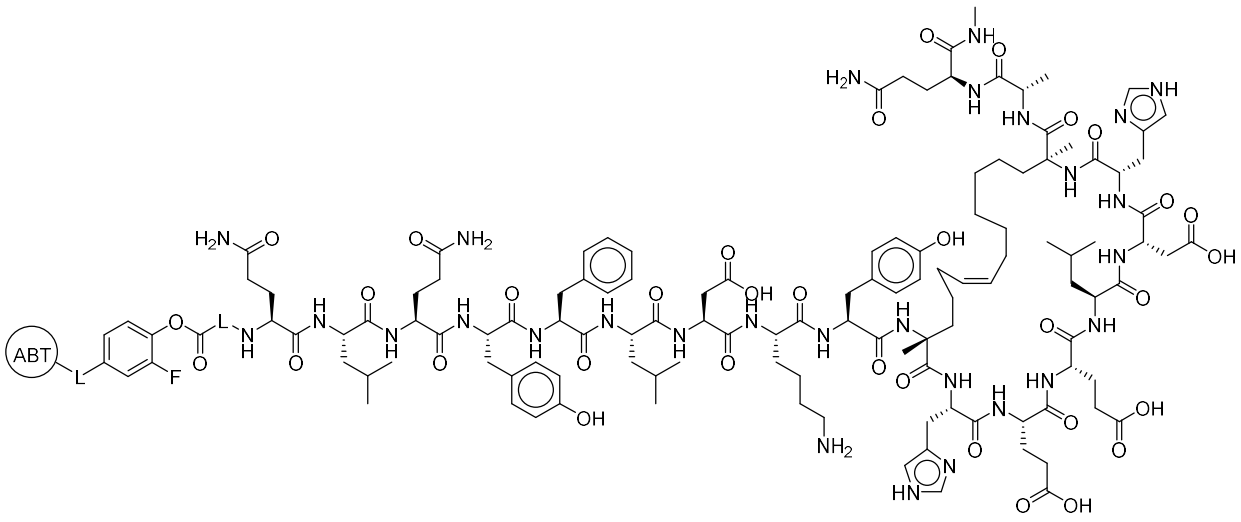
;



;

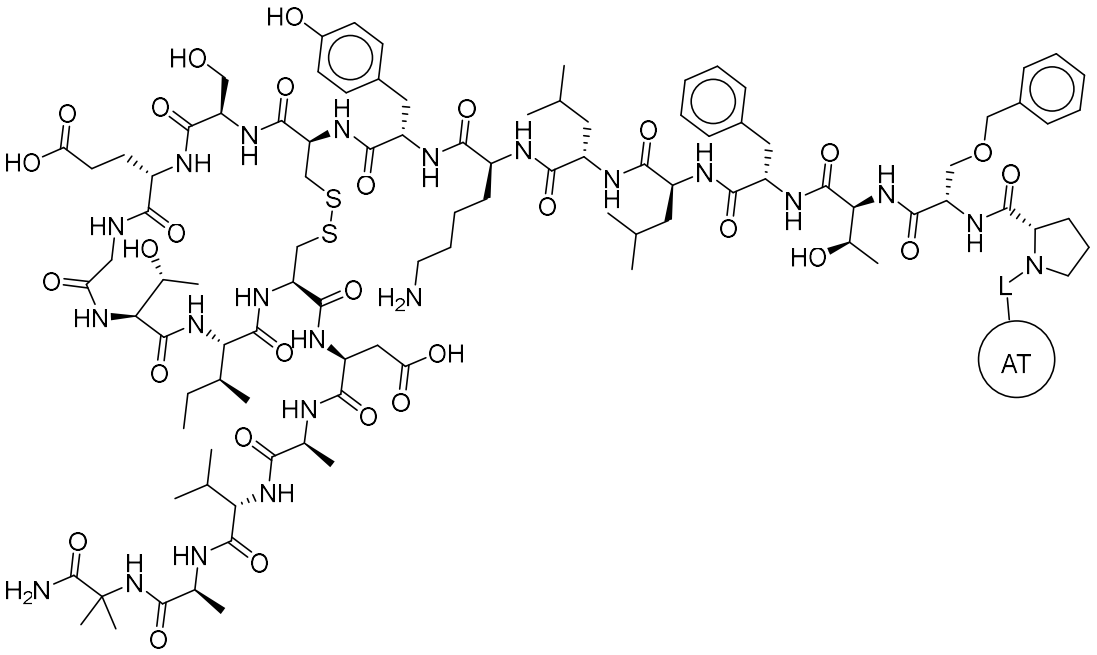


or

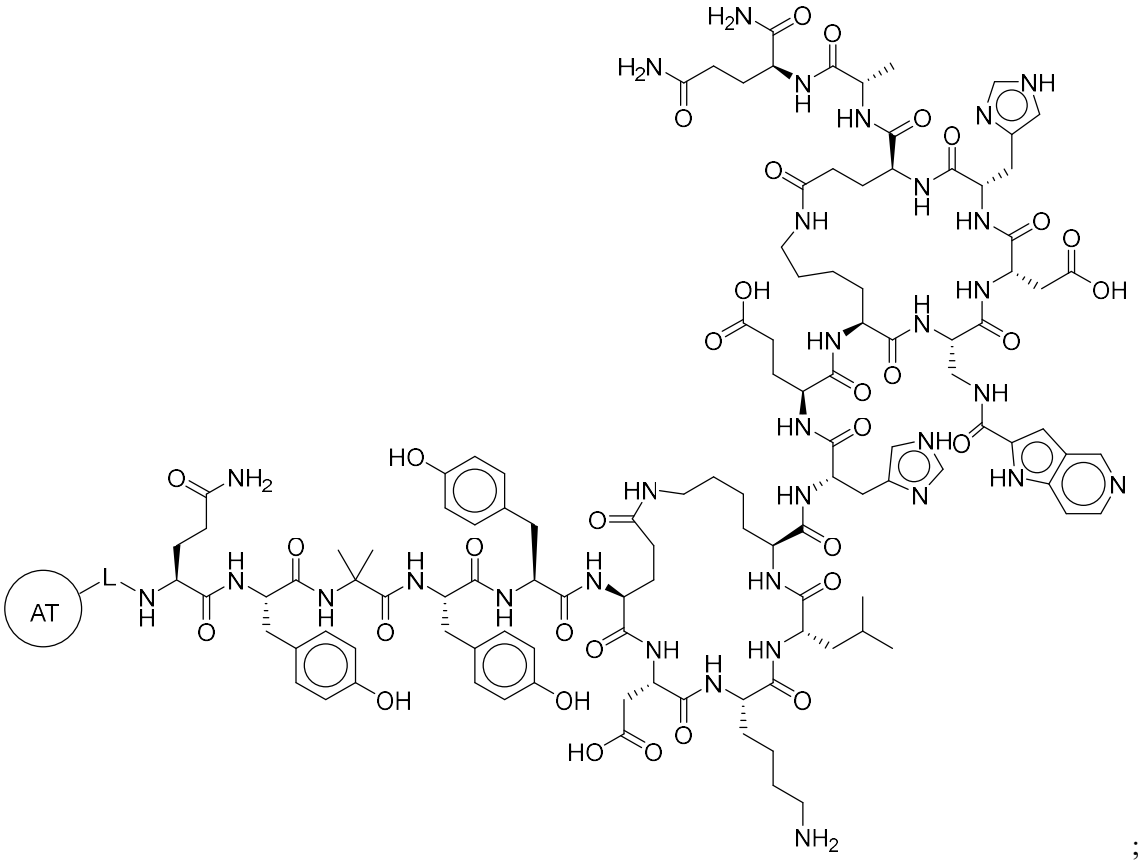


.

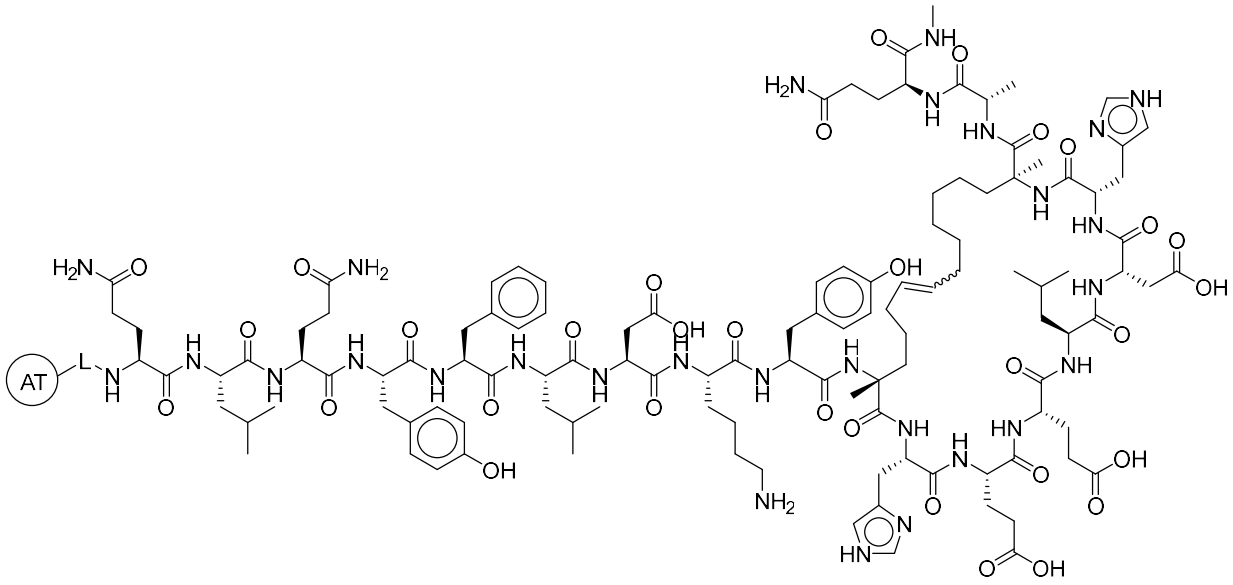
14. The agent of claim 1 or 2, wherein the agent has the structure:



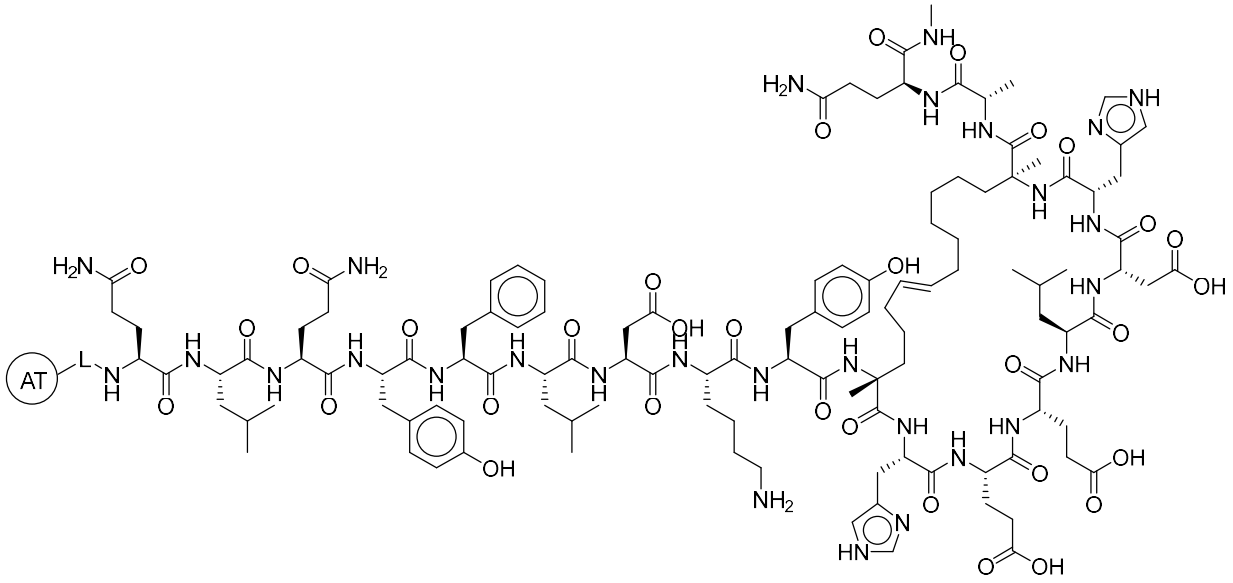
;



;

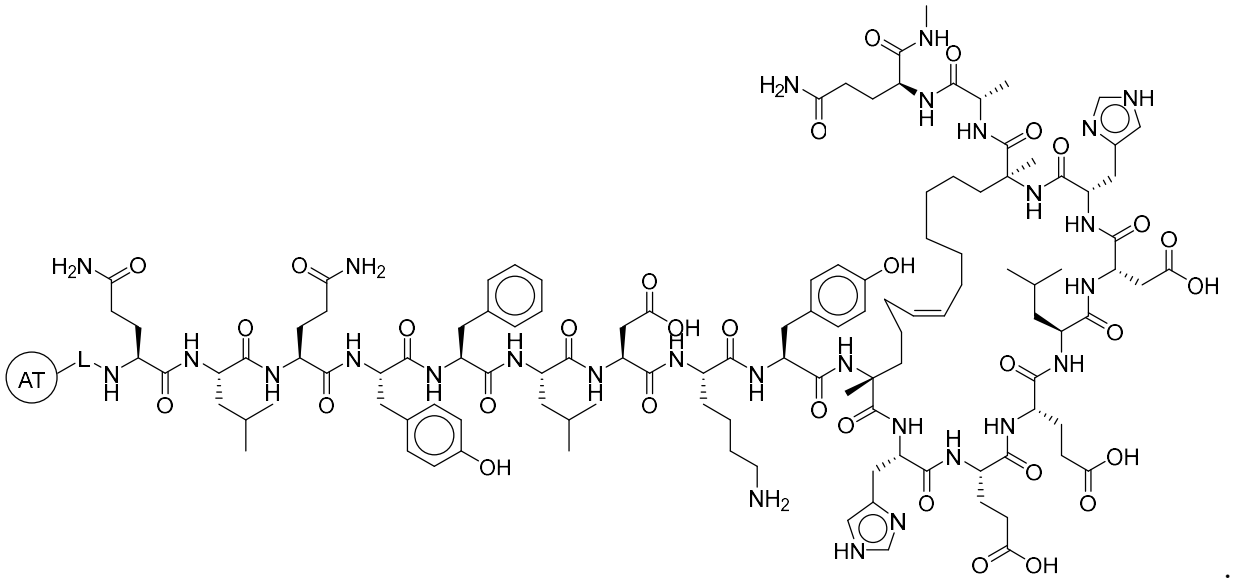


;

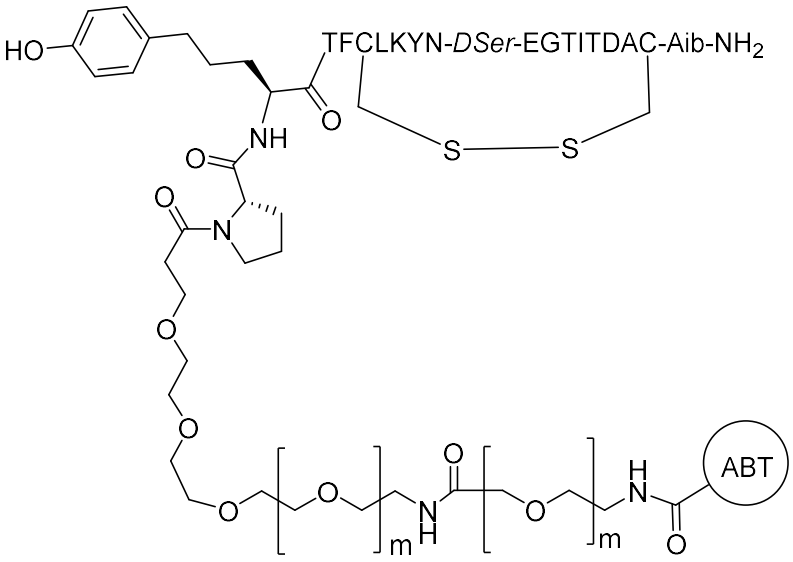


;

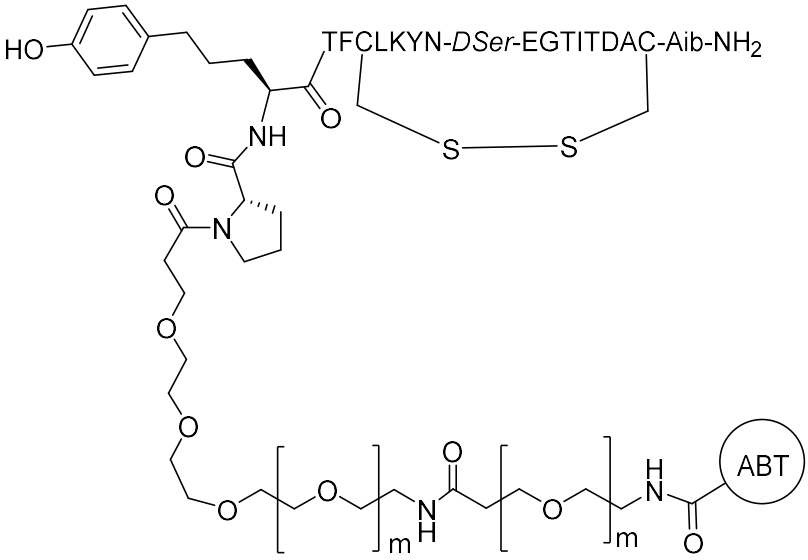
or



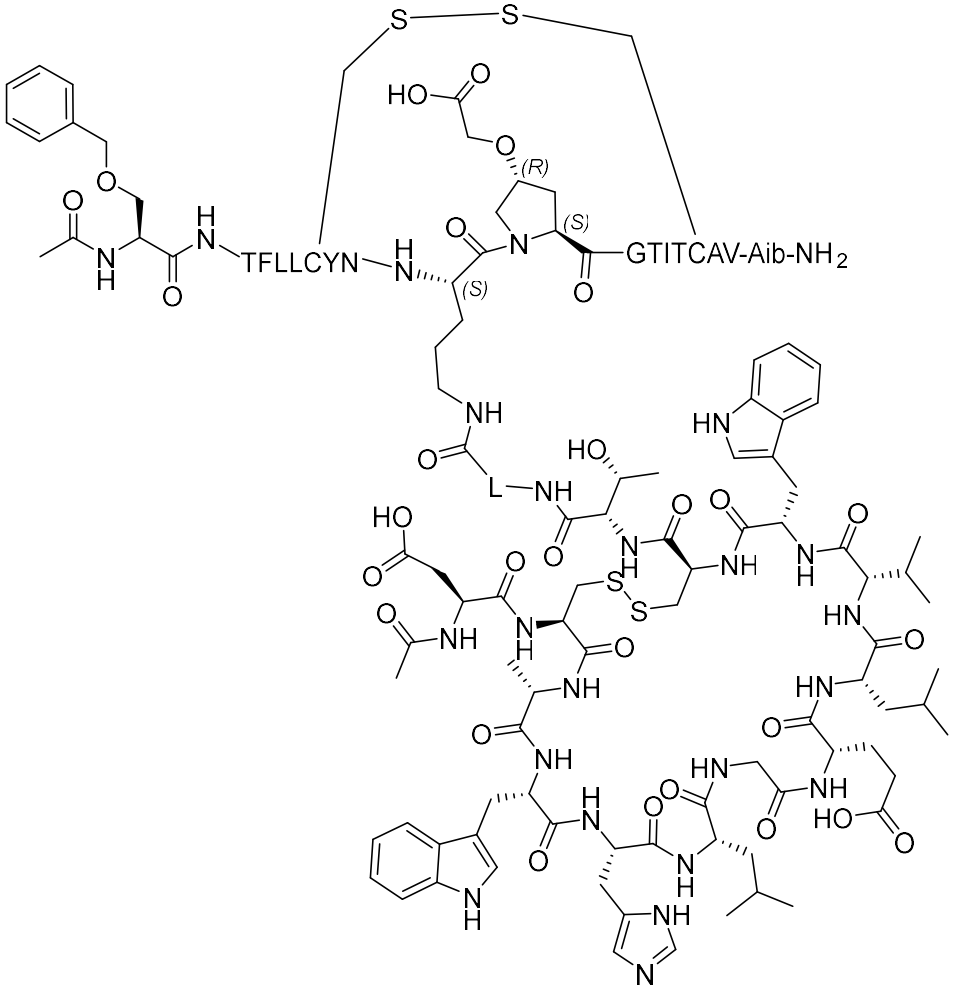
15. The agent of claim 1, 2, or 12, wherein the agent has the structure



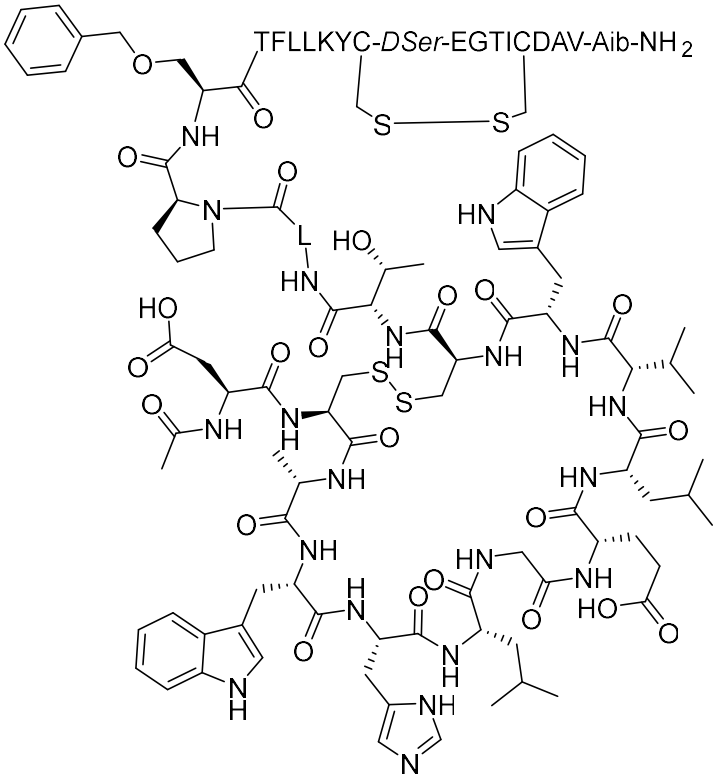
, or a salt thereof;



, or a salt thereof;

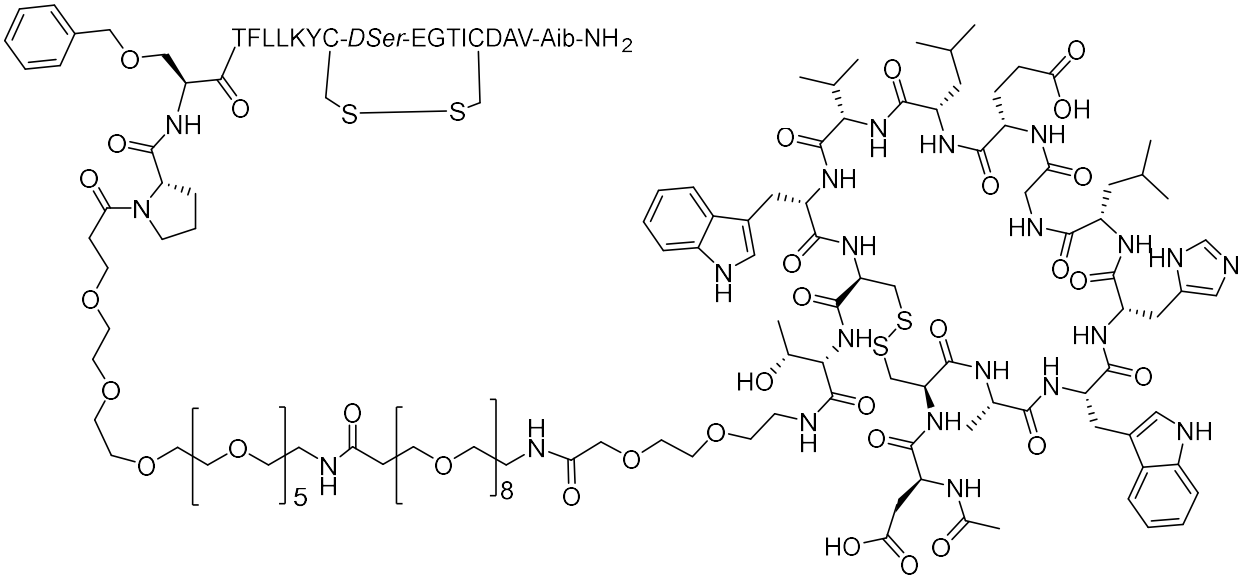


, or a salt thereof; or

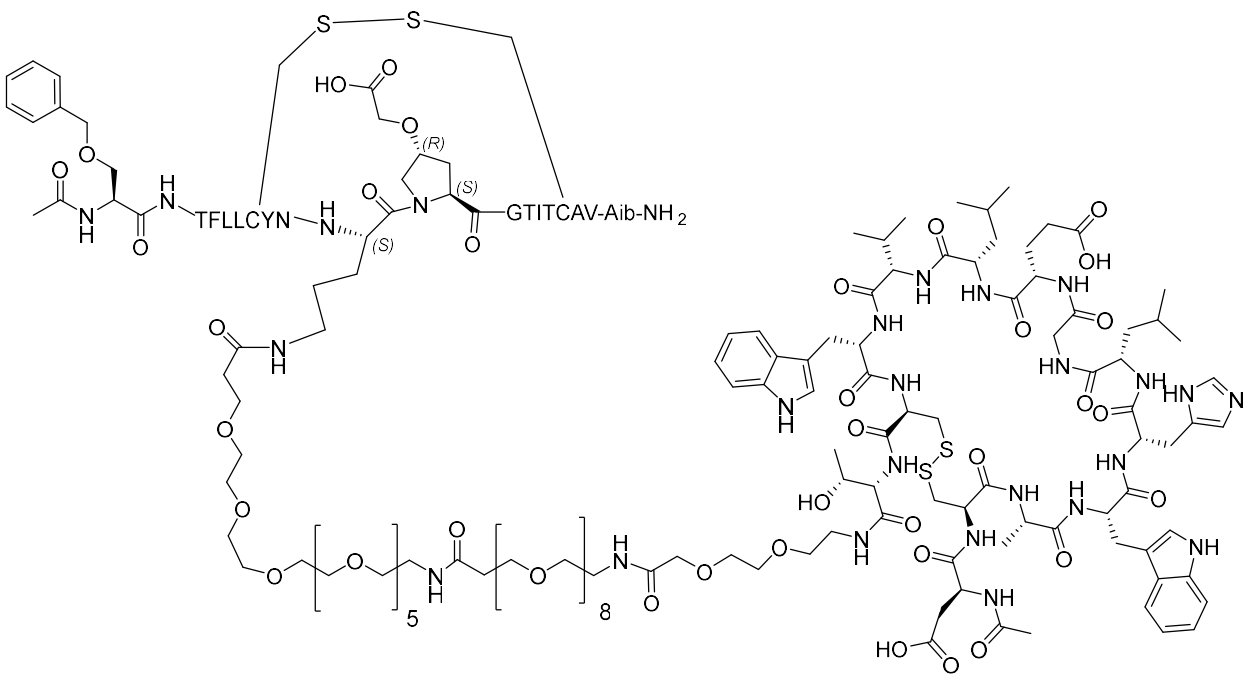


, or a salt thereof.

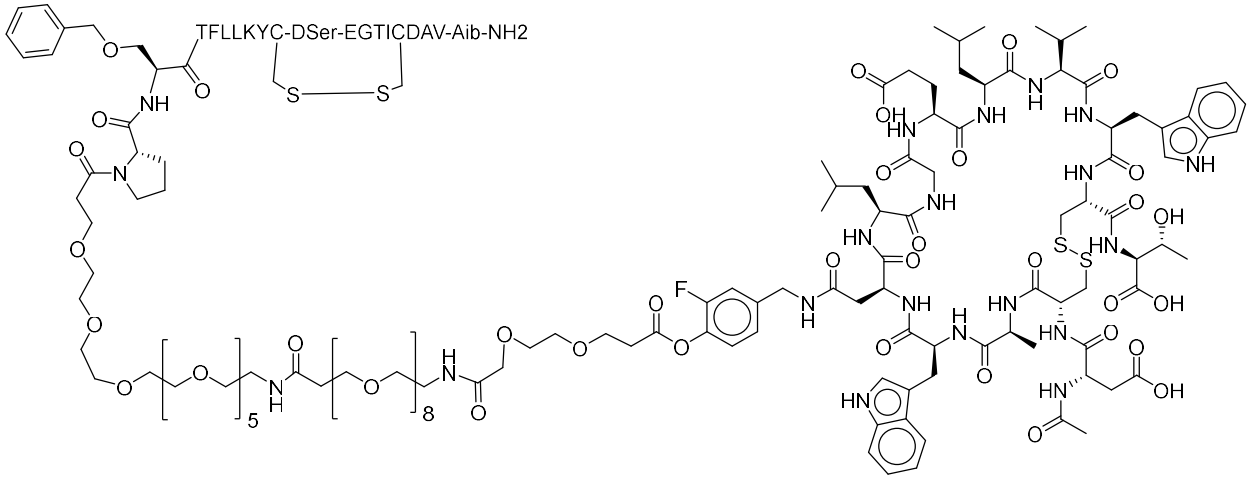
16. The agent of claim 1, wherein the agent has the structure of



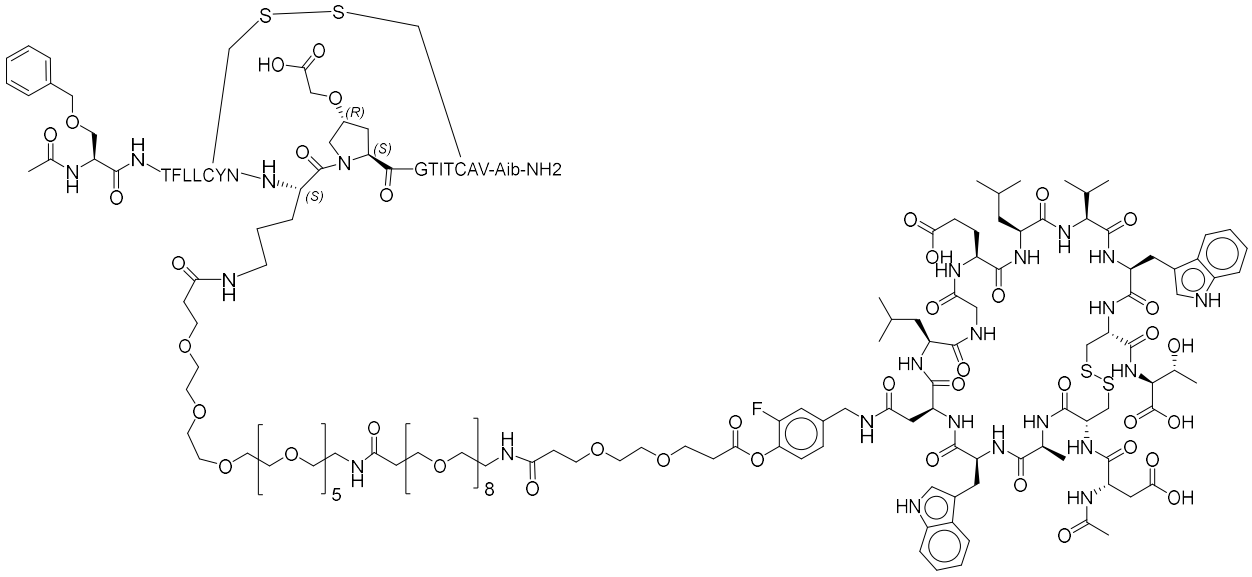
(I-1), or a salt thereof;



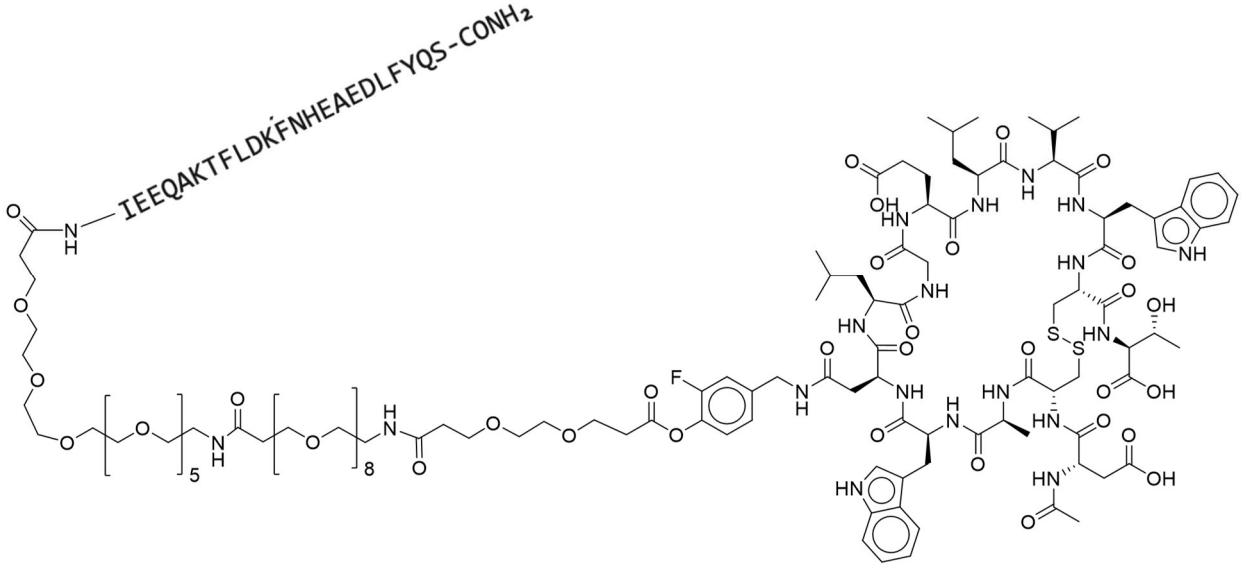
(I-2), or a salt thereof;



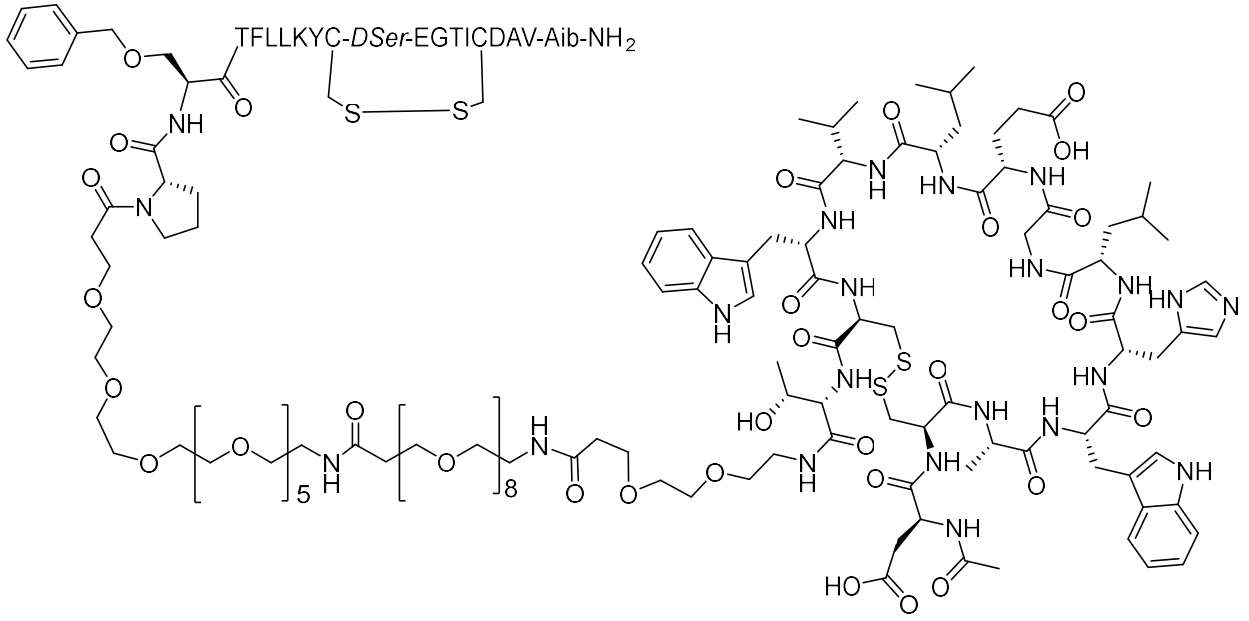
(I-3), or a salt thereof,



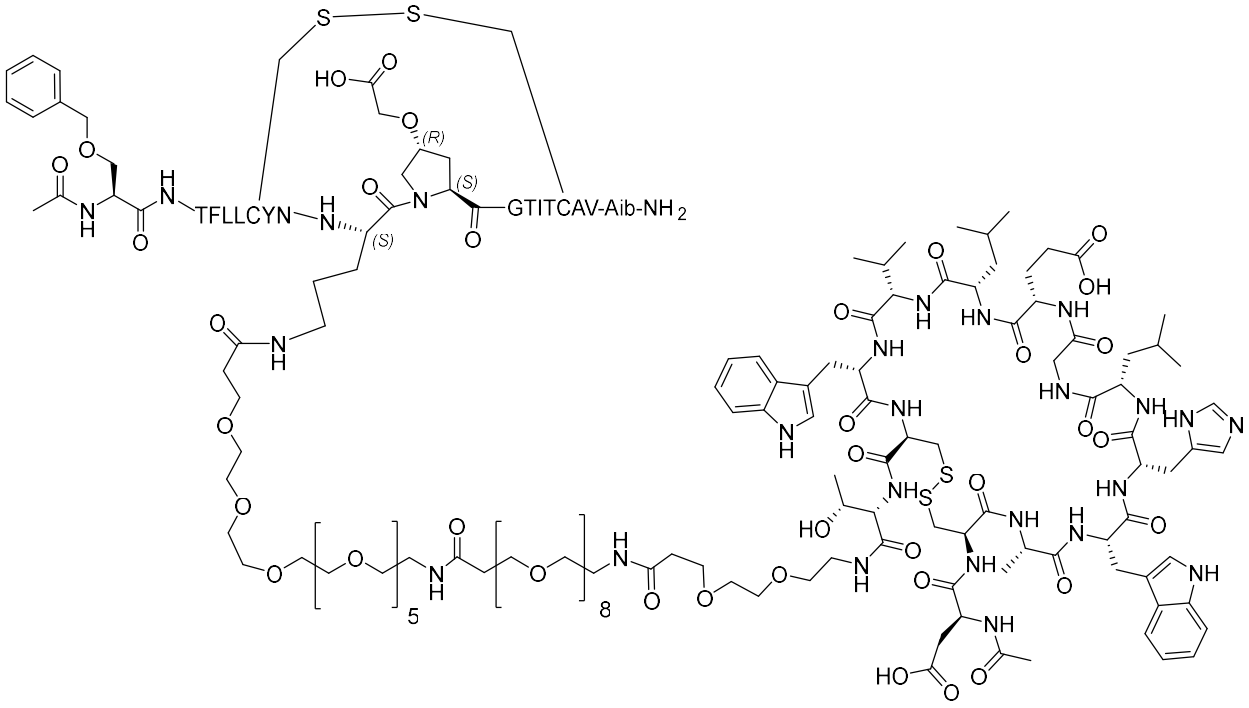
(I-4), or a salt thereof;



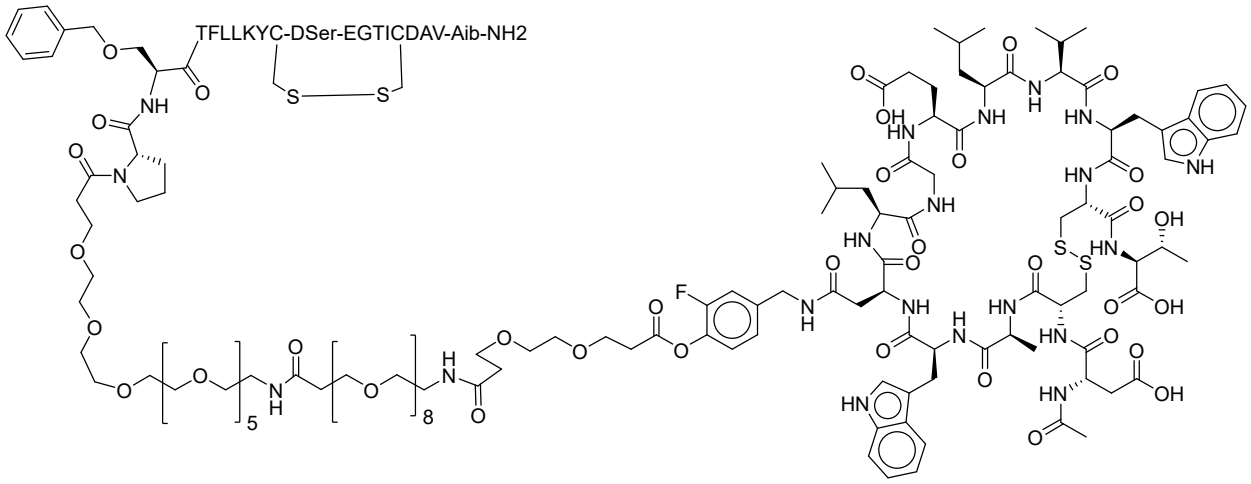
(I-5), or a salt thereof;



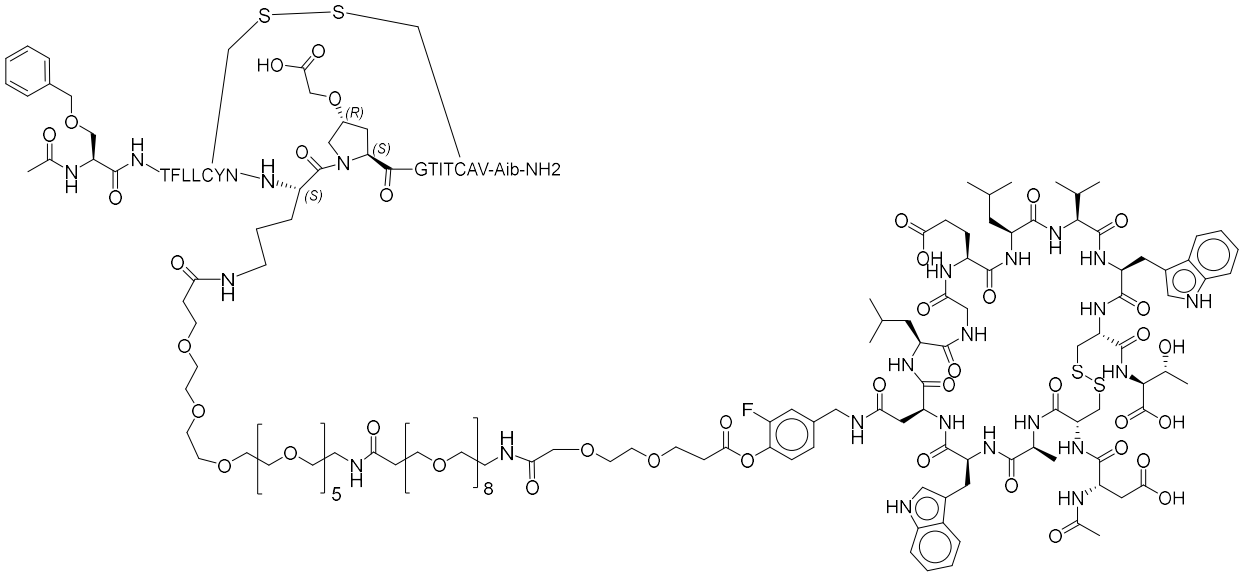
(I-9), or a salt thereof;



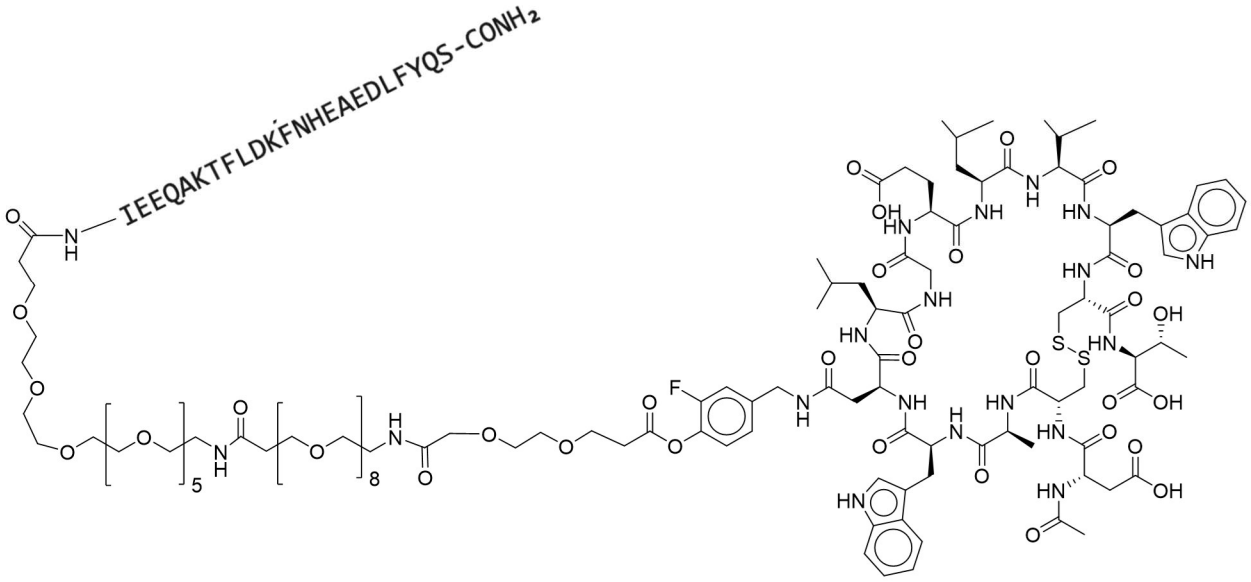
(I-10), or a salt thereof;



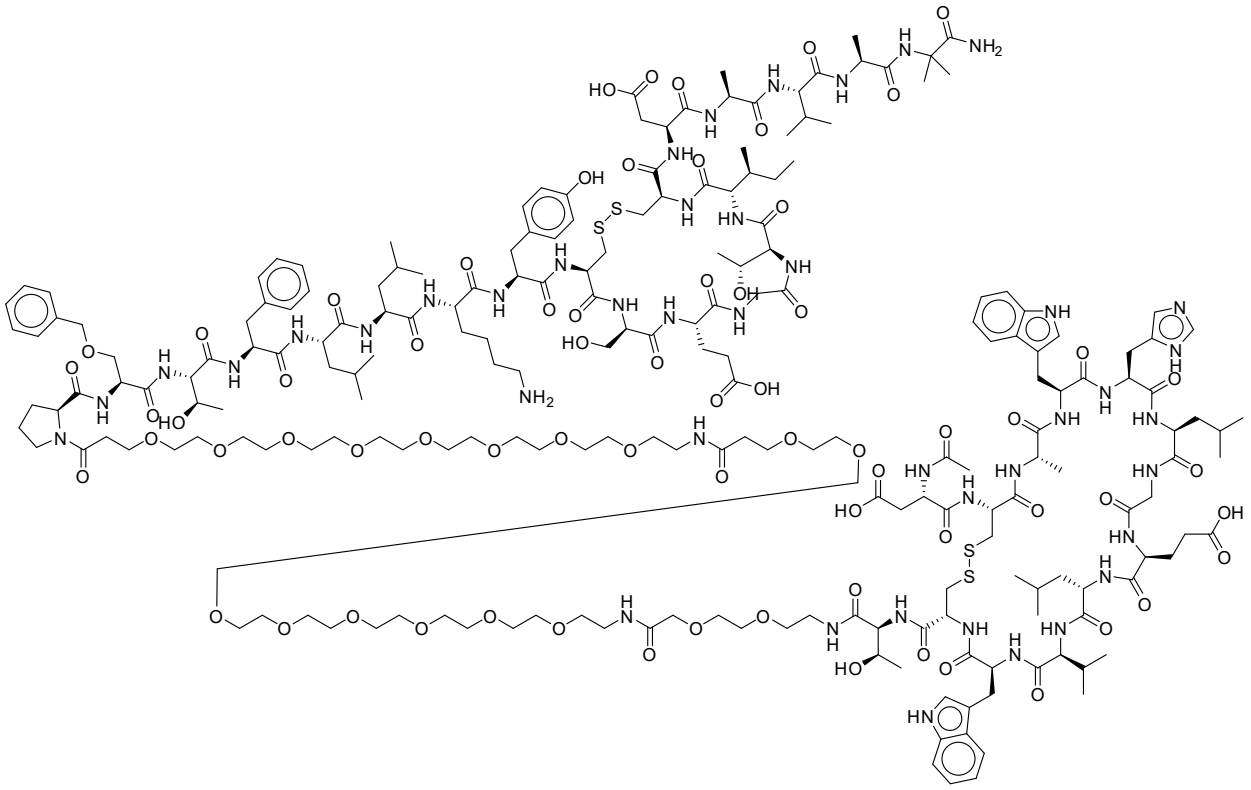
(I-11), or a salt thereof;



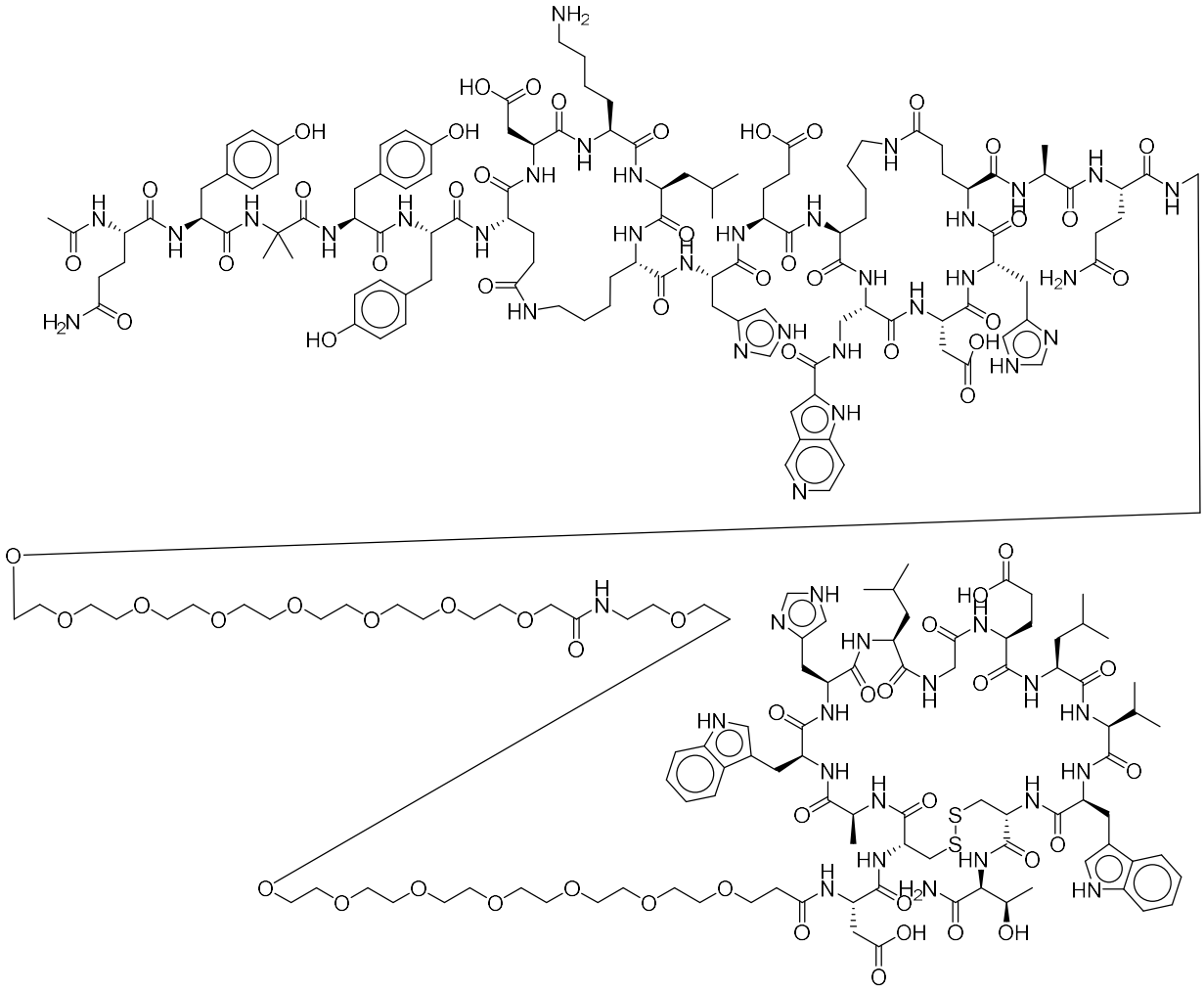
(I-12), or a salt thereof;



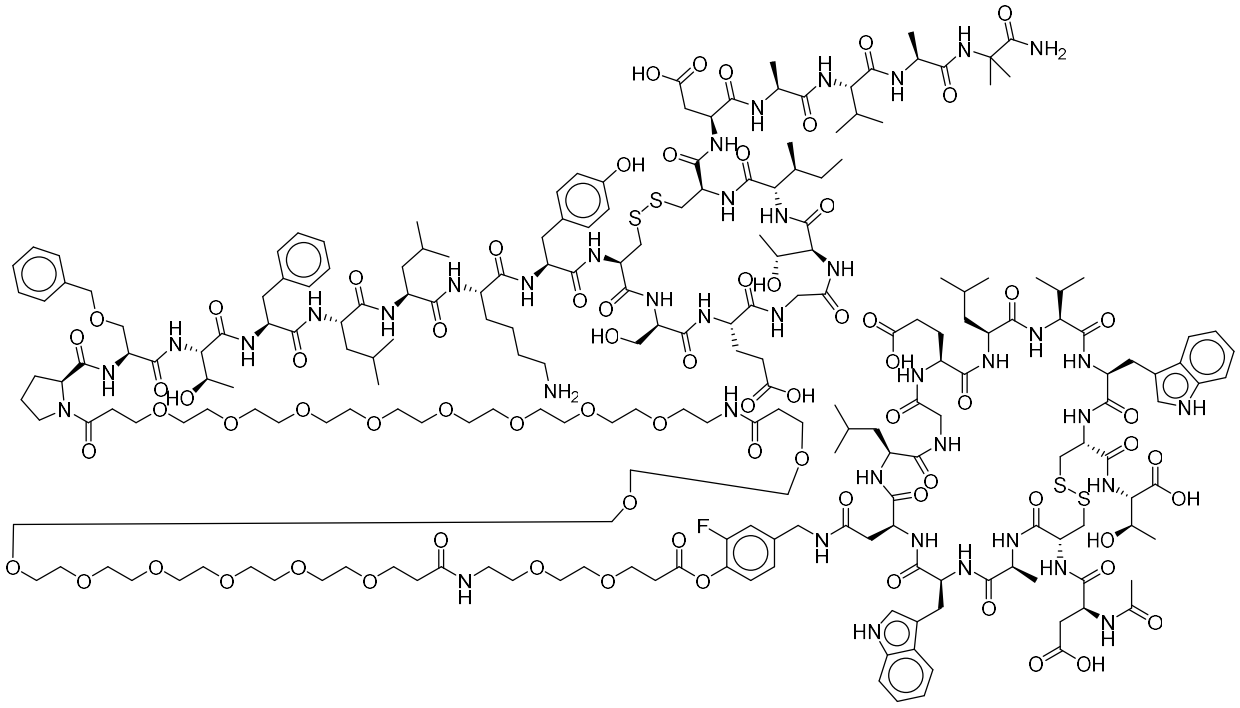
(I-13), or a salt thereof;



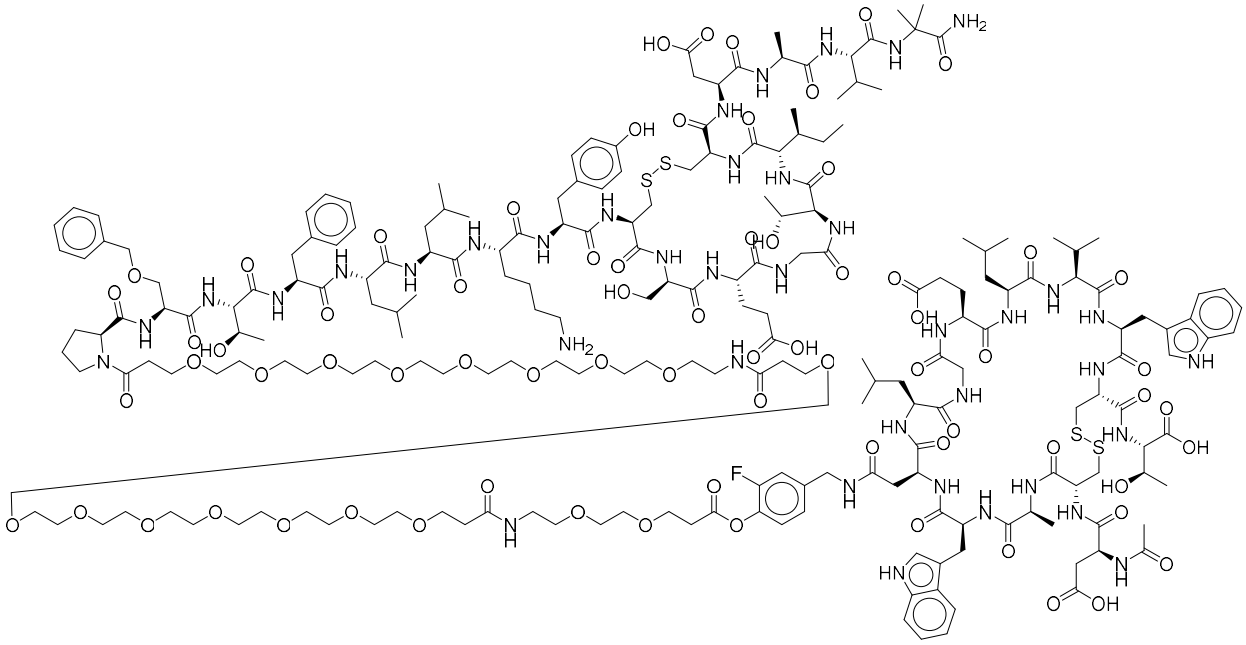
(I-17), or a salt thereof;



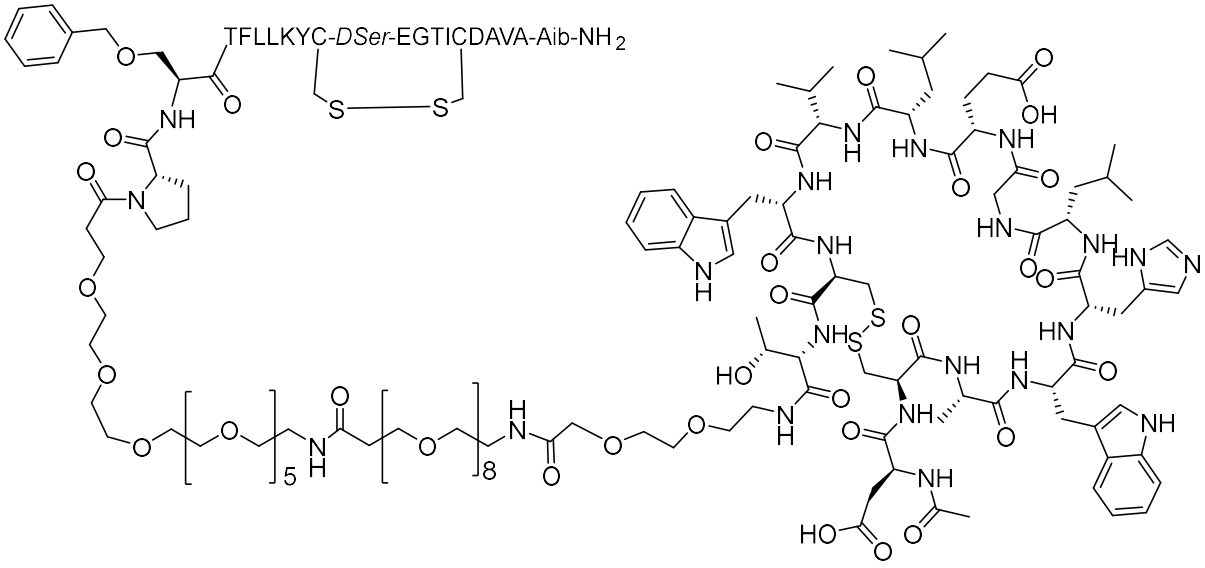
(I-18), or a salt thereof;



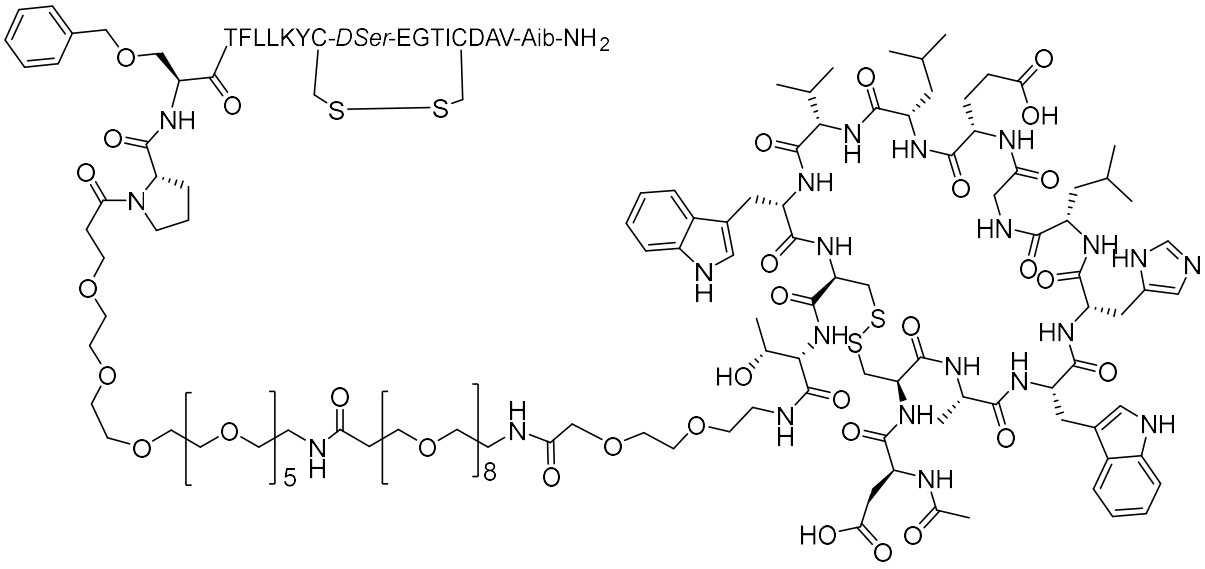
(I-19), or a salt thereof;



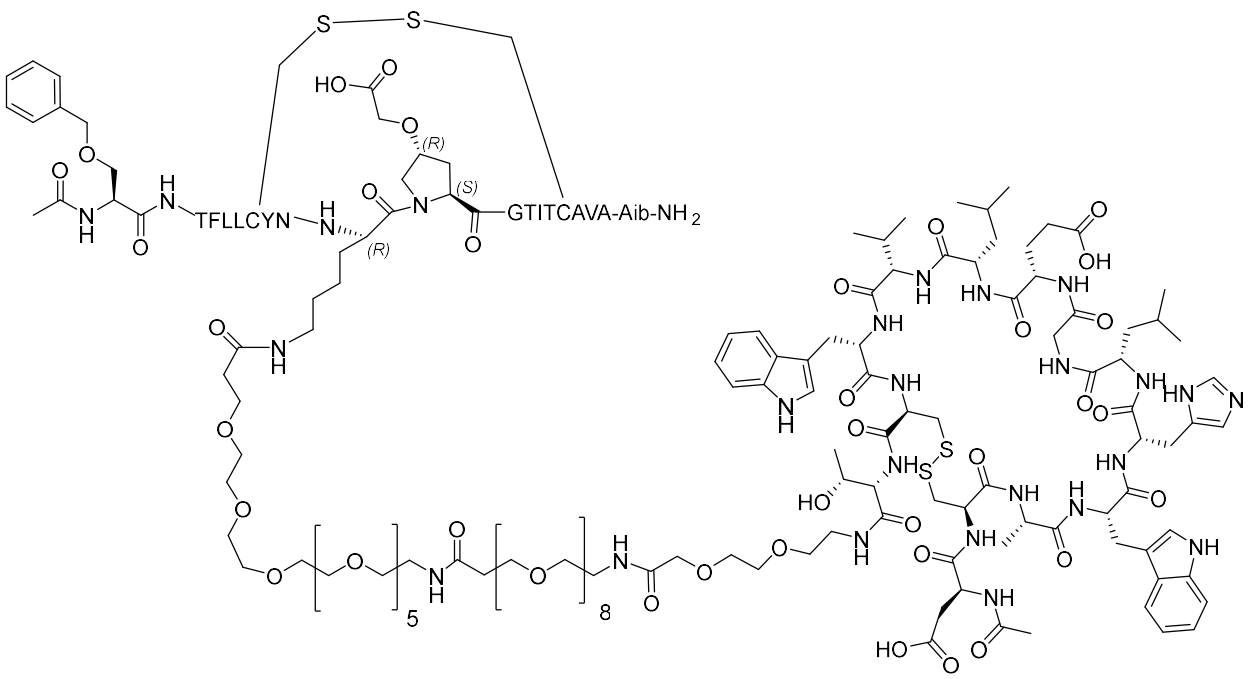
(I-20), or a salt thereof;



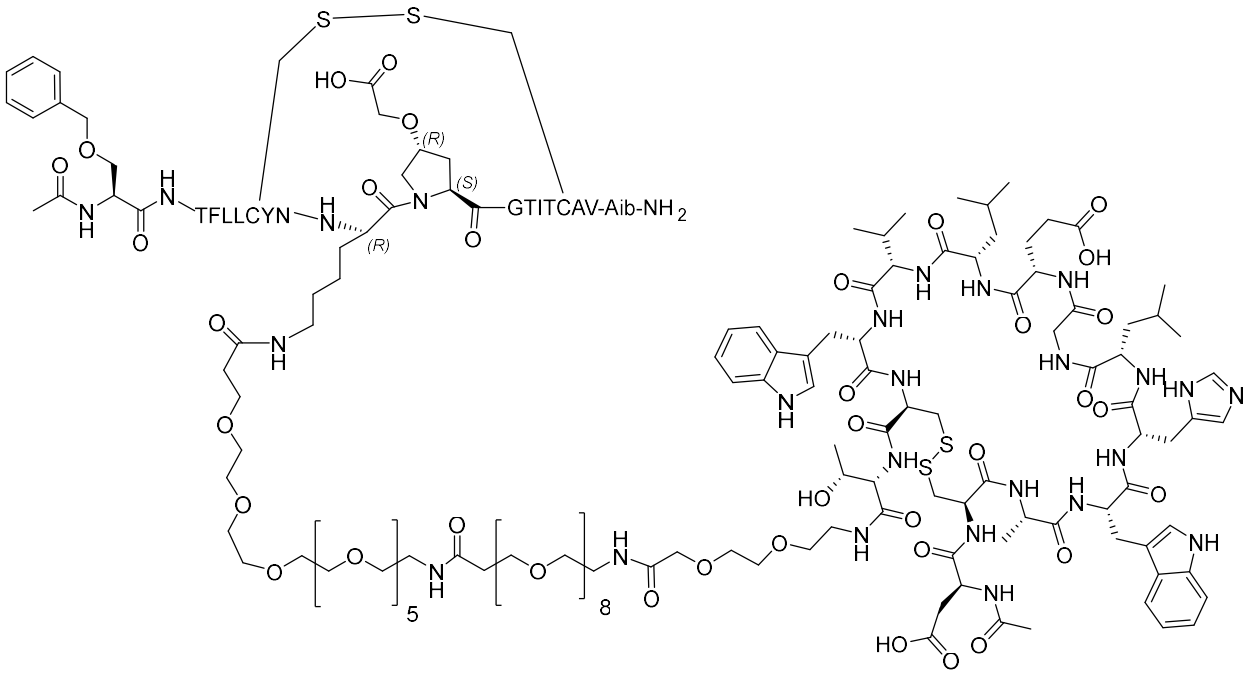
(I-23), or a salt thereof;



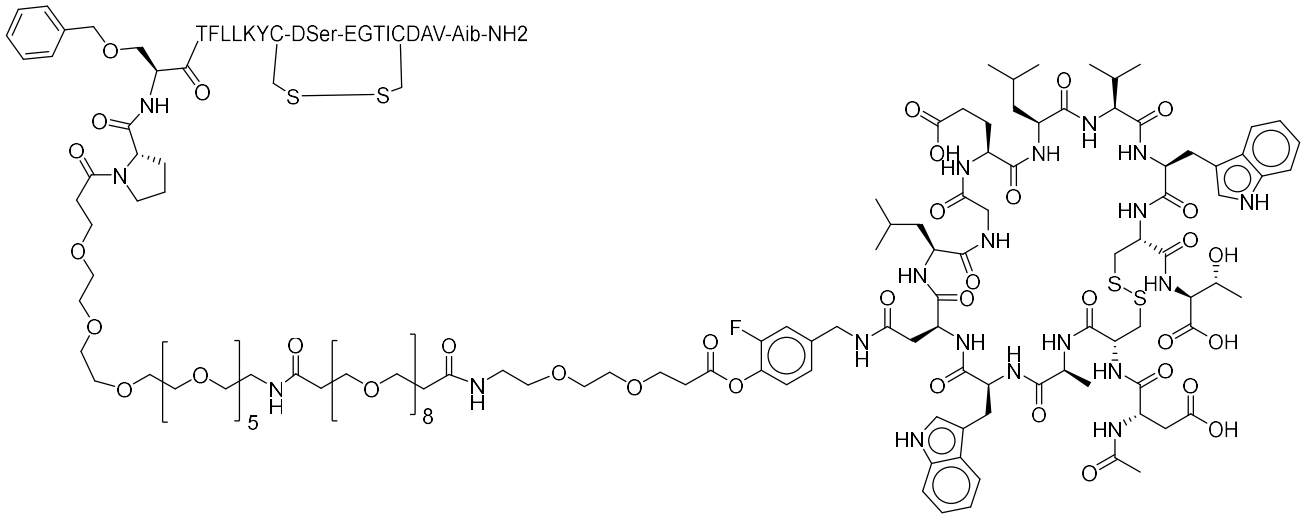
(I-24), or a salt thereof;



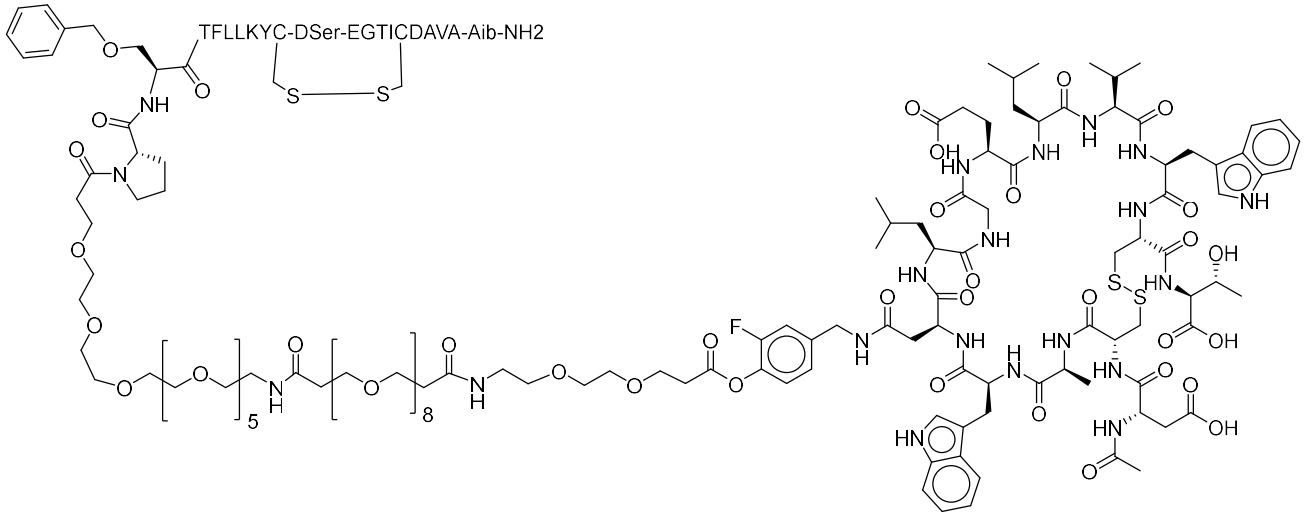
(I-25), or a salt thereof;



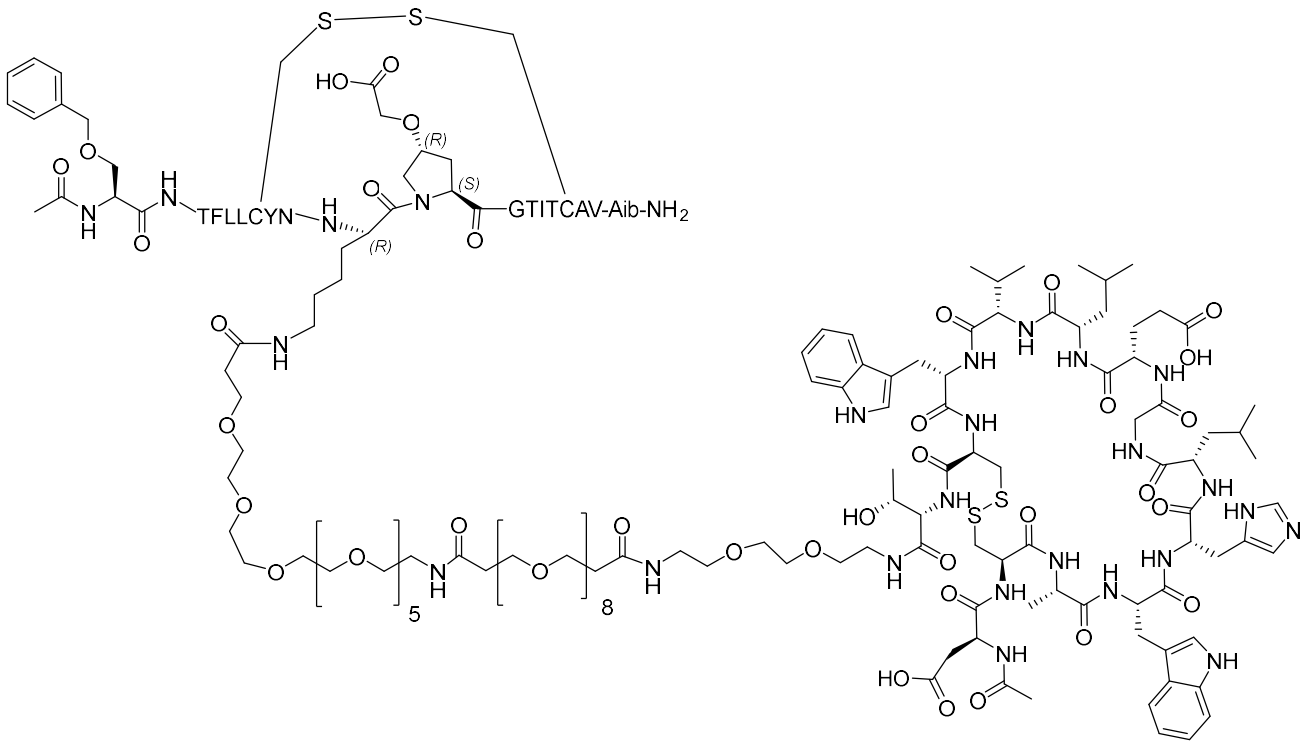
(I-26), or a salt thereof;



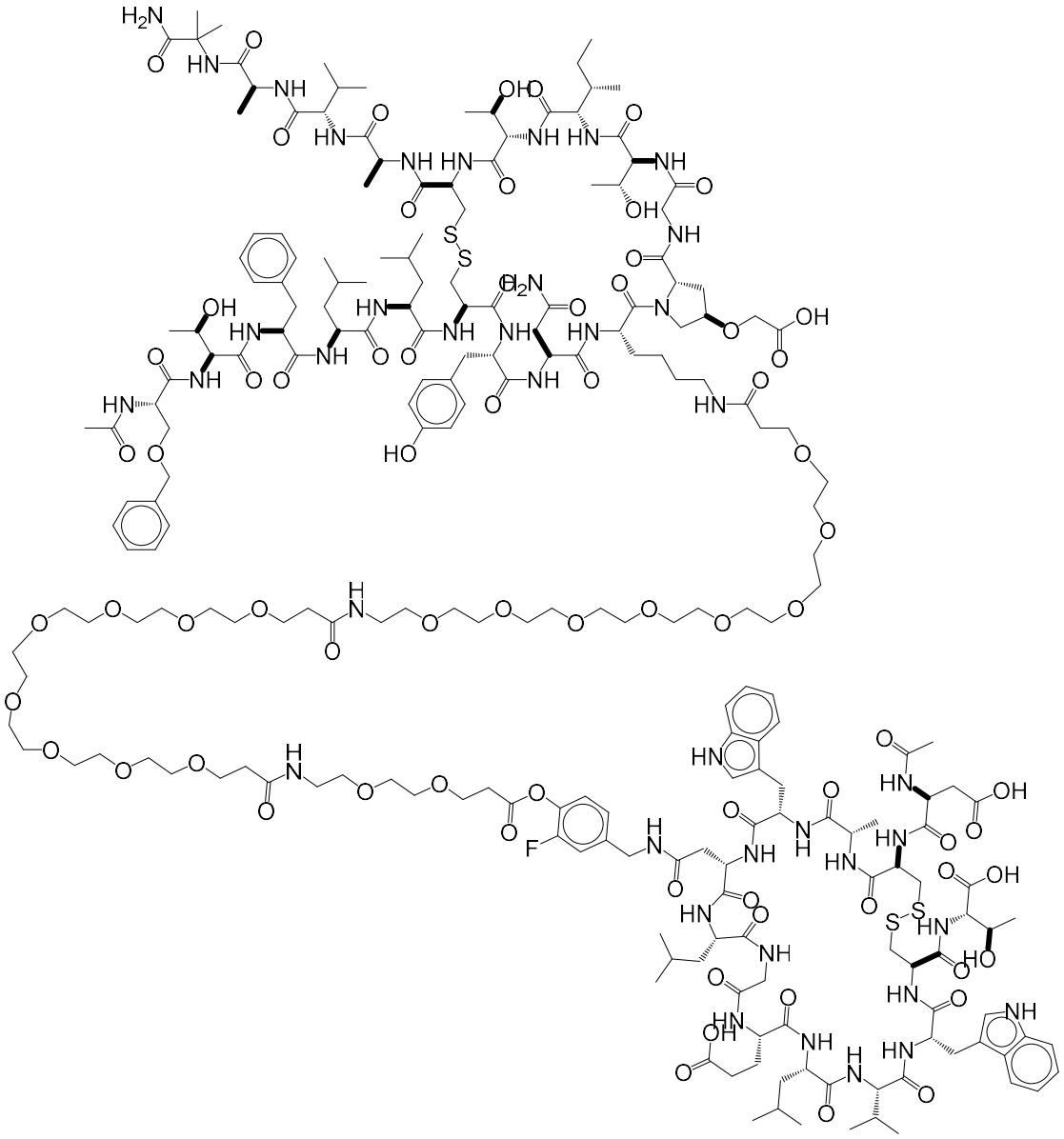
(I-27), or a salt thereof;



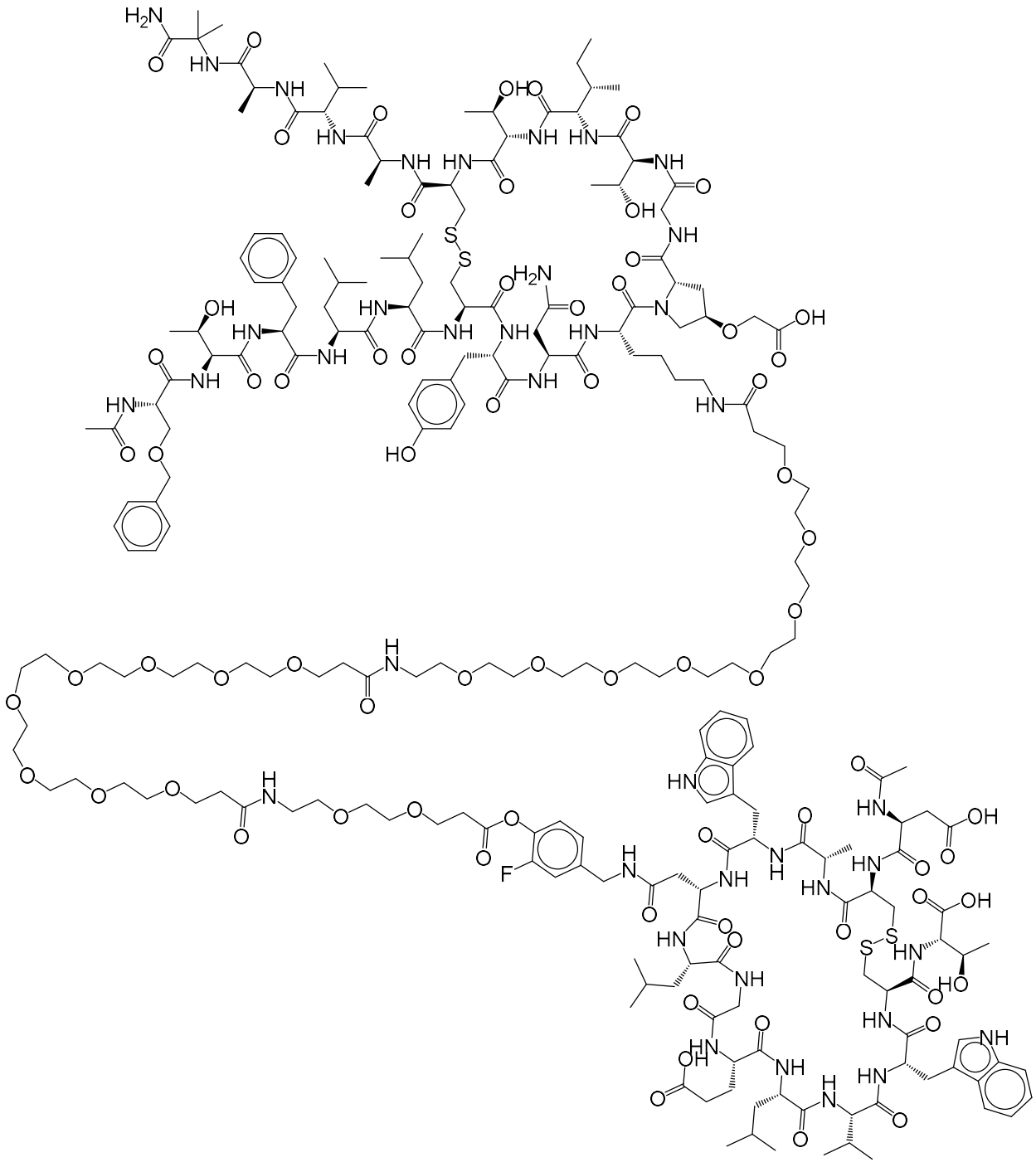
(I-28), or a salt thereof;



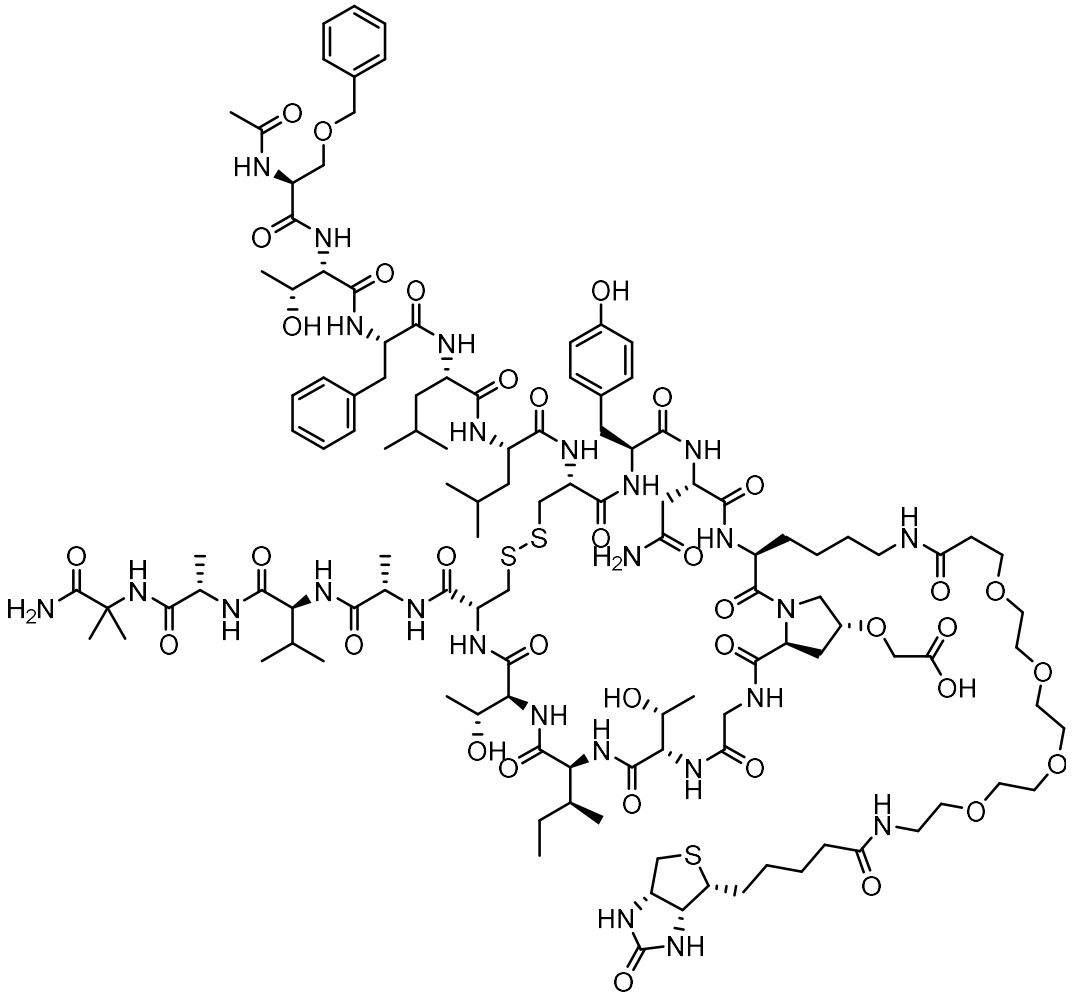
(I-29), or a salt thereof;



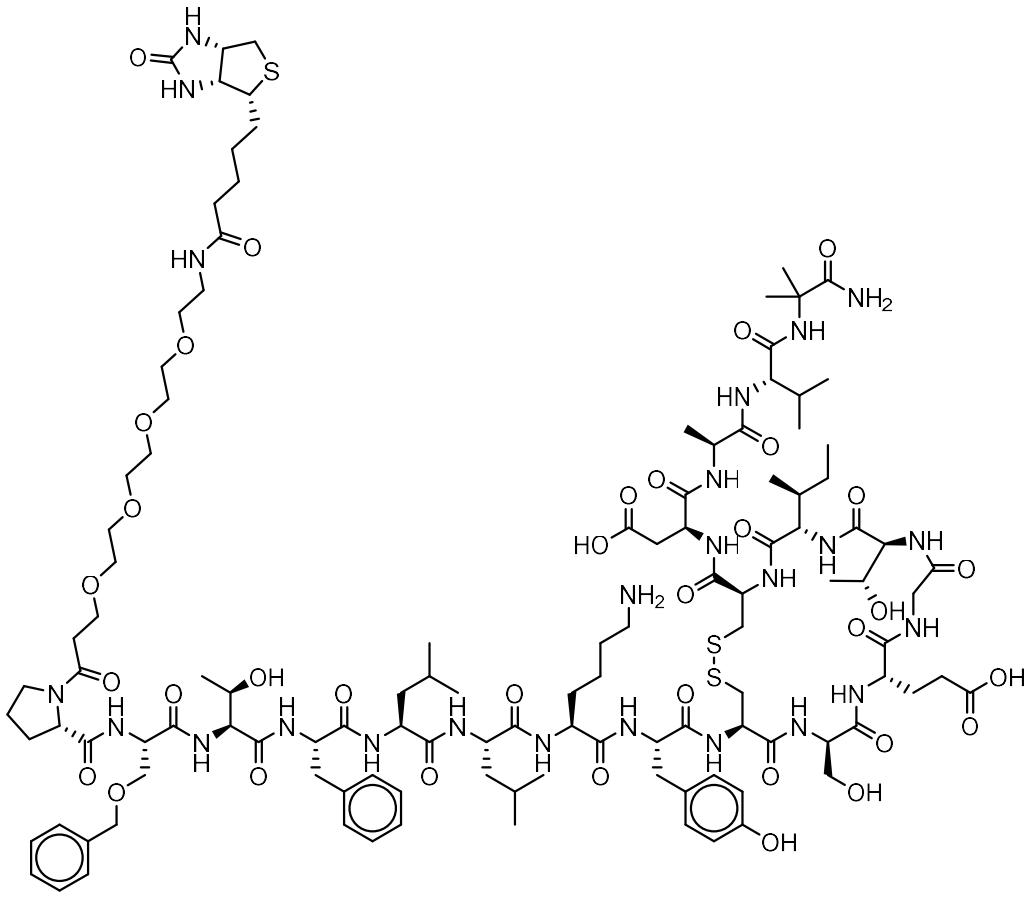
(I-30), or a salt thereof;



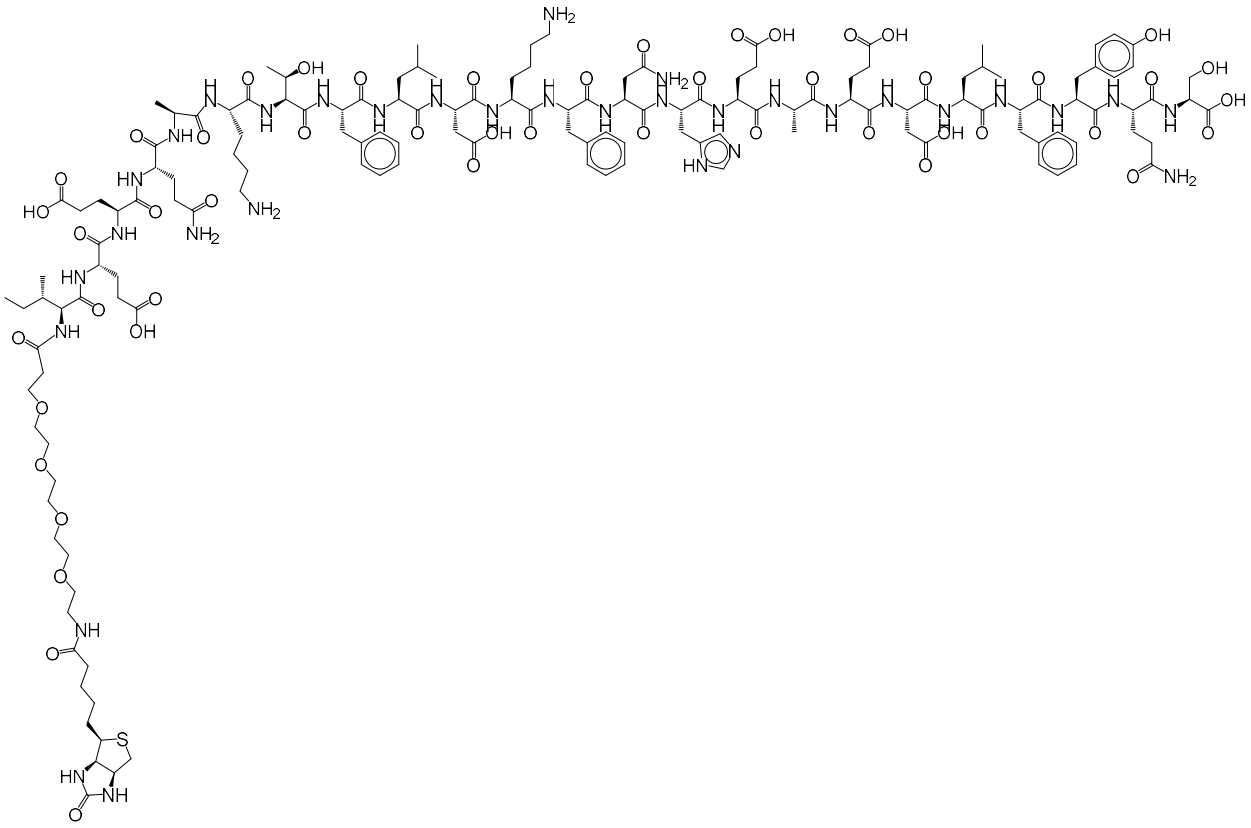
(I-31), or a salt thereof;



(I-32), or a salt thereof;

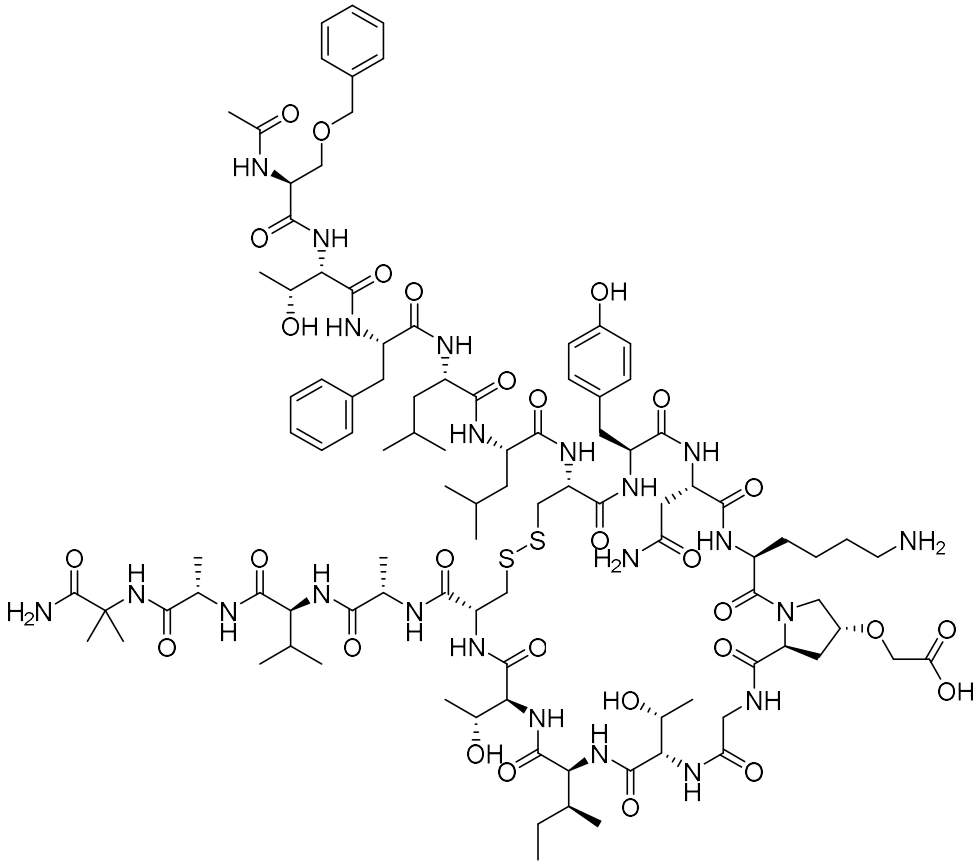


(I-33), or a salt thereof; or

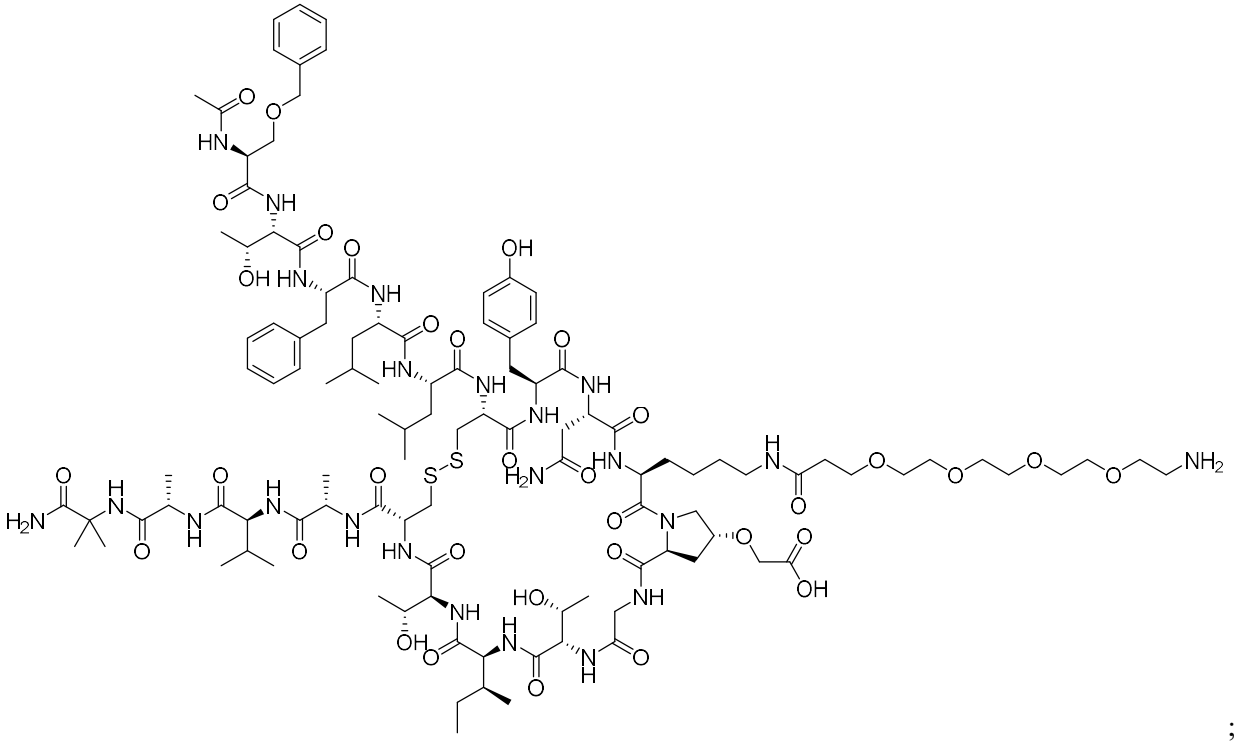


(I-34), or a salt thereof.

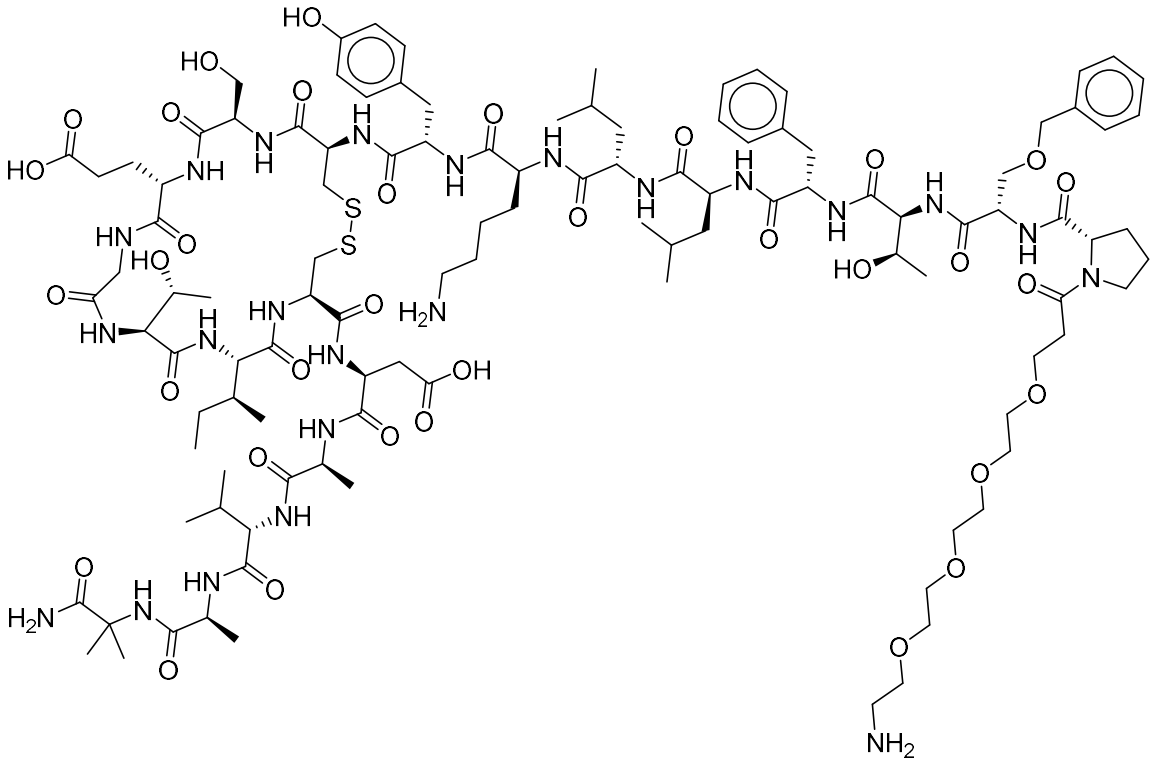
17. An agent having any of the following structures or a salt thereof:



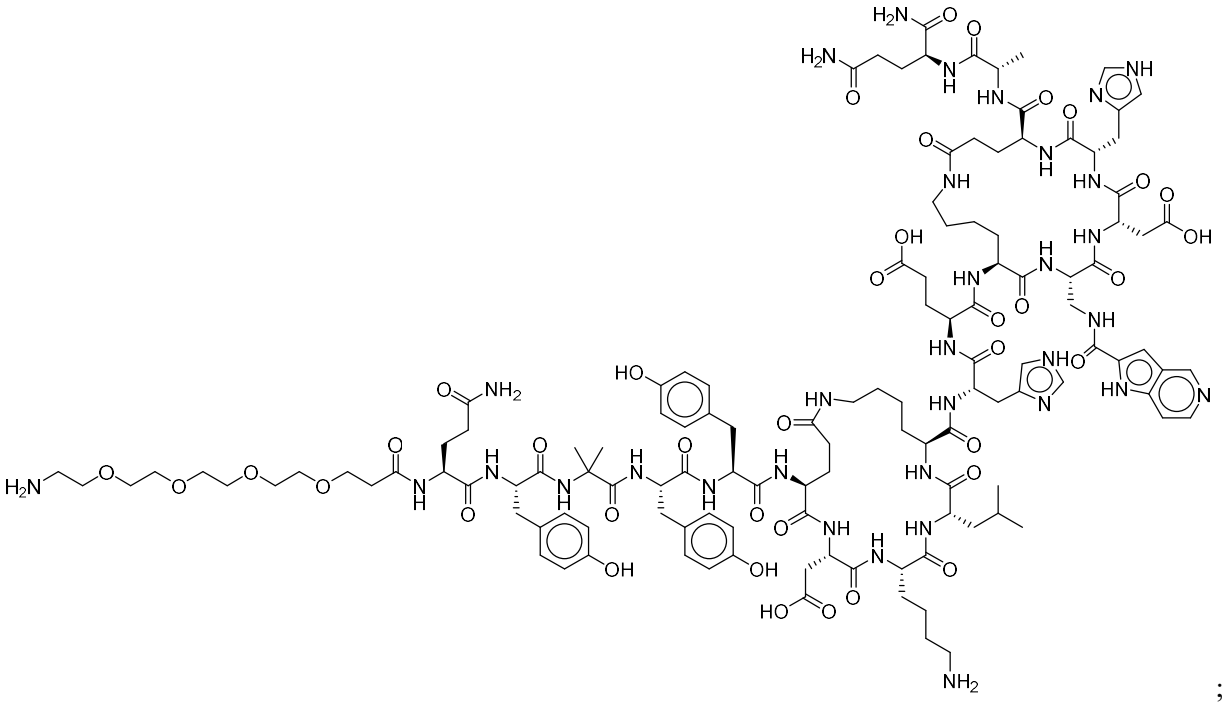
;



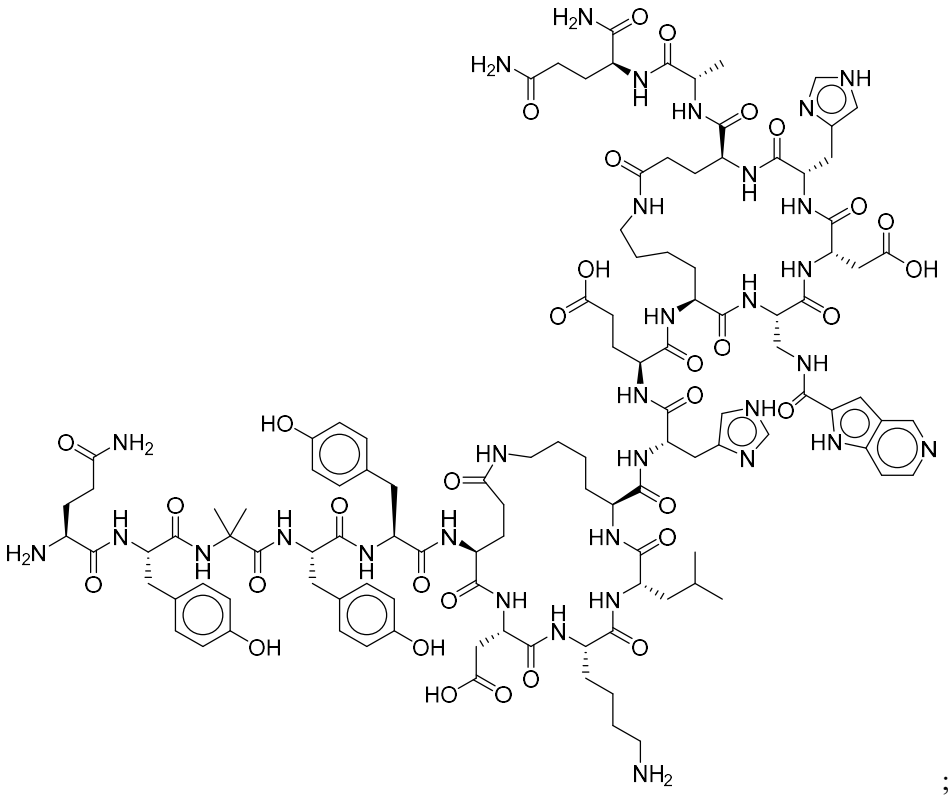
;



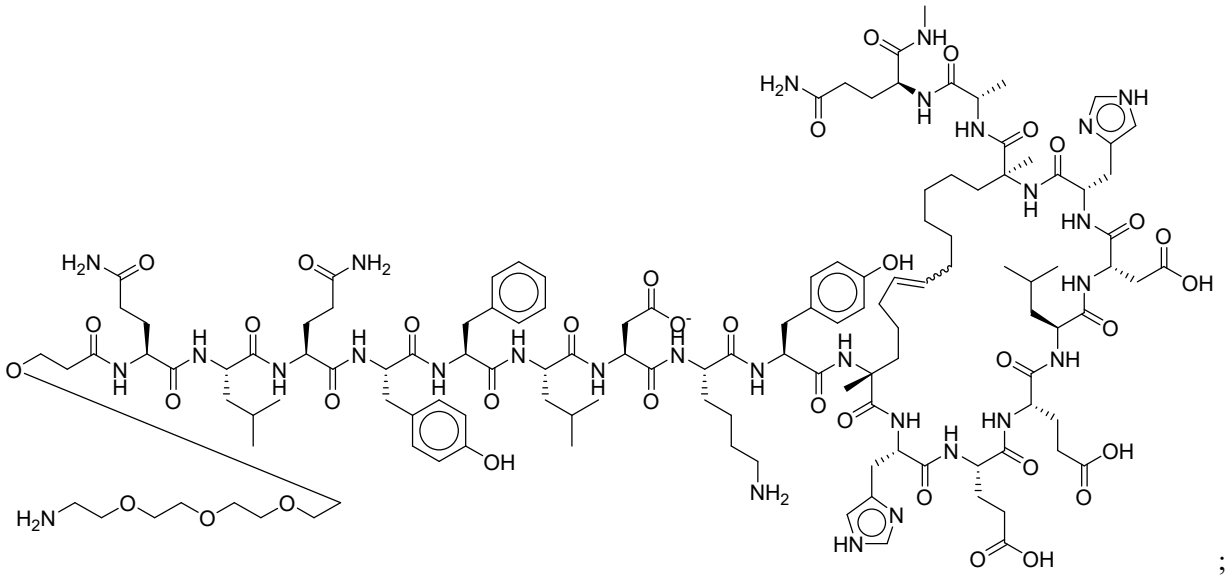
;



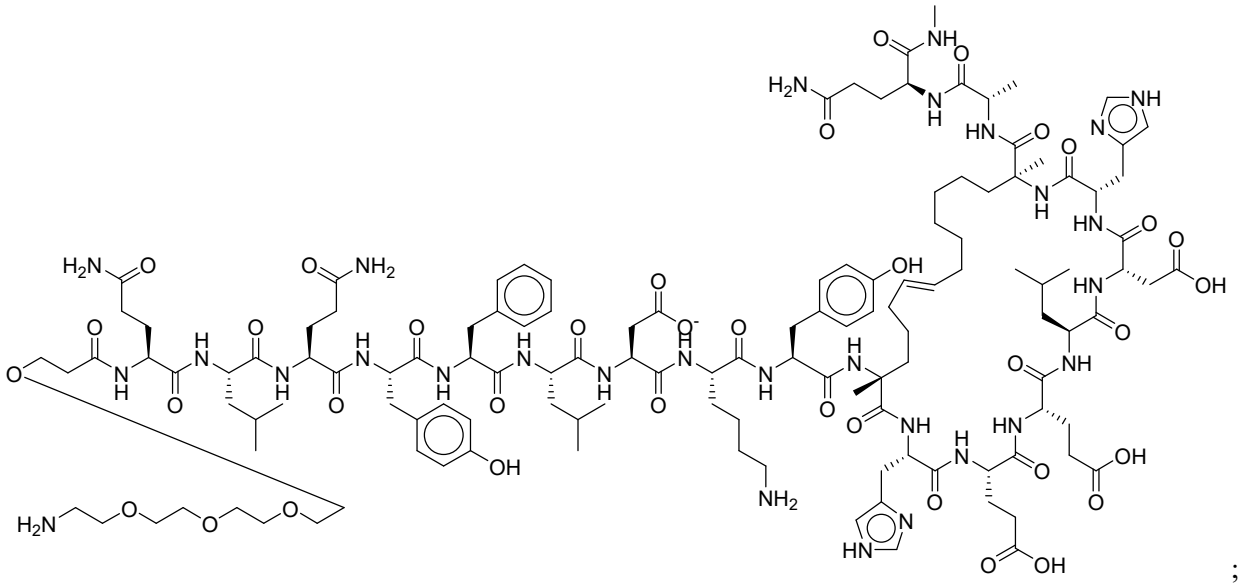
;

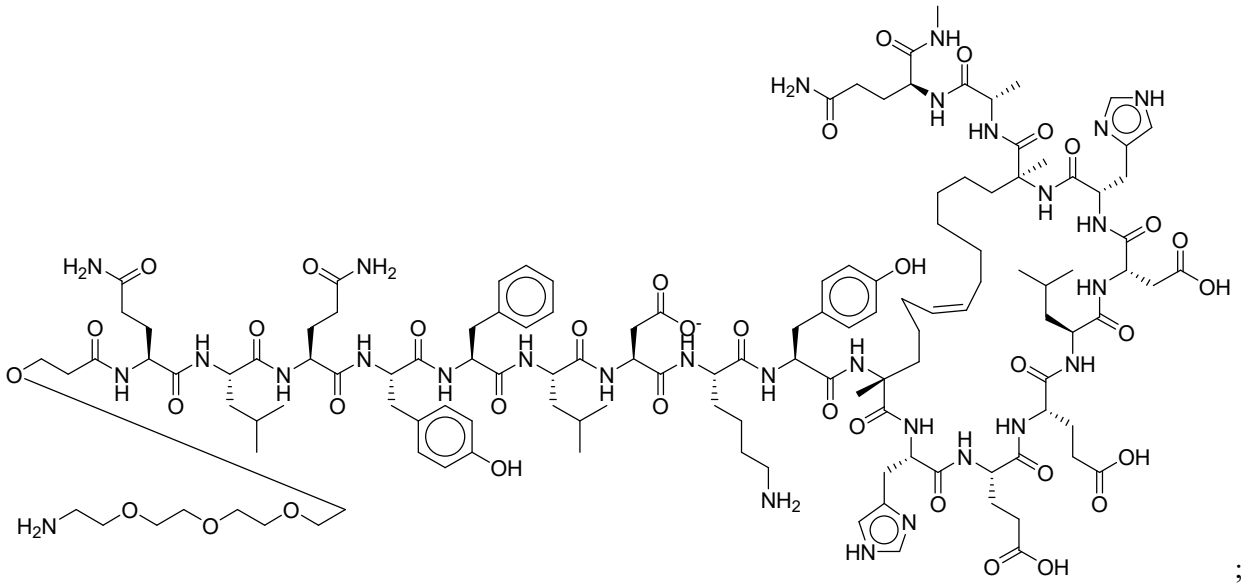


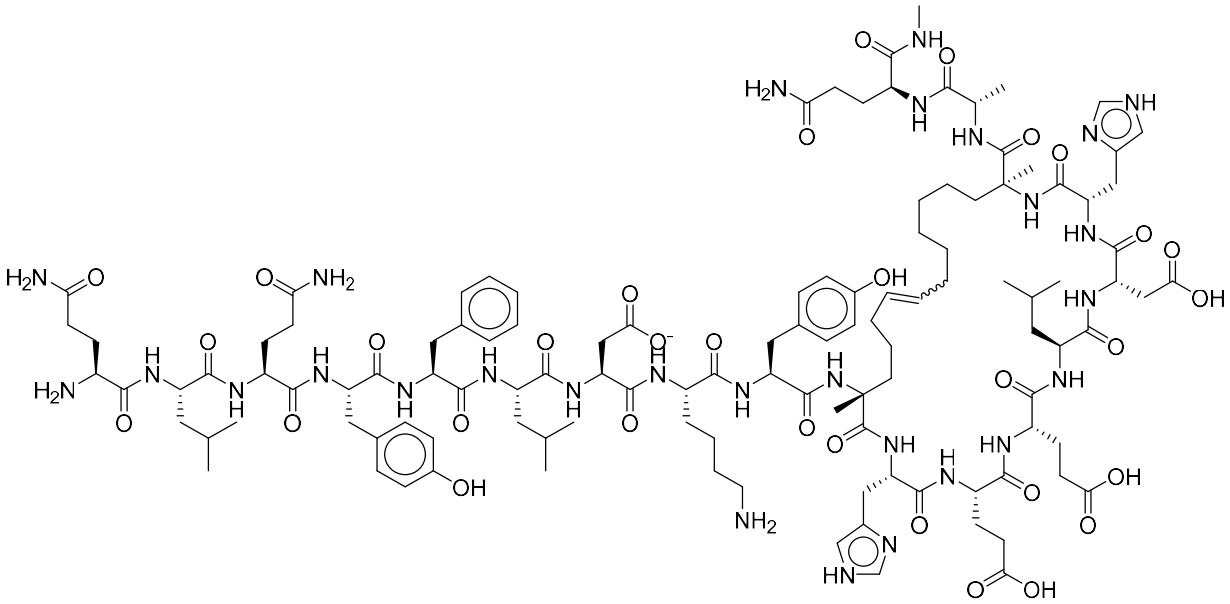
;

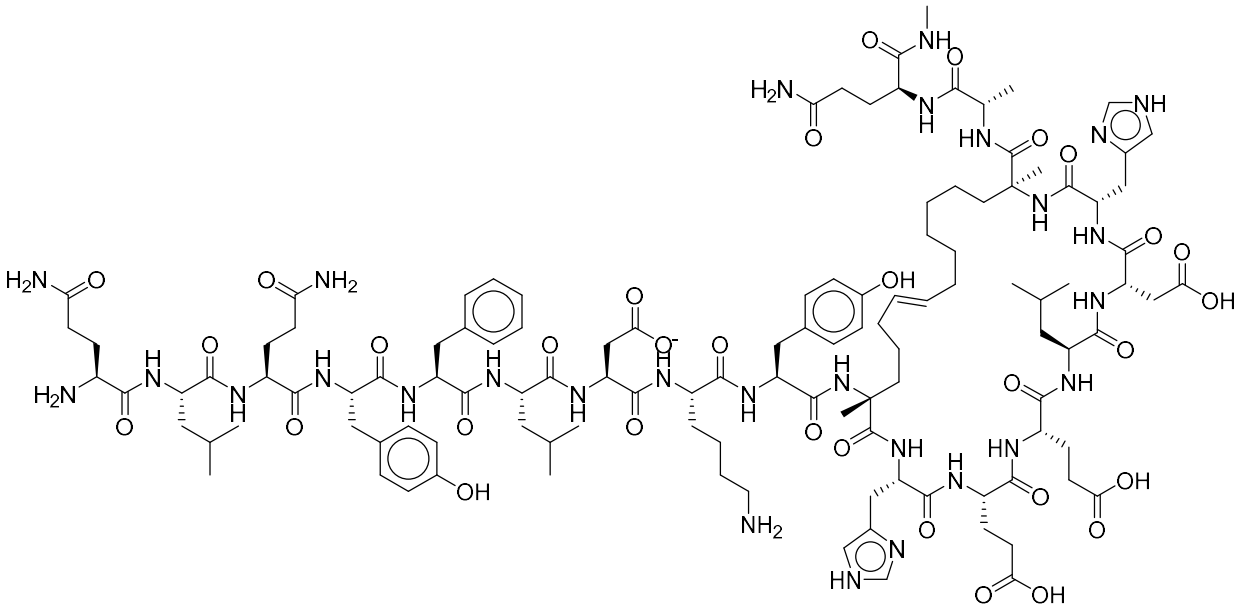


;

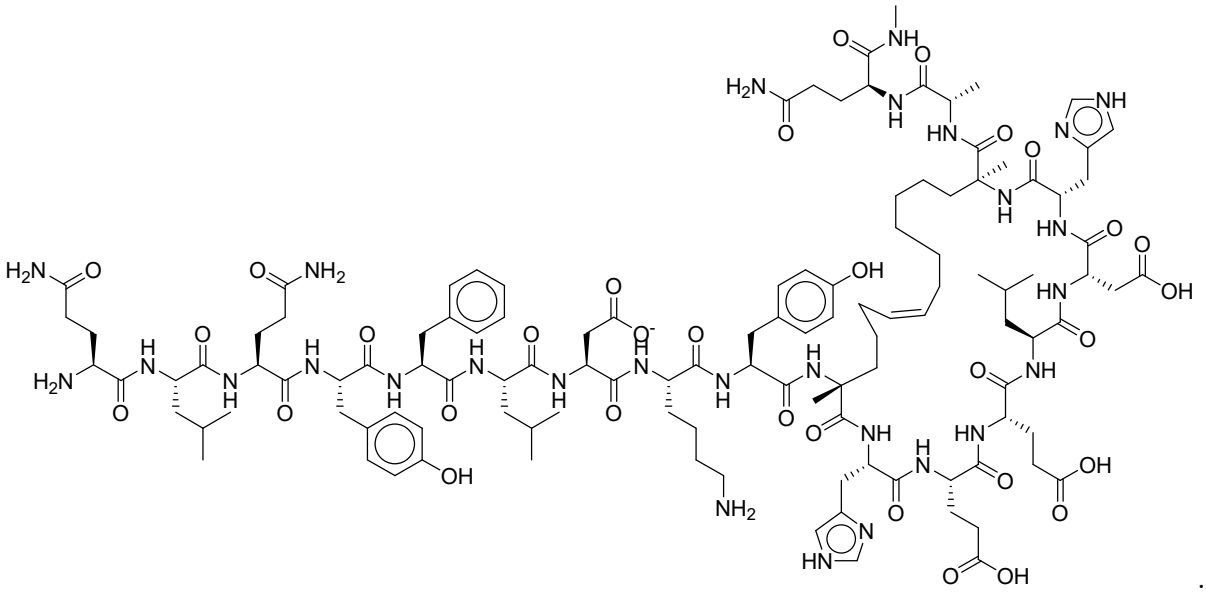

;


;


;


;

or



18. A pharmaceutical composition, comprising an agent of any one of claims 1-16, or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier.

19. Use of an agent of any one of claims 1-16, or the pharmaceutical composition of claim 18, in the manufacture of a medicament for treating a condition, disorder or disease associated with SARS-CoV-2 infection.

20. Use of an agent of any one of claims 1-16, or the pharmaceutical composition of claim 18, in the manufacture of a medicament for inducing, promoting, encouraging, enhancing, triggering, or generating an immune response toward SARS-CoV-2.

21. The use of claim 20, wherein the effective amount is an amount sufficient to

(i) induce or generate ADCC or ADCP toward SARS-CoV-2;

(ii) induce or generate long-term immunity toward SARS-CoV-2; or

(iii) provide memory T and/or B cells against SARS-CoV-2 in the subject.

22. The use of claim 20 or 21, further comprising administering a population of immune cells (e.g., the population of immune cells comprises NK cells, selected from allogeneic NK cells, peripheral blood-derived NK cells, MG4101 NK cells, CB-NK NK cells, and cord blood-derived NK cells).