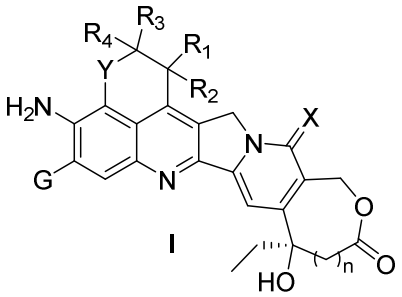
CLAIMS

1. A compound represented by structural formula I or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof:



structural formula I,

in structural formula I, R_1 and R_2 independently of one another are selected from the group consisting of halogen and C1-7 alkyl, and both R_3 and R_4 are hydrogen, or any two of R_1, R_2, R_3, and R_4, together with the carbon atoms to which they are bonded, form a C3-6 cycloalkyl;

G is hydrogen, halogen, methyl or methoxy;

Y is oxygen, sulfur, sulfone, sulfoxide, or methylene;

X is oxygen or sulfur;

n = 0 or 1.

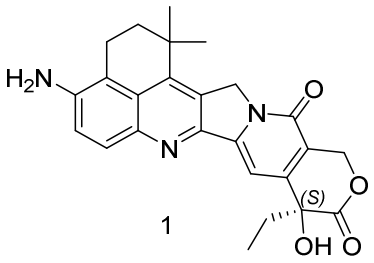
2. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to claim 1, characterized in that R_1 and R_2 are independently selected from halogen and C1-3 alkyl, and both R_3 and R_4 are hydrogen; or any two of R_1, R_2, R_3, and R_4, together with the carbon atoms to which they are bonded, form a C3-5 cycloalkyl;

G is hydrogen, fluorine or chlorine; and

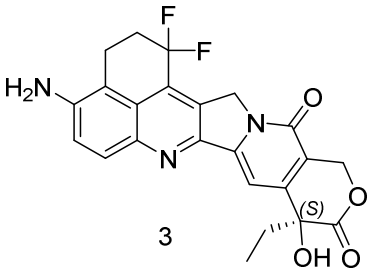
Y is oxygen, sulfur or methylene.

3. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to claim 1 or 2, characterized in that R_1 and R_2 are independently selected from fluorine and chlorine.

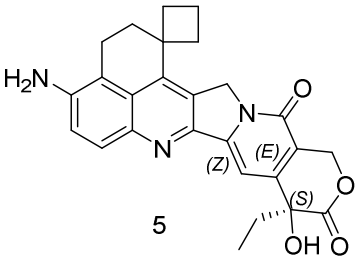
4. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 1 to 3, characterized in that, the compound has one of the following structures:



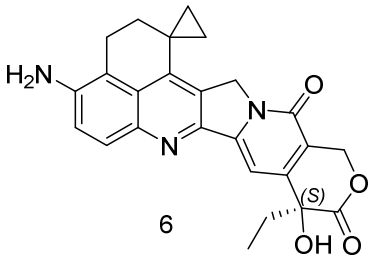
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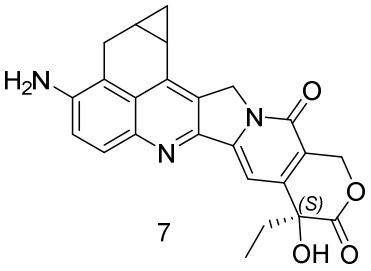
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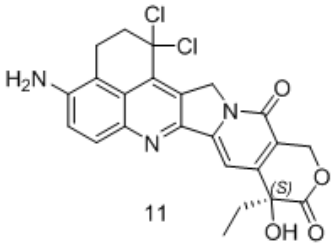
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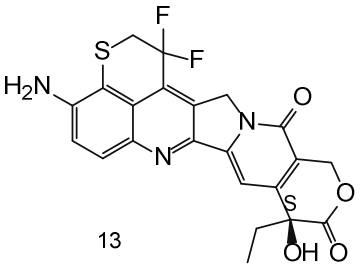
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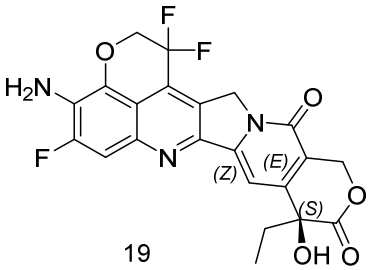
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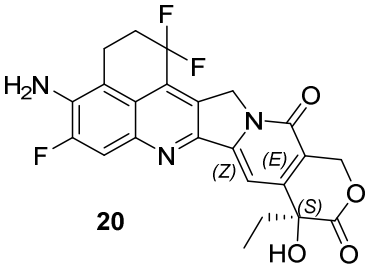
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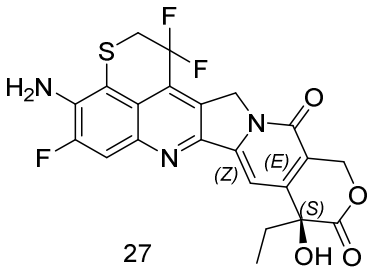


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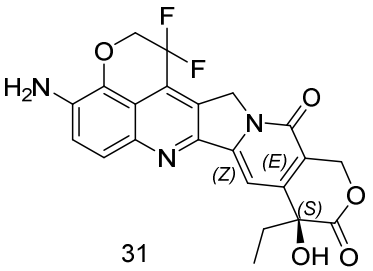


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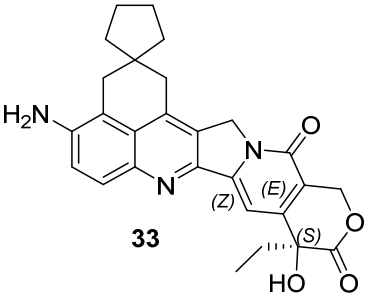
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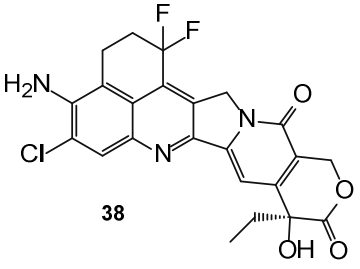
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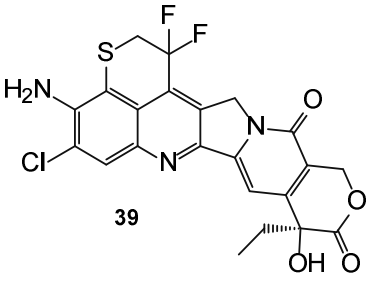
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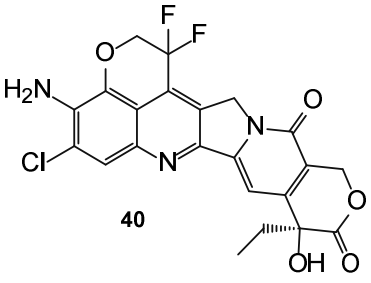
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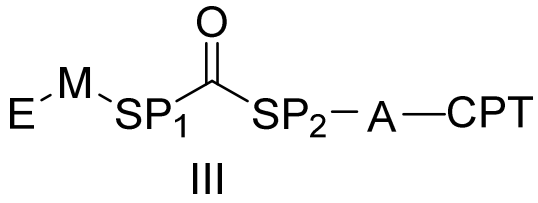
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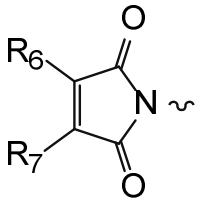
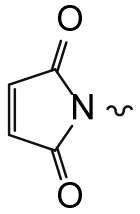
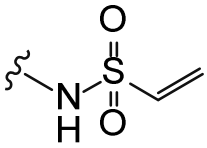
5. A compound represented by structural formula III or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof:

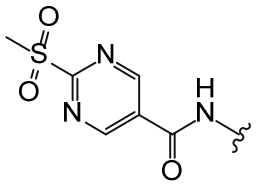
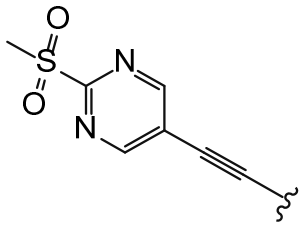
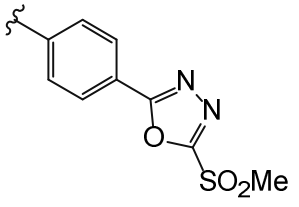


III

structural formula III,

in structural formula III, E is selected from the group consisting of the following groups, in which 〰 means the bonding site to M:

E-1:  ; E-2:  ; E-3:  ;

E-4:  ; E-5:  ; and E-6:  ;

M is phenylene or phenylene substituted with one or more substituents selected from the group consisting of alkyl, haloalkyl, alkoxy, halogen, ester, amide, and cyano, or a chemical bond;

SP_1 is selected from the group consisting of C1-8 alkylene, C1-8 cycloalkylene, or C1-21 linear heteroalkylene comprising 1-11 heteroatoms selected from the group consisting of N, O, and S, in which the C1-8 alkylene, C1-8 cycloalkylene, and C1-21 linear heteroalkylene independently of one

another are optionally substituted with one or more substituents selected from the group consisting of hydroxyl, amino, sulfonic acid group, and cyano;

SP_2 is selected from the group consisting of -NH(CH2CH2O)aCH2CH2CO-, -NH(CH2CH2O)aCH2CO-, -S(CH2)aCO-, or a chemical bond, in which a is an integer in the range of 1 to 20;

A means a peptide group of 2 to 4 amino acids;

CPT is the compound of camptothecins according to any one of claims 1 to 4 which is bonded to the carboxyl of A through an amide bond via its amino; and

when group E is E1, R_6 and R_7 independently of one another are hydrogen, halogen or Ar'S in which Ar' is phenyl or phenyl substituted with one or more substituents selected from the group consisting of alkyl, alkoxy, halogen, ester, amide, and cyano.

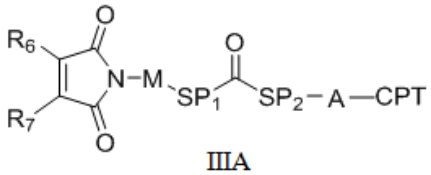
6. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to claim 5, characterized in that, M is phenylene or halogen-substituted phenylene;

SP_1 is C1-21 linear heteroalkylene comprising 1-11 heteroatoms selected from the group consisting of N, O, and S;

SP_2 is a chemical bond; and

A is *NH*-Phe-Lys-*CO*, *NH*-Val-Ala-*CO*, *NH*-Val-Lys-*CO*, *NH*-Ala-Lys-*CO*, *NH*-Val-Cit-*CO*, *NH*-Phe-Cit-*CO*, *NH*-Leu-Cit-*CO*, *NH*-Phe-Arg-*CO*, *NH*-Gly-Val-*CO*, *NH*-Glu-Val-Ala-*CO*, *NH*-Glu-Val-Cit-*CO*, *NH*-Ala-Ala-Ala-*CO*, *NH*-Gly-Gly-Phe-Gly-*CO*, or *NH*-Gly-Phe-Gly-Gly-*CO*.

7. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to claim 5 or 6, characterized in that, the compound is a compound represented by structural formula IIIA:

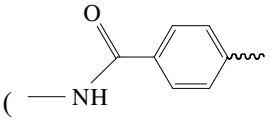
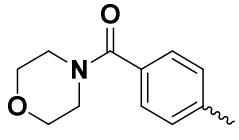


IIIA

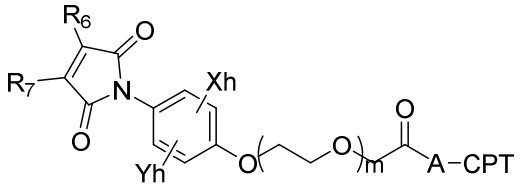
structural formula IIIA,

in structural formula IIIA, R_6 and R_7 independently of one another are hydrogen, halogen or Ar'S in which Ar' is phenyl or phenyl substituted with one or more substituents selected from the group

consisting of alkyl, alkoxy, halogen, ester, amide, and cyano.

8. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 5 to 7, characterized in that, Ar' is phenyl, phenyl substituted with 4-formylmethylamine () or phenyl substituted with 4-formylmorpholine ().

9. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 5 to 8, characterized in that, the compound represented by structural formula III or structural formula IIIA is further a compound represented by structural formula V:



V

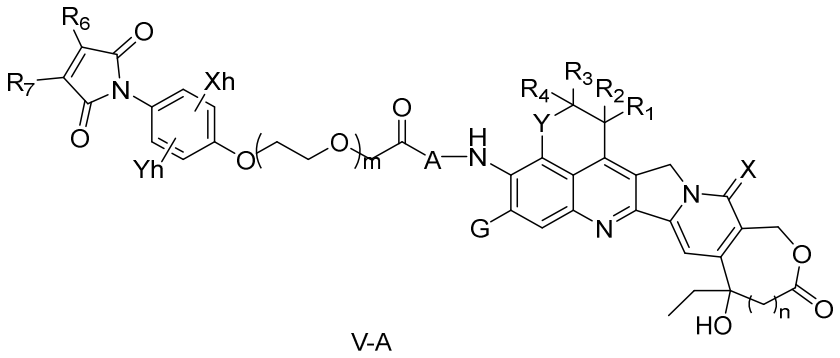
structural formula V,

in structural formula V, R_6 and R_7 independently of one another are Ar'S in which Ar' is phenyl or phenyl substituted with one or more substituents selected from the group consisting of alkyl, alkoxy, halogen, ester, amide, and cyano;

Xh and Yh independently of one another are hydrogen, halogen, haloalkyl, or alkoxy;

m is any integer in the range of 1 to 10.

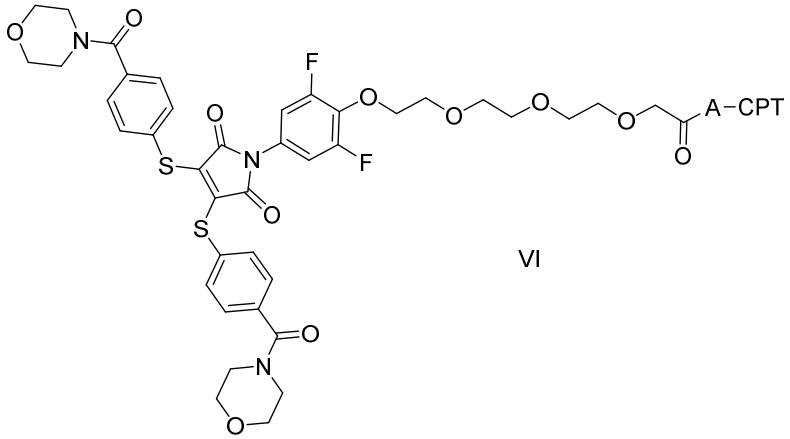
10. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to claim 9, characterized in that, the compound represented by structural formula V is further a compound represented by structural formula V-A:



V-A

structural formula V-A.

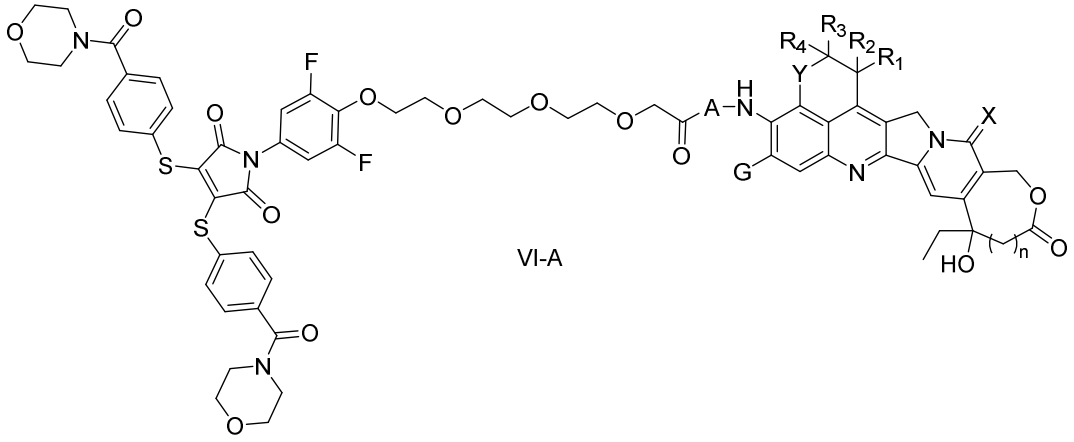
11. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 5 to 10, characterized in that, the compound is a compound represented by structural formula VI:



VI

structural formula VI;

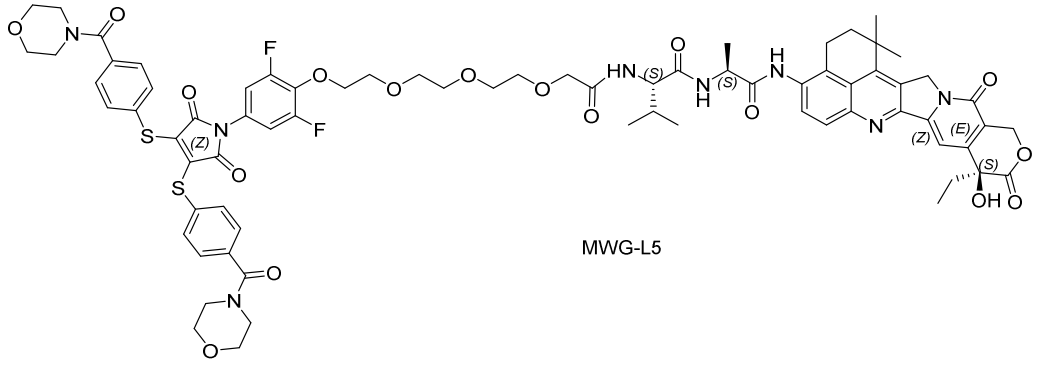
or, the compound is further a compound represented by structural formula VI-A:



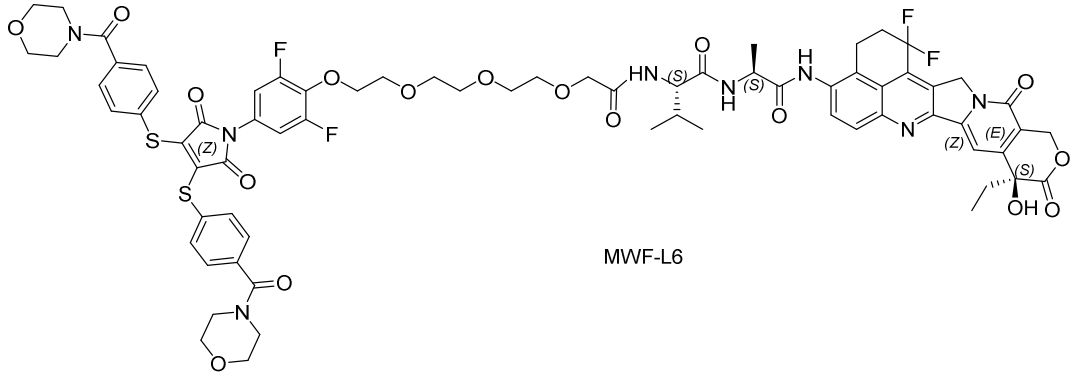
VI-A

structural formula VI-A.

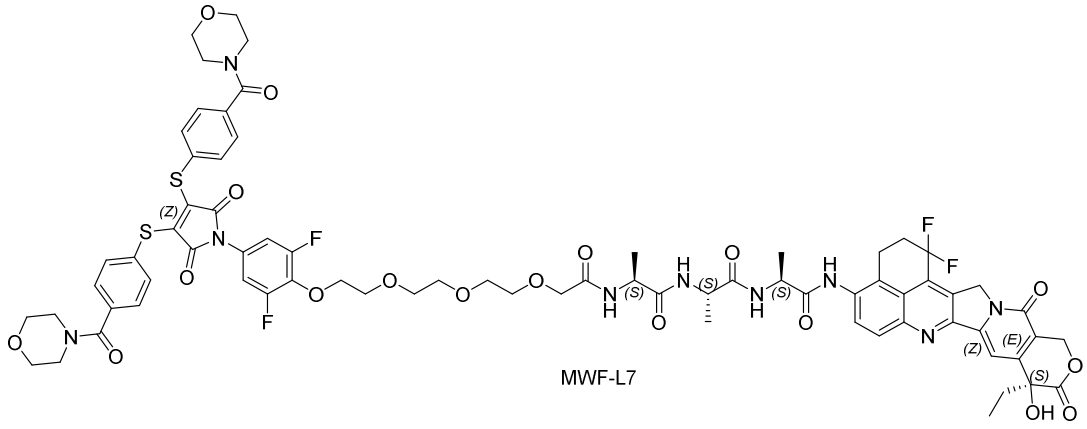
12. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 5 to 11, characterized in that, the compound has one of the following structures:



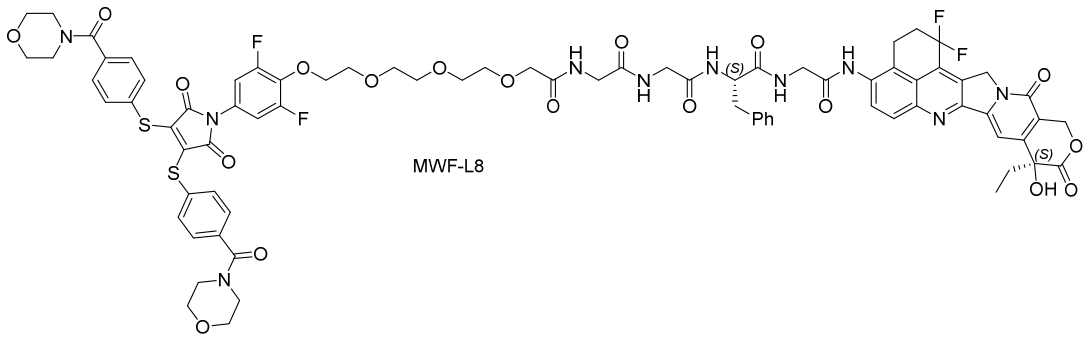
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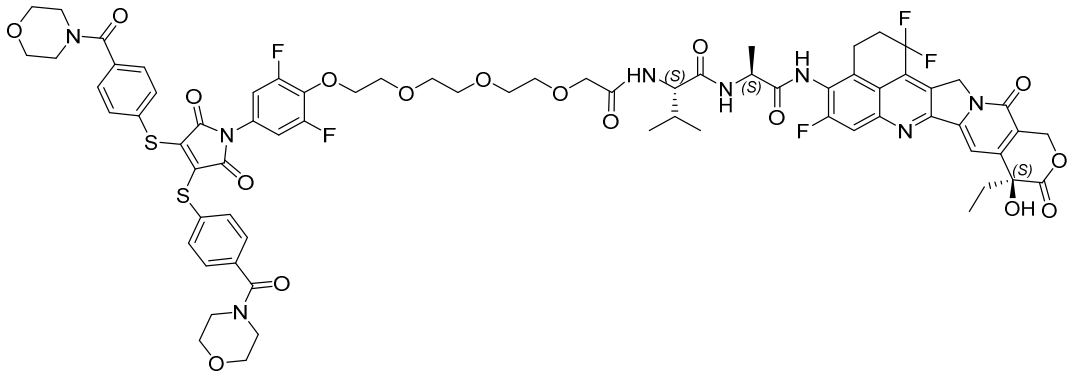
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MWF-L7

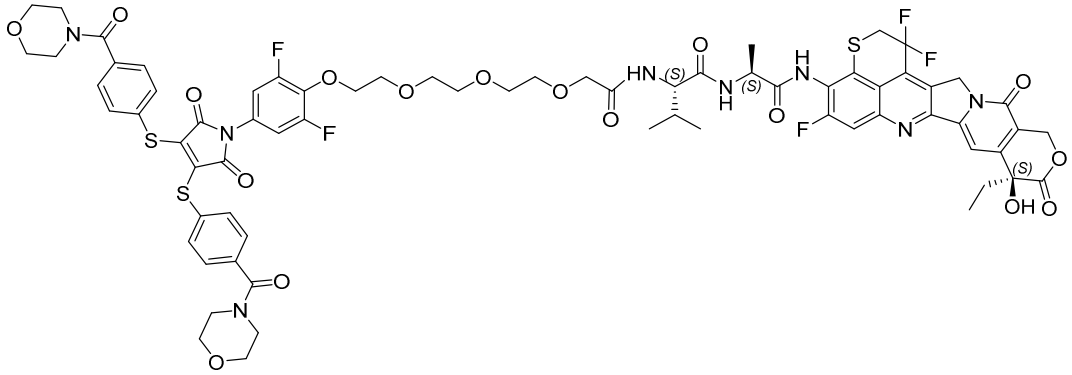


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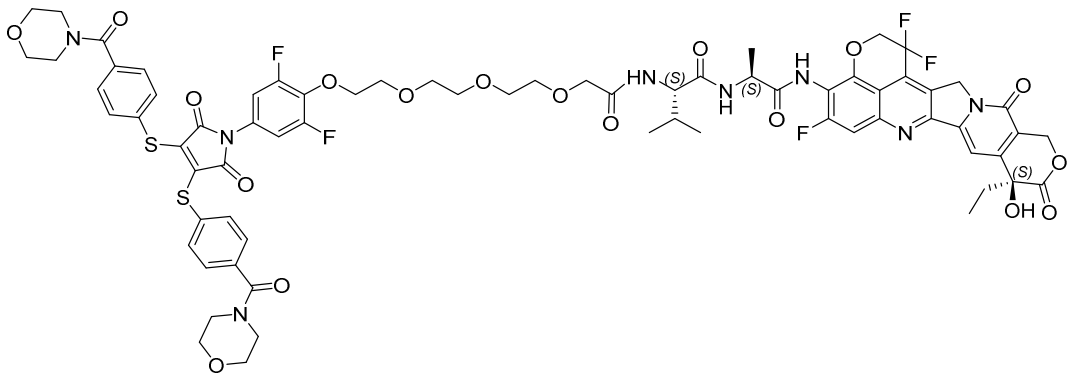


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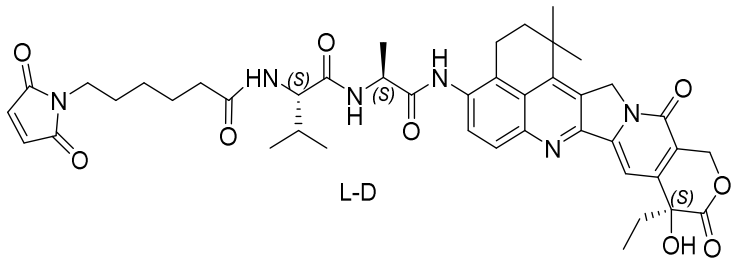
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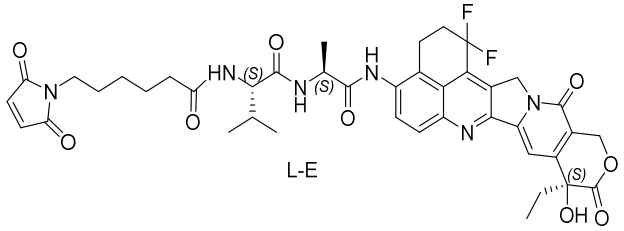
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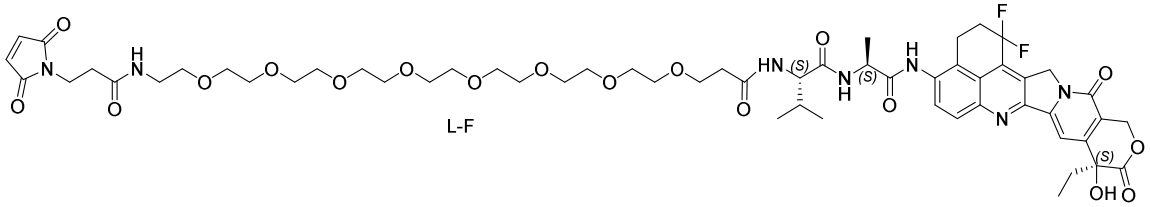
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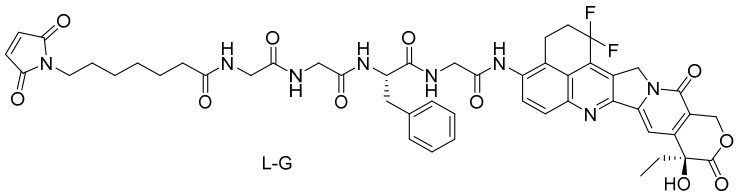
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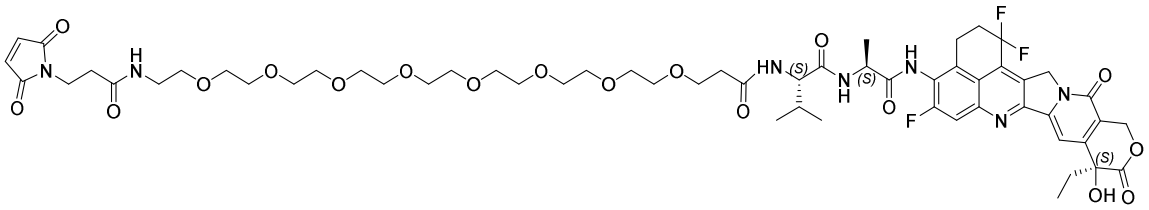
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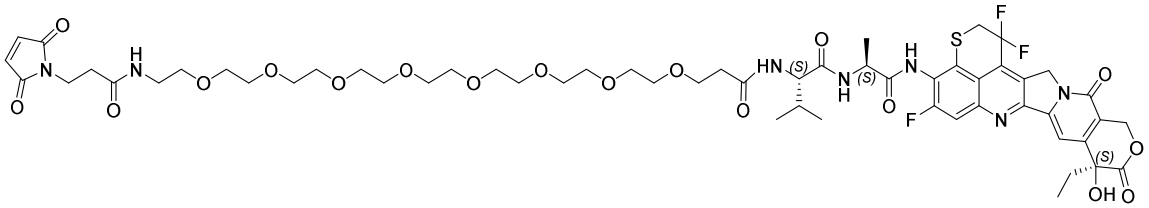
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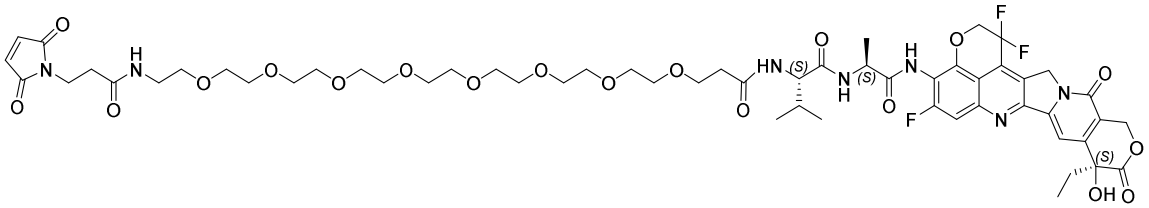
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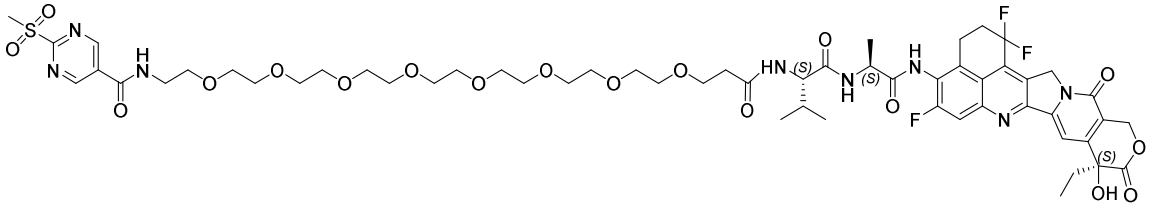
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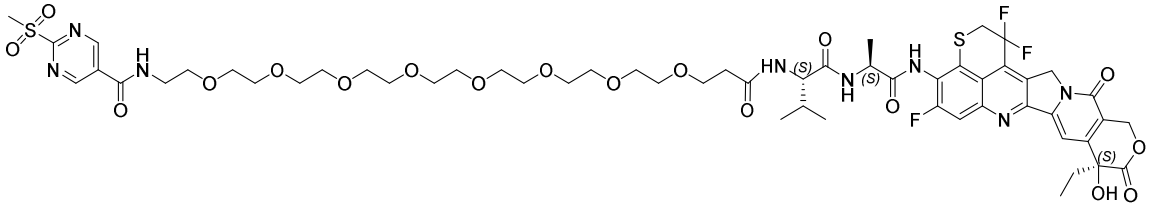
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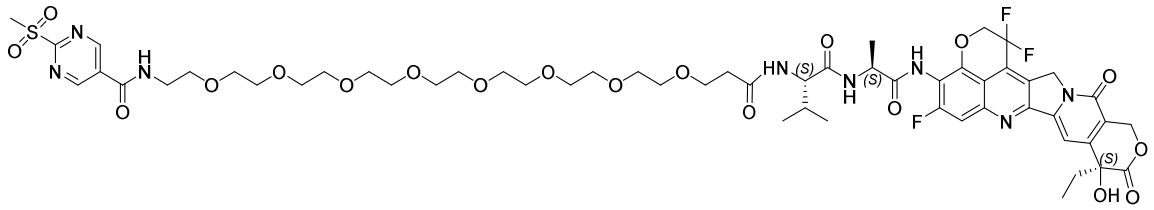
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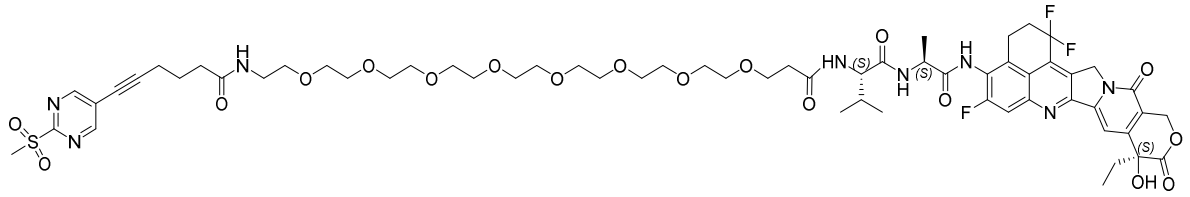
MWS-L1



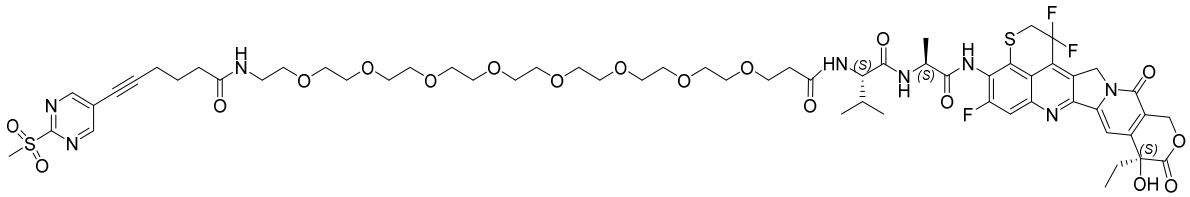
MWS-L4



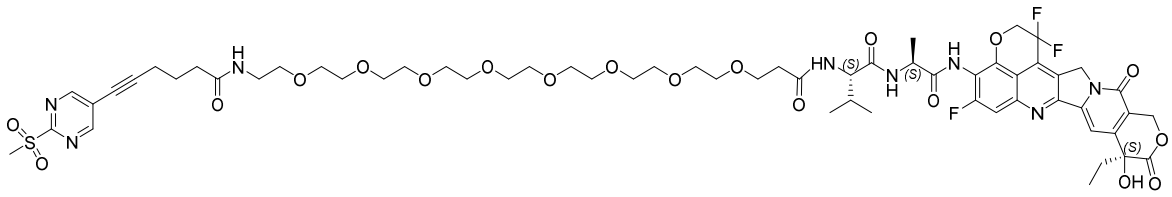
MWS-L5



MWS-L6



MWS-L9



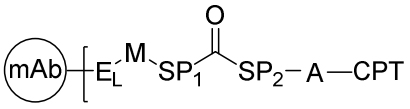
MWS-L10.

13. An antibody-drug conjugate prepared using the compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 1 to 12 and an antibody or fragment thereof.

14. The antibody-drug conjugate according to claim 13, characterized in that, the antibody or fragment thereof targets a tumor-associated antigen which is HER2, B7H3, HER3, CD19, CD20, CD22, CD30, CD33, CD37, CD45, CD56, CD66e, CD70, CD74, CD73, CD79b, CD138, CD147,

CD223, EpCAM, Mucin 1, STEAP1, GPNMB, FGF2, FOLR1, EGFR, EGFRvIII, Tissue factor, c-MET, FGFR, Nectin 4, AGS-16, Guanylyl cyclase C, Mesothelin, SLC44A4, PSMA, EphA2, AGS-5, GPC-3, c-KIT, RoR1, PD-L1, CD27L, 5T4, Mucin16, NaPi2b, STEAP, SLITRK6, ETBR, BCMA, Trop-2, CEACAM5, SC-16, SLC39A6, Delta-like protein 3, or Claudin 18.2.

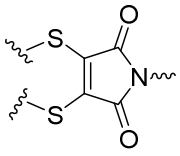
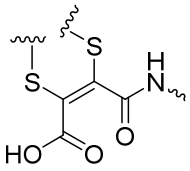
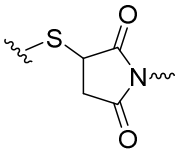
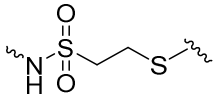
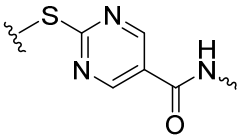
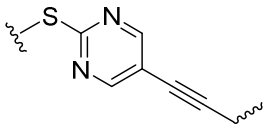
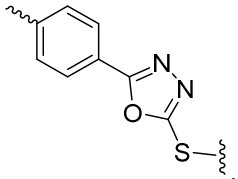
15. The antibody-drug conjugate according to claim 13 or 14, characterized in that, the antibody-drug conjugate has a structure represented by general formula



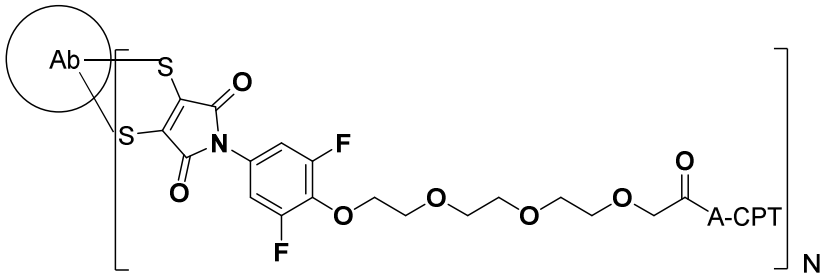
, in which mAb means the antibody or fragment thereof,

and groups M, SP_1, SP_2, A and CPT have the same meaning as defined in any one of claims 5 to 12 for the groups M, SP_1, SP_2, A and CPT; N is in the range of 1 to 10; and

E_L is selected from the group consisting of the following groups, in which  means bonding to the cysteine in mAb, means bonding to M:

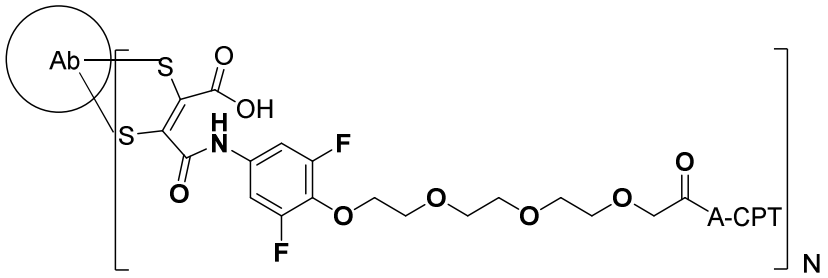
E_L-1a and/or E_L-1b:  and/or  ; E_L-2:  ; E_L-3:  ; E_L-4:  ; E_L-5:  ; E_L-6:  .

16. The antibody-drug conjugate according to claim 15, characterized in that, the antibody-drug conjugate has a structure represented by general formula VII or general formula VIII as follows:



general formula VII

and/or



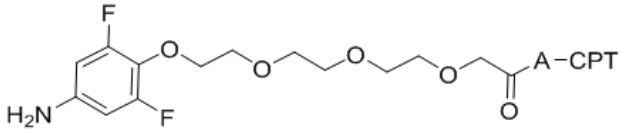
general formula VIII,

in general formula VII and general formula VIII, N is in the range of 1 to 10.

17. The antibody-drug conjugate according to any one of claims 13 to 16, characterized in that, the antibody or fragment thereof is an anti-Trop-2 antibody or fragment thereof comprises heavy chain CDR1, CDR2 and CDR3 having the amino acid sequence shown in SEQ ID NO: 1, SEQ ID NO: 2 and SEQ ID NO: 3 respectively and light chain CDR1, CDR2 and CDR3 having the amino acid sequence shown in SEQ ID NO: 4, SEQ ID NO: 5 and SEQ ID NO: 6 respectively, or the anti-Trop-2 antibody hTINA1 or fragment thereof; or

the antibody or fragment thereof is the anti-HER-2 antibody Trastuzumab or fragment thereof.

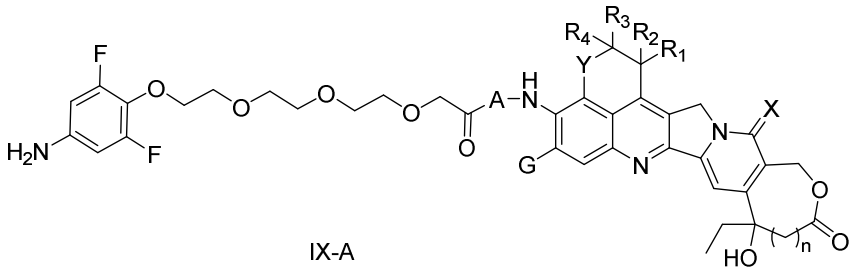
18. A prodrug metabolite produced by the antibody-drug conjugate according to any one of claims 13 to 17, characterized in that, the prodrug metabolite is a compound represented by structural formula IX:



structural formula IX,

in structural formula IX, groups A and CPT have the same meaning as defined in any one of claims 5 to 12 for the groups A and CPT.

19. The prodrug metabolite according to claim 18, characterized in that, the compound is a compound represented by structural formula IX-A:



IX-A

structural formula IX-A,

in structural formula IX-A, groups A, G, Y, R_1, R_2, R_3, R_4, X, and n have the same meaning as defined in any one of claims 5 to 12 for the groups A, G, Y, R_1, R_2, R_3, R_4, X, and n.

20. Use of the compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 1 to 12 or the antibody-drug conjugate according to any one of claims 13 to 17 or the prodrug metabolite according to any one of claims 18 to 19 in the manufacture of a medicament for the treatment of a tumor.

21. The compound or a pharmaceutically acceptable salt, stereoisomer, or solvate thereof according to any one of claims 1 to 12 or the antibody-drug conjugate according to any one of claims 13 to 17 for use in treating a tumor.

22. The use according to claim 20 or the compound or a pharmaceutically acceptable salt, stereoisomer or solvate thereof, or the antibody-drug conjugate for use according to claim 21, characterized in that, the tumor is a cancer.

23. The use according to claim 20 or 22 or the compound or a pharmaceutically acceptable salt, stereoisomer or solvate thereof, or the antibody-drug conjugate for use according to claim 21 or 22, characterized in that, the tumor is positive for a tumor-associated antigen or is associated with the

high expression of the tumor-associated antigen.

24. The use according to claim 23 or the compound or a pharmaceutically acceptable salt, stereoisomer or solvate thereof, or the antibody-drug conjugate for use according to claim 23, characterized in that, the tumor-associated antigen is HER2, B7H3, HER3, CD19, CD20, CD22, CD30, CD33, CD37, CD45, CD56, CD66e, CD70, CD74, CD73, CD79b, CD138, CD147, CD223, EpCAM, Mucin 1, STEAP1, GPNMB, FGF2, FOLR1, EGFR, EGFRvIII, Tissue factor, c-MET, FGFR, Nectin 4, AGS-16, Guanylyl cyclase C, Mesothelin, SLC44A4, PSMA, EphA2, AGS-5, GPC-3, c-KIT, RoR1, PD-L1, CD27L, 5T4, Mucin16, NaPi2b, STEAP, SLITRK6, ETBR, BCMA, Trop-2, CEACAM5, SC-16, SLC39A6, Delta-like protein 3, or Claudin 18.2.

25. The use according to any one of claims 20, and 22 to 24 or the compound or a pharmaceutically acceptable salt, stereoisomer or solvate thereof, or the antibody-drug conjugate for use according to any one of claims 21, and 22 to 24, characterized in that, the tumor is colorectal cancer, bladder cancer, breast cancer, pancreatic cancer, liver cancer, ovarian cancer, endometrial cancer, fallopian tube cancer, gastric cancer, prostate cancer, small cell lung cancer, non-small cell lung cancer, esophageal squamous cell carcinoma, head and neck squamous cell carcinoma, melanoma, leukemia, lymphoma, glioma, or glioblastoma.

26. The compound or a pharmaceutically acceptable salt, stereoisomer or solvate thereof, or the antibody-drug conjugate for use according to any one of claims 21 to 25, characterized in that, the subject is a human.