Claims

1. An antibody drug conjugate comprising:

an anti-CD37 antibody or antigen binding fragment thereof, conjugated to monomethyl auristatin E (MMAE) via a linker, wherein the antibody or antigen binding fragment thereof comprises a heavy chain variable region comprising CDR-H1 consisting of the amino acid sequence ranging from 31 to 35 of SEQ ID NO:7, CDR-H2 consisting of the amino acid sequence ranging from 50 to 65 of SEQ ID No: 7, and CDR-H3 consisting of the amino acid sequence ranging from 98 to 104 of SEQ ID NO: 7; and a light chain variable region comprising CDR-L1 consisting of the amino acid sequence ranging from 24 to 34 of SEQ ID NO: 8, CDR-L2 consisting of the amino acid sequence ranging from 50 to 56 of SEQ ID No: 8, and CDR-L3 consisting of the amino acid sequence ranging from 89 to 95 of SEQ ID NO: 8.

2. The antibody drug conjugate of claim 1, wherein the antibody or antigen binding fragment thereof comprises the heavy chain variable region consisting of the amino acid sequence ranging from residue 1 to residue 115 of SEQ ID NO: 7 and the light chain variable region consisting of the amino acid sequence ranging from residue 1 to residue 106 of SEQ ID NO: 8.

3. The antibody drug conjugate of claims 1 or 2, wherein the antibody comprises the heavy chain consisting of the amino acid sequence ranging from residue 1 to residue 441 of SEQ ID NO: 7 and the light chain consisting of the amino acid sequence ranging from residue 1 to residue 212 of SEQ ID NO: 8.

4. An antibody drug conjugate comprising an anti-CD37 antibody or antigen binding fragment thereof conjugated to monomethyl auristatin E (MMAE) via a linker, wherein the antibody or antigen binding fragment thereof comprises a heavy chain variable region comprising the amino acid sequence of the heavy chain variable region of an antibody produced by a Chinese Hamster Ovary (CHO) cell deposited under American Type Culture Collection

(ATCC) Accession No. PTA-120464, and a light chain variable region comprising the amino acid sequence of the light chain variable region of an antibody produced by a Chinese Hamster Ovary (CHO) cell deposited under ATCC Accession No. PTA-120464.

5. The antibody drug conjugate of claim 4, wherein the antibody comprises a heavy chain consisting of the amino acid sequence of the heavy chain of an antibody produced by a Chinese Hamster Ovary (CHO) cell deposited under ATCC. Accession No. PTA-120464, and a light chain consisting of the amino acid sequence of the light chain of an antibody produced by a Chinese Hamster Ovary (CHO) deposited under ATCC. Accession No. PTA-120464.

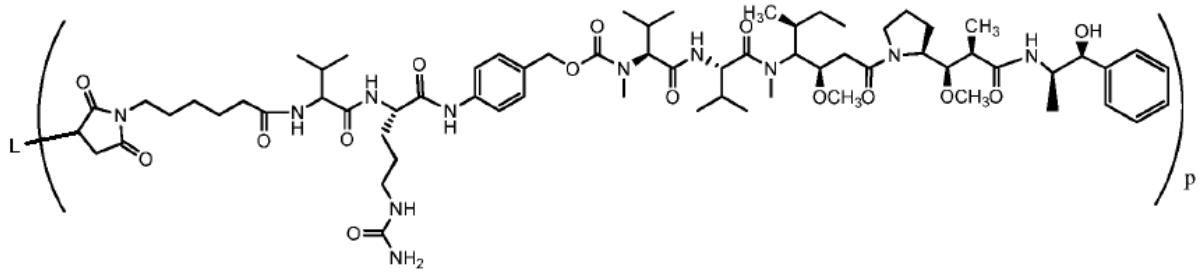
6. The antibody drug conjugate of claims 1, 2 and 4, wherein the antigen binding fragment thereof is an Fab, $F(ab')_2$, Fv or scFv fragment.

7. The antibody drug conjugate of any one of claims 1 to 6, wherein the antibody or antigen binding fragment thereof is a fully human antibody or antigen binding fragment thereof.

8. The antibody drug conjugate of any one of claims 1 to 7, wherein the antibody or antigen binding fragment thereof is recombinantly produced.

9. The antibody drug conjugate of claim 1, wherein the linker has an amino acid unit of valine-citrulline (Val-Cit linker).

10. The antibody drug conjugate of claim 1, wherein the antibody drug conjugate has the following structure:



wherein L- represents an antibody or antigen binding fragment thereof and p is from 1 to 10.

11. The antibody drug conjugate of claim 10, wherein the antibody or antigen binding fragment thereof comprises the heavy chain variable region consisting of the amino acid sequence ranging from residue 1 to residue 115 of SEQ ID NO: 7 and the light chain variable region consisting of the amino acid sequence ranging from residue 1 to residue 106 of SEQ ID NO: 8.

12. The antibody drug conjugate of claim 11, wherein the antibody comprises the heavy chain consisting of the amino acid sequence ranging from residue 1 to residue 441 of SEQ ID NO: 7 and the light chain consisting of the amino acid sequence ranging from residue 1 to residue 212 of SEQ ID NO: 8.

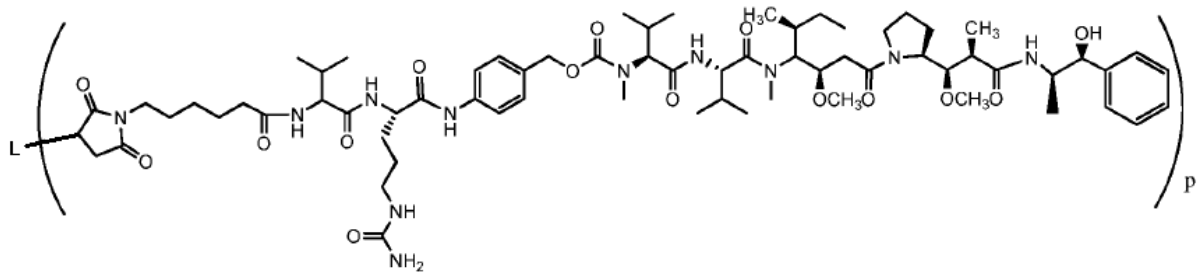
13. The antibody drug conjugate of claim 1, wherein the antibody or antigen binding fragment thereof comprises the heavy chain variable region consisting of the amino acid sequence ranging from residue 2 to residue 115 of SEQ ID NO: 7 wherein residue 1 is pyroglutamate and the light chain variable region consisting of the amino acid sequence ranging from residue 1 to residue 106 of SEQ ID NO: 8.

14. The antibody drug conjugate of claim 1, wherein the antibody comprises the heavy chain consisting of the amino acid sequence ranging from residue 2 to residue 440 of SEQ

ID NO: 7 wherein residue 1 is pyroglutamate and the light chain consisting of the amino acid sequence ranging from residue 1 to residue 212 of SEQ ID NO: 8.

15. The antibody drug conjugate of claim 4, wherein the linker is Val-Cit linker.

16. The antibody drug conjugate of claim 4, wherein the antibody drug conjugate has the following structure:

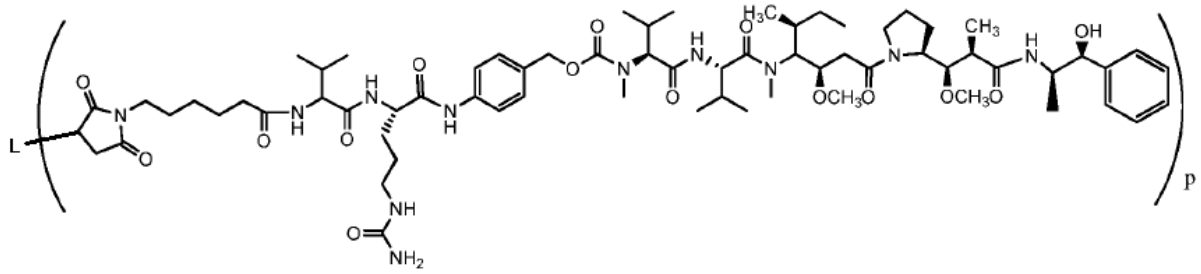


wherein L- represents an antibody or antigen binding fragment thereof and p is from 1 to 10.

17. The antibody drug conjugate of claim 16, wherein the antibody comprises a heavy chain consisting of the amino acid sequence of the heavy chain of an antibody produced by a Chinese Hamster Ovary (CHO) cell deposited under ATCC. Accession No. PTA-120464, and a light chain consisting of the amino acid sequence of the light chain of an antibody produced by a Chinese Hamster Ovary (CHO) deposited under ATCC. Accession No. PTA-120464.

18. The antibody drug conjugate of claim 13, wherein the linker is Val- Cit linker.

19. The antibody drug conjugate of claim 13, wherein the antibody drug conjugate has the following structure:



wherein L- represents an antibody or antigen binding fragment thereof and p is from 1 to 10.

20. The antibody drug conjugate of claim 19, wherein the antibody comprises the heavy chain consisting of the amino acid sequence ranging from residue 2 to residue 440 of SEQ ID NO: 7 wherein residue 1 is pyroglutamate and the light chain consisting of the amino acid sequence ranging from residue 1 to residue 212 of SEQ ID NO: 8.

21. A polynucleotide comprising a sequence encoding the heavy chain variable region of the anti-CD37 antibody or the antigen binding fragment thereof of any one of claims 1 to 2.

22. A polynucleotide comprising a sequence encoding the light chain variable region of the anti-CD37 antibody or the antigen binding fragment thereof of any one of claims 1 to 2.

23. An expression vector comprising the polynucleotide of claim 21 and/or 22.

24. A host cell selected from the group consisting of:

(a) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-CD37 antibody or the antigen binding fragment thereof of any one of claims 1 to 2 and a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen binding fragment thereof of any one of claims 1 to 2;

(b) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-CD37 antibody or the antigen binding fragment thereof of any one of claims 1 to 2 and an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen binding fragment thereof of any one of claims 1 to 2;

(c) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-CD37 antibody or the antigen binding fragment thereof of any one of claims 1 to 2; and

(d) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain variable region of the anti-CD37 antibody or the antigen binding fragment thereof of any one of claims 1 to 2.

25. A method of producing an antibody drug conjugate, wherein the method comprises:

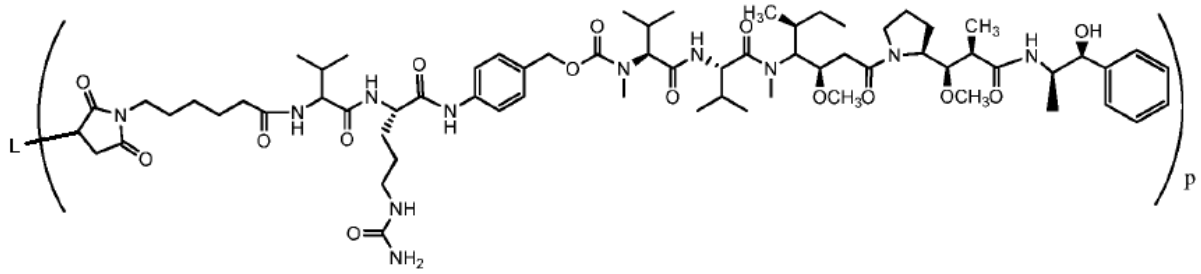
a) culturing the host cell of claim 24 under conditions suitable to allow expression of an anti-CD37 antibody or antigen binding fragment thereof; and

b) conjugating the antibody or antigen binding fragment thereof to monomethyl auristatin E (MMAE) via a linker.

26. An anti-CD37 antibody drug conjugate produced by the method of claim 25.

27. The antibody drug conjugate of claim 26, wherein the linker is Val- Cit linker.

28. The antibody drug conjugate of claim 26, wherein the antibody drug conjugate has the following structure:



wherein L- represents an antibody or antigen binding fragment thereof and p is from 1 to 10.

29. A host cell selected from the group consisting of:

(a) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-CD37 antibody of claim 3 and a polynucleotide comprising a base sequence encoding the light chain of the antibody;

(b) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-CD37 antibody of claim 3 and an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain of the antibody;

(c) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-CD37 antibody of claim 3; and

(d) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain of the anti-CD37 antibody of claim 3.

30. A method of producing an antibody drug conjugate, wherein the method comprises:

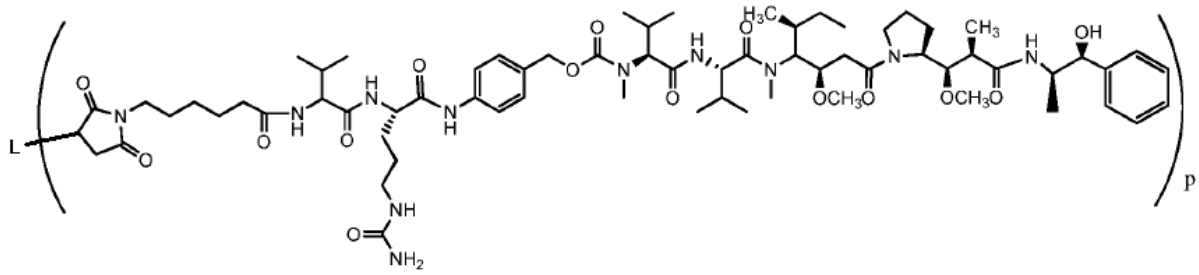
a) culturing the host cell of claim 29 under conditions suitable to allow expression of an anti-CD37 antibody; and

b) conjugating the antibody to monomethyl auristatin E (MMAE) via a linker.

31. An anti-CD37 antibody drug conjugate produced by the method of claim 30.

32. The antibody drug conjugate of claim 31, wherein the linker is Val- Cit linker.

33. The antibody drug conjugate of claim 31, wherein the antibody drug conjugate has the following structure:



wherein L- represents an antibody and p is from 1 to 10.

34. A pharmaceutical composition comprising a therapeutically effective amount of the antibody drug conjugate of anyone of claims 1 to 20, 26 to 28 and 31 to 33 and a pharmaceutically acceptable excipient in a human unit dose form.

35. A pharmaceutical composition comprising a therapeutically effective amount of the antibody drug conjugate of claim 12 and the antibody drug conjugate of claim 20 and a pharmaceutically acceptable excipient in a human unit dose form.

36. The pharmaceutical composition of claims 34 or 35, wherein the composition is for treating a CD37-expressing cancer.

37. The pharmaceutical composition of claim 36, wherein the CD37-expressing cancer is Non-Hodgkin's lymphoma (NHL), chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML), or Multiple Myeloma (MM).

38. The pharmaceutical composition of claims 34 or 35, wherein the composition is for administration in combination with radiation or a chemotherapeutic agent.

39. The pharmaceutical composition of claims 34 or 35 comprising a therapeutically effective amount of the antibody drug conjugate of claim 1 and a chemotherapeutic agent and a pharmaceutically acceptable excipient in a human unit dose form.

40. The pharmaceutical composition of claims 35 comprising a therapeutically effective amount of the antibody drug conjugate of claim 12, the antibody drug conjugate of claim 20 and a chemotherapeutic agent, and a pharmaceutically acceptable excipient in a human unit dose form.

41. Use of the antibody drug conjugate of any of claims 1 to 20, 26 to 28 and 31 to 33 in the manufacture of a medicament for the treatment of a CD37-expressing cancer in a subject.

42. The antibody drug conjugate of any of claims 1 to 20, 26 to 28 and 31 to 33 for use in a method of treating a CD37-expressing cancer in a subject.

43. The use of claim 41, wherein the medicament is for administration to a subject in an effective amount in combination with radiation.

44. The use of claim 41, wherein the medicament is for administration to a subject in an effective amount in combination with chemotherapeutic agent.