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.

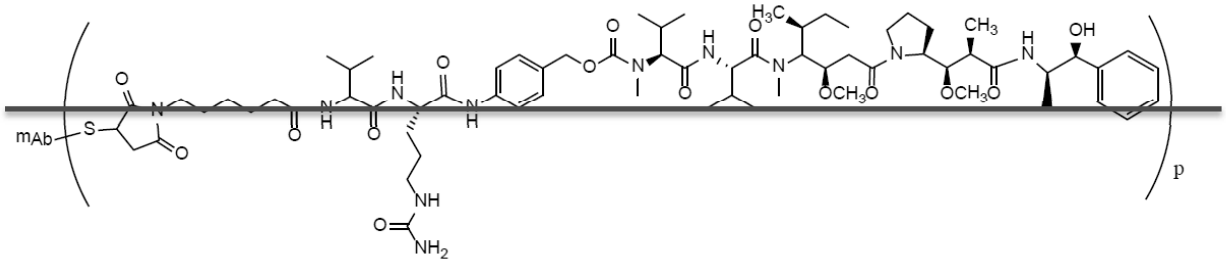
6. The antibody drug conjugate of claims 1, 2 and 4, wherein the antigen binding fragment thereof is an Fab, $F(ab')_2$, Fv or scFv fragment.

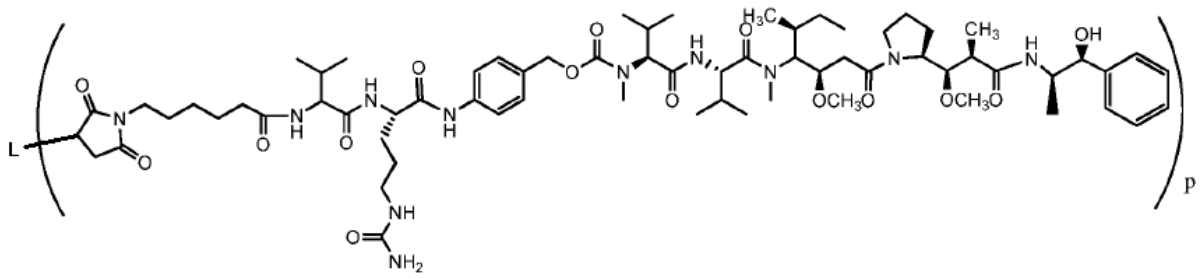
7. The antibody drug conjugate of any one of claims 1 to 6, wherein the antibody or antigen binding fragment thereof is a fully human antibody or antigen binding fragment thereof.

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 ~~is~~ 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 ~~mAb-~~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 any one of claims 1 to 12, wherein the antibody or antigen binding fragment thereof undergoes post-translational modifications.~~

~~14. The antibody drug conjugate of any one of claims 1 to 12, wherein residue 1 of the heavy chain variable region is a pyroglutamate.~~

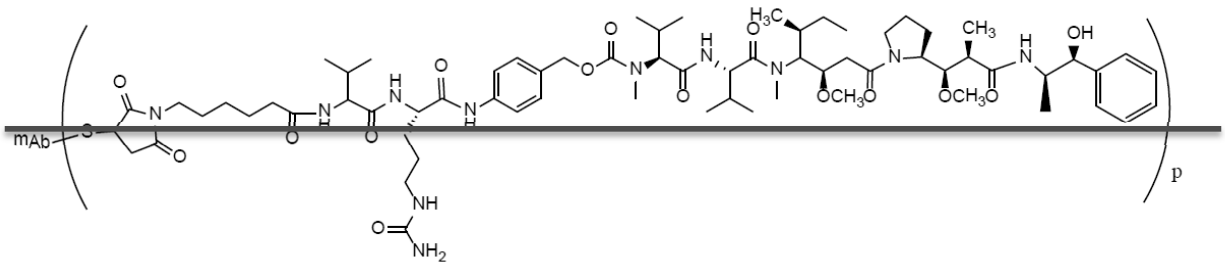
~~15~~13. The antibody drug conjugate of claim 1, wherein the antibody or antigen binding fragment thereof comprises the heavy chain variable region consisting of the amino acid sequence ranging from residue ~~1~~ 2 to residue 115 of SEQ ID NO: 7 wherein residue 1 is

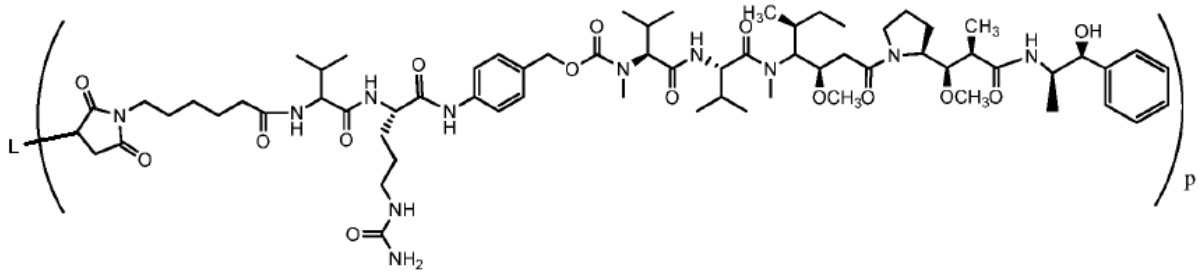
pyroglutamate and the light chain variable region consisting of the amino acid sequence ranging from residue 1 to residue 106 of SEQ ID NO: 8.

~~16~~14. The antibody drug conjugate of claim 1, wherein the antibody comprises the heavy chain consisting of the amino acid sequence ranging from residue ~~1~~ 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.

~~17~~15. The antibody drug conjugate of claim 4, wherein the linker is Val-Cit linker.

~~18~~16. The antibody drug conjugate of claim 4, wherein the antibody drug conjugate has the following structure:





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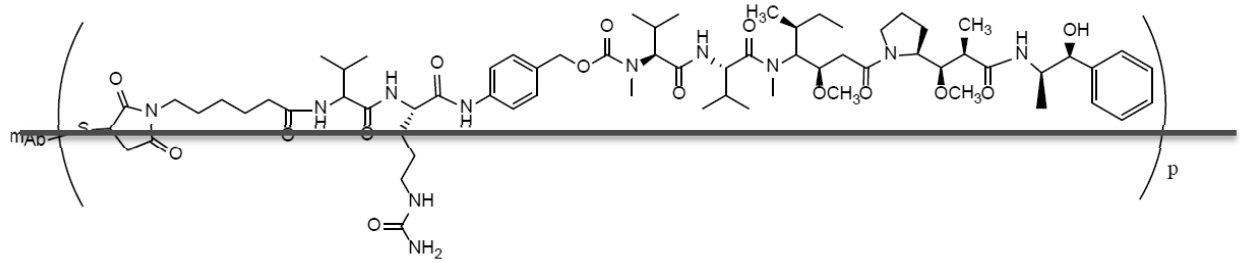
wherein ~~mAb-~~L- represents an antibody or antigen binding fragment thereof and p is from 1 to 10.

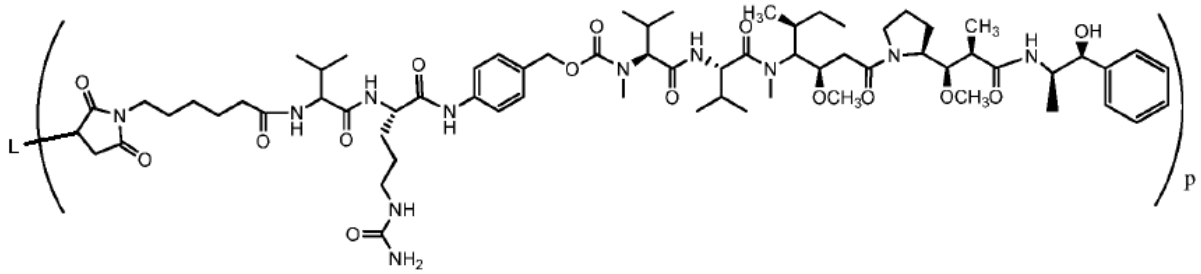
~~19~~17. The antibody drug conjugate of claim ~~18~~16, wherein the antibody comprises a heavy chain consisting of the amino acid sequence of the heavy chain of an antibody produced

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.

~~20~~18. The antibody drug conjugate of claim ~~15~~13, wherein the linker is Val- Cit linker.

~~21~~19. The antibody drug conjugate of claim ~~15~~13, wherein the antibody drug conjugate has the following structure:





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

~~22~~20. The antibody drug conjugate of claim ~~21~~19, wherein the antibody comprises the heavy chain consisting of the amino acid sequence ranging from residue ~~1~~ 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.

~~23~~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.

~~24~~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.

~~25~~23. An expression vector comprising the polynucleotide of claim ~~23~~ 21 and/or ~~24~~22.

~~26~~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.

~~27~~25. A method of producing an antibody drug conjugate, wherein the method comprises:

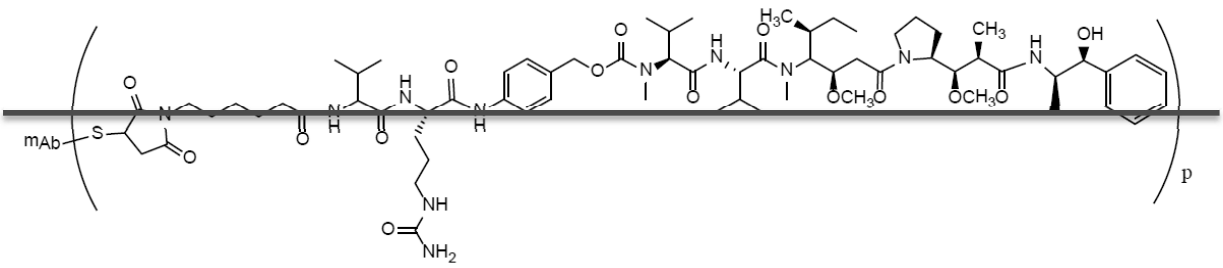
a) culturing the host cell of claim ~~26~~ 24 under conditions suitable to allow expression of an anti-CD37 antibody or antigen binding fragment thereof; and

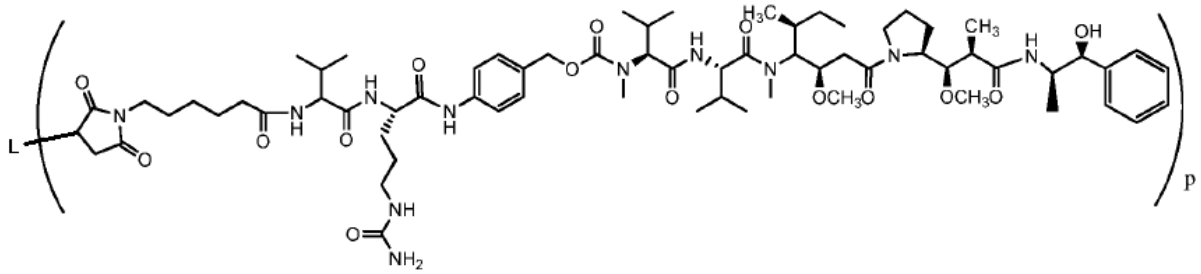
b) conjugating the antibody or antigen binding fragment thereof to monomethyl auristatin E (MMAE) via a linker.

~~28~~26. An anti-CD37 antibody drug conjugate produced by the method of claim ~~27~~25.

~~29~~27. The antibody drug conjugate of claim ~~28~~26, wherein the linker is Val- Cit linker.

~~30~~28. The antibody drug conjugate of claim ~~28~~26, wherein the antibody drug conjugate has the following structure:





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

~~31~~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.

~~32~~30. A method of producing an antibody drug conjugate, wherein the method comprises:

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a) culturing the host cell of claim ~~31~~ under conditions suitable to allow expression of an anti-CD37 antibody; and

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

~~33~~31. An anti-CD37 antibody drug conjugate produced by the method of claim ~~32.~~ 30.

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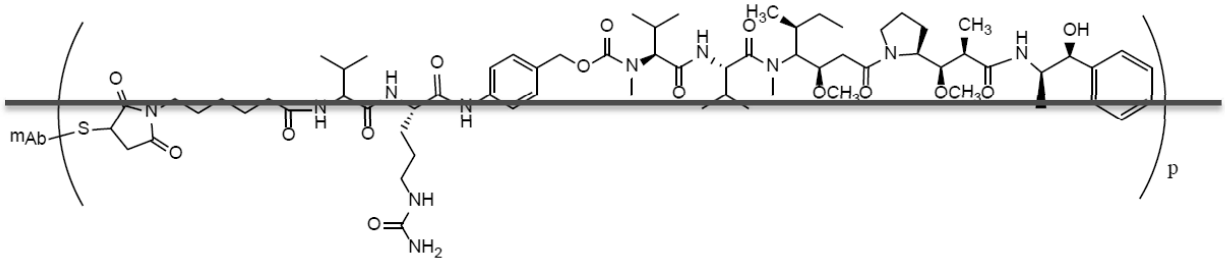
~~34~~32. The antibody drug conjugate of claim ~~33~~, wherein the linker is Val- Cit linker.

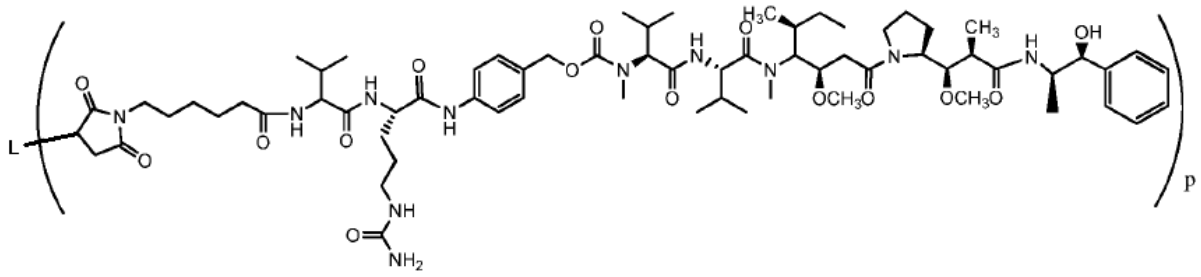
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~~35~~33. The antibody drug conjugate of claim ~~33~~, wherein the antibody drug conjugate has the following structure:

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

~~36~~34. A pharmaceutical composition ~~that comprises~~ comprising a therapeutically effective amount of the antibody drug conjugate of anyone of claims 1 to ~~22~~20, ~~28~~ 26 to ~~30~~ 28 and ~~33~~ 31 to ~~35~~ 33 and a pharmaceutically acceptable excipient in a human unit dose form.

~~37~~35. A pharmaceutical composition ~~that comprises~~ comprising a therapeutically effective amount of the antibody drug conjugate of claim 12 and the antibody drug conjugate of claim ~~22~~ 20 and a pharmaceutically acceptable excipient in a human unit dose form.

~~38~~36. The pharmaceutical composition of claims ~~36~~ 34 or ~~37~~35, wherein the composition is for ~~cancer treatment~~ treating a CD37-expressing cancer.

~~39~~37. The pharmaceutical composition of claim ~~38~~36, wherein the CD37-expressing cancer is Non-Hodgkin's lymphoma (NHL), chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML), or Multiple Myeloma (MM).

~~40~~38. The pharmaceutical composition of claims ~~36~~ 34 or ~~37~~35, wherein the composition is for administration in combination with radiation or a chemotherapeutic agent.

~~41~~39. The pharmaceutical composition of claims ~~36~~ 34 or ~~37~~ 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.

~~42~~40. The pharmaceutical composition of claims ~~37~~ 35 comprising a therapeutically effective amount of the antibody drug conjugate of claim 12, the antibody drug conjugate of claim ~~22~~ 20 and a chemotherapeutic agent, and a pharmaceutically acceptable excipient in a human unit dose form.

~~43~~41. Use of the~~The~~ antibody drug conjugate of any of claims 1 to ~~22~~20, ~~28~~ 26 to ~~30~~ 28 and ~~33~~ 31 to ~~35~~ 33 ~~for use~~ in the manufacture of a medicament ~~a pharmaceutical composition~~ for the ~~treating~~ treatment of a CD37-expressing cancer in a subject.

~~44~~42. The antibody drug conjugate of any of claims 1 to ~~22~~20, ~~28~~ 26 to ~~30~~ 28 and ~~33~~ 31 to ~~35~~ 33 for use in a method of treating a CD37-expressing cancer in a subject.

~~45~~43. ~~The antibody drug conjugate according to claim 43 or claim 44~~ The use of claim 41, wherein the ~~antibody drug conjugate~~ medicament is for administration to a subject in an effective amount in combination with radiation.

~~46~~44. ~~The antibody drug conjugate according to claim 43 or claim 44~~ The use of claim 41, wherein the ~~antibody drug conjugate~~ medicament is for administration to a subject in an effective amount in combination with chemotherapeutic agent.