CLAIMS:

1. An antibody or antigen binding fragment thereof that specifically binds to CD37, wherein said antibody or fragment thereof comprises a heavy chain variable region comprising a CDR1, CDR2, and CDR3 and a light chain variable region comprising a CDR1, CDR2, and CDR3, wherein the CDR1, CDR2, and CDR3 of said heavy chain variable region comprise the sequences as set forth in SEQ ID NOs: 4, 5, and 6, respectively, and wherein the CDR1, CDR2, and CDR3 of said light chain variable region comprise the sequences as set forth in SEQ ID NOs: 28, 29, and 30.

2. The antibody or antigen binding fragment thereof of claim 1, wherein said antibody is also capable of inducing antibody dependent cell mediated cytotoxicity (ADCC).

3. An antibody or antigen binding fragment thereof that specifically binds to CD37, wherein the antibody or antigen binding fragment thereof specifically binds to the same CD37 epitope as an antibody comprising the heavy chain variable region and light chain variable region sequences as set forth in SEQ ID NO:57 and SEQ ID NO:198, respectively.

4. The antibody or antigen binding fragment thereof of claim 1 or 2, wherein the antibody or fragment thereof comprises the heavy chain variable region and light chain variable region sequences that are at least 90% identical over the full length to polypeptide sequences selected from the group consisting of:

    (a) SEQ ID NO:57 and SEQ ID NO:198, respectively; and

    (b) SEQ ID NO:58 and SEQ ID NO:198, respectively.

5. The antibody or antigen binding fragment thereof of claim 4, wherein the antibody or fragment thereof comprises heavy chain variable region and light chain variable region sequences that are at least 95% identical over the full length to polypeptide sequences selected from the group consisting of:

    (a) SEQ ID NO:57 and SEQ ID NO: 198, respectively; and

    (b) SEQ ID NO:58 and SEQ ID NO:198, respectively.

6. The antibody or antigen binding fragment thereof of claim 5, wherein the antibody or fragment thereof comprises heavy chain variable region and light chain variable region sequences that are at least 99% identical over the full length to polypeptide sequences selected from the group consisting of:

(a) SEQ ID NO:57 and SEQ ID NO:198, respectively; and

(b) SEQ ID NO:58 and SEQ ID NO:198, respectively.

7. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or fragment thereof comprises the heavy chain variable region and the light chain variable region sequences that are selected from the group consisting of:

(a) SEQ ID NO:57 and SEQ ID N0:198, respectively; and

(b) SEQ ID NO:58 and SEQ ID NO:198, respectively.

8. The antibody or antigen binding fragment thereof of any one of claims 1-7, wherein said antibody or antigen binding fragment thereof is resurfaced.

9. The antibody of any one of claims 1-7, which is a full length antibody.

10. The antibody or antigen binding fragment of any one of claims 1-7, which is an antigen binding fragment.

11. The antibody or antigen binding fragment thereof of any one of claims 1-7, wherein said antibody or antigen binding fragment thereof comprises a Fab, Fab', $F(ab')_2$, single chain Fv or scFv, disulfide linked Fv, IgGΔCH2, minibody, $F(ab')_3$, tetrabody, triabody, diabody, mAb^2, $(scFv)_2$, or scFv-Fc.

12. An isolated cell producing the antibody or antigen binding fragment thereof of any one of claims 1-11.

13. A method of making the antibody or antigen-binding fragment thereof of any one of claims 1-11, comprising (a) culturing the cell of claim 12; and (b) isolating said antibody or antigen-binding fragment thereof from said cultured cell.

14. An immunoconjugate having the formula (A) - (L) - (C), wherein:

(A) is an antibody or antigen binding fragment thereof of any one of claims 1-11;
(L) is a linker; and
(C) is a cytotoxic agent; and
wherein said linker (L) links (A) to (C).

15. The immunoconjugate of claim 14, wherein said linker is a non-cleavable linker.

16. The immunoconjugate of claim 14 or 15, further comprising a second (C).

17. The immunoconjugate of claim 16, further comprising a third (C).

18. The immunoconjugate of claim 17, further comprising a fourth (C).

19. The immunoconjugate of claim 14 or 15 further comprising two to six (C).

20. The immunoconjugate of claim 14 or 15 further comprising three to four (C).

21. The immunoconjugate of any one of claims 14 and 16-20, wherein said linker is selected from the group consisting of a cleavable linker, a hydrophilic linker, and a dicarboxylic acid based linker.

22. The immunoconjugate of claim 15 or 21, wherein said linker is selected from the group consisting: N-succinimidyl 4-(2-pyridyldithio)pentanoate (SPP); N-succinimidyl 4-(2-pyridyldithio)butanoate (SPDB); N-succinimidyl 4-(2-pyridyldithio)-2-sulfobutanoate (sulfo- SPDB); N-succinimidyl 4-(maleimidomethyl) cyclohexanecarboxylate (SMCC); N-sulfosuccinimidyl 4-(maleimidomethyl) cyclohexanecarboxylate (sulfoSMCC); N-succinimidyl-4-(iodoacetyl)-aminobenzoate (SIAB); and N-succinimidyl-[(N-maleimidopropionamido)-tetraethyleneglycol] ester (NHS-PEG4-maleimide).

23. The immunoconjugate of claim 15 or 22, wherein said linker is SMCC.

24. The immunoconjugate of any one of claims 14-23, wherein said cytotoxic agent is selected from the group consisting of a maytansinoid, maytansinoid analog, doxorubicin, a modified doxorubicin, benzodiazepine, taxoid, CC-1065, CC-1065 analog,

duocarmycin, duocarmycin analog, calicheamicin, dolastatin, dolastatin analog, auristatin, tomaymycin derivative, and leptomycin derivative.

25. The immunoconjugate of claim 24, wherein said cytotoxic agent is a maytansinoid.

26. The immunoconjugate of claim 25, wherein said cytotoxic agent is N(2')-deacetyi- N(2')-(3-mercapto-1-oxopropyl)-maytansine (DM1) or N(2')-deacetyl-N(2')-(4-mercapto-4-methyl-l-oxopentyl)-maytansine (DM4).

27. The immunoconjugate of claim 14, wherein (A) is an antibody comprising a heavy chain variable region and a light chain variable region, and wherein the CDRl, CDR2, and CDR3 of said heavy chain variable region and the light chain variable region comprise the sequences set forth in SEQ ID NOs: 4, 5, and 6 and SEQ ID NOs: 28, 29, and 30, respectively.

28. The immunoconjugate of claim 27, wherein the antibody comprises the heavy chain variable region as set forth in SEQ ID NO:57 and the light chain variable region as set forth in SEQ ID NO:198.

29. The immunoconjugate of claim 27 or 28, wherein (C) is a maytansinoid.

30. The immunoconjugate of claim 29, wherein (A) is an antibody comprising the heavy chain variable region as set forth in SEQ ID NO:57 and the light chain variable region as set forth in SEQ ID NO:l98, wherein (L) is SMCC, and wherein (C) is DM1.

31. The immunoconjugate of claim 27, wherein (A) is an antibody comprising the heavy chain variable region as set forth in SEQ ID NO:58 and the light chain variable region as set forth in SEQ ID N0:198, wherein (L) is SMCC, and wherein (C) is DM1.

32. A pharmaceutical composition comprising the antibody or antigen binding fragment thereof of any one of claims 1-11, or the immunoconjugate of any one of claims 14-31 and a pharmaceutically acceptable carrier.

33. A pharmaceutical composition comprising two or more of the immunoconjugates of any one of claims 14-31, wherein the immunoconjugates have an average of 3 to 4 (C) per (A).

34. The pharmaceutical composition of claim 33, wherein the immunoconjugates have an average of 3.5 (C) per (A).

35. The pharmaceutical composition of claim 33, wherein the immunoconjugates have an average of 3.5 ± 0.5 (C) per (A).

36. A diagnostic reagent comprising the antibody or antigen binding fragment thereof of any one of claims 1-11 or the immunoconjugate of any one of claims 14-31 which is labeled.

37. The diagnostic reagent of claim 36, wherein said label is selected from the group consisting of a radiolabel, a fluorophore, a chromophore, an imaging agent and a metal ion.

38. A kit comprising the antibody or antigen binding fragment thereof of any one of claims 1-11, the immunoconjugate of any one of claims 14-31, or the pharmaceutical composition of any one of claims 32-35, and components for a detection assay.

39. An *in vitro* method for inhibiting the growth of a cell expressing CD37 comprising contacting the cell with the antibody or antigen binding fragment thereof of any one of claims 1-11, the immunoconjugate of any one of claims 14-31, or the pharmaceutical composition of any one of claims 32-35.

40. Use of the antibody or antigen binding fragment thereof of any one of claims 1-11, the immunoconjugate of any one of claims 14-31, or the pharmaceutical composition of any one of claims 32-35 in the preparation of a medicament for inhibiting the growth of a cell expressing CD37.

41. The antibody or antigen binding fragment thereof of any one of claims 1-11, the immunoconjugate of any one of claims 14-31, or the pharmaceutical composition of any one of claims 32-35 for use in inhibiting the growth of a cell expressing CD37.

42. Use of the antibody or antigen binding fragment thereof of any one of claims 1-11, the immunoconjugate of any one of claims 14-31, or the pharmaceutical composition of any one of claims 32-35 in the preparation of a medicament for treating a patient having a CD37- expressing cancer.

43. The antibody or antigen binding fragment thereof of any one of claims 1-11, the immunoconjugate of any one of claims 14-31, or the pharmaceutical composition of any one of claims 32-35 for use in treating a patient having a CD37-expressing cancer.

44. The use or the antibody or antigen binding fragment thereof, immunoconjugate or pharmaceutical composition of any one of claims 42-43, wherein said cancer is selected from the group consisting of B cell lymphomas, NHL, precursor B cell lymphoblastic leukemia/lymphoma and mature B cell neoplasms, B cell chronic lymphocytic leukemia (CLL)/small lymphocytic lymphoma (SLL), B cell prolymphocytic leukemia, lymphoplasmacytic lymphoma, mantle cell lymphoma (MCL), follicular lymphoma (FL), low grade, intermediate-grade and high-grade (FL), cutaneous follicle center lymphoma, marginal zone B cell lymphoma, MALT type marginal zone B cell lymphoma, nodal marginal zone B cell lymphoma, splenic type marginal zone B cell lymphoma, hairy cell leukemia, diffuse large B cell lymphoma, Burkitt's lymphoma, plasmacytoma, plasma cell myeloma, post-transplant lymphoproliferative disorder, Waldenstrom's macroglobulinemia, and anaplastic large-cell lymphoma (ALCL).

45. The use or the antibody or antigen binding fragment thereof, immunoconjugate or pharmaceutical composition of any one of claims 42-43, wherein said cancer is leukemia or lymphoma.

46. An isolated polynucleotide encoding an antibody or antigen binding fragment thereof comprising the heavy chain variable region and light chain variable region sequences as set forth in SEQ ID NO: 57 or 58 and SEQ ID NO: 198, respectively.

47. The isolated polynucleotide of claim 46, wherein the polynucleotide comprises a sequence that is at least 90% identical over the full length to a sequence selected from the group consisting of SEQ ID NOs: 123, 124, and 138.

48. The isolated polynucleotide of claim 47, wherein the polynucleotide comprises a sequence that is at least 95% identical over the full length to a sequence selected from the group consisting of SEQ ID NOs: 123, 124, and 138.

49. The isolated polynucleotide of claim 48, wherein the polynucleotide comprises a sequence that is at least 99% identical over the full length to a sequence selected from the group consisting of SEQ ID NOs: 123, 124, and 138.

50. The isolated polynucleotide of claim 49, wherein the polynucleotide comprises a sequence selected from the group consisting of SEQ ID NOs: 123, 124, and 138.

51. A vector comprising the polynucleotide of any one of claims 46-50.

52. A host cell comprising the vector of claim 51.