

CLAIMS

1. A CD19 antibody or antigen-binding fragment thereof comprising:
 - a heavy chain variable complementarity determining region (CDR) sequences of SYGMH (SEQ ID NO: 1) (HCDR1), LIWYDGSNKYYADSVKG (SEQ ID NO: 2) (HCDR2) and PVEGLLRGFDY (SEQ ID NO: 3) (HCDR3).
2. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGAVPIT (SEQ ID NO: 12) (LCDR3).
3. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQVDSLHPFT (SEQ ID NO: 13) (LCDR3).
4. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGGVPLT (SEQ ID NO: 14) (LCDR3).
5. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVRSSSYLA (SEQ ID NO: 8) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQLFDSPYT (SEQ ID NO: 15) (LCDR3).
6. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVRSSSYLA (SEQ ID NO: 8) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGVPPLT (SEQ ID NO: 16) (LCDR3).

7. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGGVPPFT (SEQ ID NO: 17) (LCDR3).
8. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASNRAT (SEQ ID NO: 10) (LCDR2), and QQAGVFPFT (SEQ ID NO: 18) (LCDR3).
9. The CD19 antibody or antigen-binding fragment thereof of claim 1, further comprising:
 - a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASRRAT (SEQ ID NO: 11) (LCDR2), and QQAGIPPYT (SEQ ID NO: 19) (LCDR3).
10. The CD19 antibody or antigen-binding fragment thereof of claim 1, comprising
 - an immunoglobulin light chain variable (V_L) region comprising an amino acid sequence that is at least 90% identical to SEQ ID NO: 20; and
 - an immunoglobulin heavy chain variable (V_H) region comprising an amino acid sequence that is at least 90% identical to SEQ ID NO: 5.
11. A CD19 antibody or antigen-binding fragment thereof comprising:
 - an immunoglobulin light chain variable (V_L) region comprising an amino acid sequence that is at least 90% identical to SEQ ID NOs: 20-27; and
 - an immunoglobulin heavy chain variable (V_H) region comprising an amino acid sequence that is at least 90% identical to SEQ ID NO: 5.
12. The CD19 antibody or antigen-binding fragment thereof of claims 1-11, wherein the V_L region comprises an amino acid sequence that is at least 95% identical to SEQ ID NOs: 20-27.

13. The CD19 antibody or antigen-binding fragment thereof of claim 12, wherein the V_L region comprises an amino acid sequence that is identical to SEQ ID NOs: 20-27.
14. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the V_H region comprises an amino acid sequence that is at least 95% identical to SEQ ID NO: 5.
15. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the V_H region comprises an amino acid sequence that is identical to SEQ ID NO: 5.
16. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the V_L region comprises an amino acid sequence that is identical to SEQ ID NOs:20-27 and the V_H region is identical to SEQ ID NO: 5.
17. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the CD19 antibody or fragment thereof is selected from the group consisting of an IgA antibody, IgG antibody, IgE antibody, IgM antibody, bi- or multi- specific antibody, Fab fragment, Fab' fragment, F(ab')₂ fragment, Fd' fragment, Fd fragment, isolated CDRs or sets thereof; single-chain variable fragment (scFv), polypeptide-Fc fusion, single domain antibody, cameloid antibody; masked antibody, Small Modular ImmunoPharmaceutical ("SMIPsTM"), single chain, Tandem diabody, VHHs, Anticalin, Nanobody, minibodies, BiTE, ankyrin repeat protein, DARPIN, Avimer, DART, TCR-like antibody, Adnectin, Affilin, Trans-body; Affibody, TrimerX, MicroProtein, Fynomer, Centyrin; and KALBITOR.
18. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the CD19 antibody or fragment thereof is a monoclonal antibody or a single-chain variable fragment (scFv).
19. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the CD19 antibody or fragment thereof is an antibody comprising an IgG constant region.

20. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the CD19 antibody or fragment thereof is a single-chain variable fragment (scFv).
21. The CD19 antibody or antigen-binding fragment thereof of claim 20, wherein the CD19 scFv comprises linker sequence comprising SEQ ID Nos: 36-39.
22. The CD19 antibody or antigen-binding fragment thereof of claim 20 or 21, wherein the CD19 scFv comprises a signal peptide selected from SEQ ID NOs: 40 or 41.
23. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the antibody or fragment thereof binds CD19 with a K_D between about 8 nanomolar (nM) and about 242 nM.
24. The CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the antibody or fragment thereof binds CD19 on target cells with an EC_{50} between about 0.1 nM and about 2.7 nM.
25. A method of treating a cancer comprising administering the CD19 antibody or antigen-binding fragment thereof of any one of the preceding claims to a subject in need of treatment.
26. The method of claim 25, wherein the cancer is selected from leukemia, lymphoma, or myeloma.
27. A pharmaceutical composition comprising a CD19 antibody or antigen-binding fragment thereof and a pharmaceutically acceptable carrier, wherein the CD19 antibody or fragment thereof comprises:
a heavy chain variable region with complementarity determining region (CDR) sequences of SYGMH (SEQ ID NO: 1) (HCDR1),
LIWYDGSNKYYADSVKG (SEQ ID NO: 2) (HCDR2) and PVEGLLRGFDY (SEQ ID NO: 3) (HCDR3).

28. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGAVPIT (SEQ ID NO: 12) (LCDR3).
29. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQVDSLHPFT (SEQ ID NO: 13) (LCDR3).
30. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGGVPLT (SEQ ID NO: 14) (LCDR3).
31. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVRSSSYLA (SEQ ID NO: 8) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQLFDSPYT (SEQ ID NO: 15) (LCDR3).
32. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVRSSSYLA (SEQ ID NO: 8) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGVPPLT (SEQ ID NO: 16) (LCDR3).
33. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGGVPPFT (SEQ ID NO: 17) (LCDR3).

34. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASNRAT (SEQ ID NO: 10) (LCDR2), and QQAGVFPFT (SEQ ID NO: 18) (LCDR3).
35. The pharmaceutical composition of claim 27, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASRRAT (SEQ ID NO: 11) (LCDR2), and QQAGIPPYT (SEQ ID NO: 19) (LCDR3).
36. A method of treating a cancer comprising administering an CD19 antibody or antigen-binding fragment thereof to a subject in need of treatment, wherein the CD19 antibody or fragment thereof comprises:
- a heavy chain variable region with complementarity determining region (CDR) sequences of SYGMH (SEQ ID NO: 1) (HCDR1), LIWYDGSNKYYADSVKG (SEQ ID NO: 2) (HCDR2) and PVEGLLRGFDY (SEQ ID NO: 3) (HCDR3).
37. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGAVPIT (SEQ ID NO: 12) (LCDR3).
38. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQVDSLHPFT (SEQ ID NO: 13) (LCDR3).
39. The method of claim 36, wherein the CD19 antibody or fragment thereof further comprises

- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGGVPPLT (SEQ ID NO: 14) (LCDR3).
40. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVRSSSYLA (SEQ ID NO: 8) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQLFDSPYT (SEQ ID NO: 15) (LCDR3).
41. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVRSSSYLA (SEQ ID NO: 8) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGVPPLT (SEQ ID NO: 16) (LCDR3).
42. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASSRAT (SEQ ID NO: 9) (LCDR2), and QQAGGVPPFT (SEQ ID NO: 17) (LCDR3).
43. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASNRAT (SEQ ID NO: 10) (LCDR2), and QQAGVFPFT (SEQ ID NO: 18) (LCDR3).
44. The method of claim 36, wherein the CD19 antibody or antigen-binding fragment thereof further comprises
- a light chain variable region with complementarity determining region (CDR) sequences of RASQSVSSSYLA (SEQ ID NO: 7) (LCDR1), GASRRAT (SEQ ID NO: 11) (LCDR2), and QQAGIPPYT (SEQ ID NO: 19) (LCDR3).
45. A nucleic acid encoding an amino acid sequence that is at least 90% identical to SEQ ID NO: 5.

46. A nucleic acid encoding an amino acid sequence that is at least 90% identical to any one of SEQ ID NOs:20-27.
47. A vector comprising the isolated nucleic acid sequence of any claims 45 or 46.
48. An isolated cell comprising the vector of claim 47.