

WHAT IS CLAIMED IS:

1. An antigen-binding site that binds FLT3, comprising:
 - (a) a heavy chain variable domain (VH) comprising complementarity-determining region 1 (CDR1), complementarity-determining region 2 (CDR2), and complementarity-determining region 3 (CDR3) comprising the amino acid sequences of SEQ ID NOs: 11, 4, and 55, respectively; and
 - (b) a light chain variable domain (VL) comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 6, 7, and 8, respectively.
2. The antigen-binding site of claim 1, wherein the CDR3 of the VH comprises the amino acid sequence of SEQ ID NO:5.
3. The antigen-binding site of claim 1, wherein the CDR3 of the VH comprises the amino acid sequence of SEQ ID NO:50.
4. The antigen-binding site of any one of claims 1-3, wherein the VH comprises an amino acid sequence at least 90% identical to SEQ ID NO:37, and the VL comprises an amino acid sequence at least 90% identical to SEQ ID NO:38.
5. The antigen-binding site of any one of claims 1-4, wherein the VH comprises the amino acid sequence of SEQ ID NO:53, and the VL comprises the amino acid sequence of SEQ ID NO:42.
6. The antigen-binding site of claim 5, wherein the VH and the VL comprise the amino acid sequences of SEQ ID NOs: 9 and 10; 13 and 10; 17 and 10; 9 and 22; 9 and 26; 9 and 30; 9 and 34; 37 and 38; 41 and 42; 45 and 42; or 49 and 42, respectively.
7. An antigen-binding site that binds FLT3, comprising:
 - (a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 59, 63, and 54, respectively; and
 - (b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 86, 66, and 67, respectively.
8. The antigen-binding site of claim 7, wherein the VH comprises CDR1, CDR2, and CDR3 of SEQ ID NO: 78, 63, 79, respectively, and the VL comprises CDR1, CDR2, and CDR3 of SEQ ID NO: 80, 66, 67, respectively.

9. The antigen-binding site of claim 7, wherein the VH comprises CDR1, CDR2, and CDR3 of SEQ ID NO: 62, 63, 64, respectively, and the VL comprises CDR1, CDR2, and CDR3 of SEQ ID NO: 65, 66, 67.
10. The antigen-binding site of claim 7, wherein the VH comprises an amino acid sequence at least 90% identical to SEQ ID NO:76, and the VL comprises an amino acid sequence at least 90% identical to SEQ ID NO:77.
11. The antigen-binding site of any one of claims 7-10, wherein the VH comprises the amino acid sequence of SEQ ID NO:29, and the VL comprises the amino acid sequence of SEQ ID NO:84.
12. The antigen-binding site of claim 11, wherein the VH and the VL comprise the amino acid sequences of SEQ ID NOs: 68 and 69; 72 and 73; or 76 and 77, respectively.
13. An antigen-binding site that binds FLT3, comprising:
(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 87, 88, and 89, respectively; and
(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 91, 92, and 93, respectively.
14. An antigen-binding site that binds FLT3, comprising:
(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 97, 99, and 100, respectively; and
(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 101, 102, and 103, respectively.
15. An antigen-binding site that binds FLT3, comprising:
(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 87, 98, and 89, respectively; and
(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 106, 92, and 93, respectively.
16. An antigen-binding site that binds FLT3, comprising:
(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 109, 110, and 111, respectively; and

(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 112, 113, and 114, respectively.

17. An antigen-binding site that binds FLT3, comprising:

(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 117, 118, and 119, respectively; and

(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 120, 121, and 122, respectively.

18. An antigen-binding site that binds FLT3, comprising:

(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 87, 98, and 89, respectively; and

(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 106, 92, and 93, respectively.

19. An antigen-binding site that binds FLT3, comprising:

(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 62, 33, and 127, respectively; and

(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 128, 129, and 130, respectively.

20. An antigen-binding site that binds FLT3, comprising:

(a) a VH comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 132, 133, and 134, respectively; and

(b) a VL comprising CDR1, CDR2, and CDR3 comprising the amino acid sequences of SEQ ID NOs: 65, 66, and 46, respectively.

21. An antigen-binding site that competes with the antigen-binding site of any one of claims 13-15 and 18-19.

22. The antigen-binding site of any one of the preceding claims, wherein the antigen-binding site binds human FLT3 with a dissociation constant (K_D) smaller than or equal to 20 nM as measured by surface plasmon resonance (SPR).

23. The antigen-binding site of any one of claims 1-6, 13, 14, and 18, wherein the antigen-binding site binds human FLT3 with a K_D smaller than or equal to 10 nM as measured by SPR.
24. The antigen-binding site of any one of claims 1-6, wherein the antigen-binding site binds a human FLT3 variant comprising the amino acid sequence of SEQ ID NO:25.
25. The antigen-binding site of any one of claims 1-6, wherein the antigen-binding site binds a human FLT3 variant comprising the amino acid sequence of SEQ ID NO:18.
26. The antigen-binding site of any one of claims 1-16 and 18-25, wherein the antigen-binding site binds cynomolgus FLT3.
27. The antigen-binding site of any one of claims 1-15 and 17-26, wherein the antigen-binding site does not compete with FLT3L for binding FLT3.
28. The antigen-binding site of any one of the preceding claims, wherein the antigen-binding site is present as a single-chain fragment variable (scFv).
29. The antigen-binding site of claim 28, wherein the scFv comprises an amino acid sequence selected from SEQ ID NOs: 3, 12, 15, 16, 19, 20, 23, 24, 27, 28, 31, 32, 35, 36, 39, 40, 43, 44, 47, 48, 51, 52, 70, 71, 74, 75, 81, and 82.
30. A protein comprising the antigen-binding site of any one of the preceding claims.
31. The protein of claim 30, further comprising an antibody heavy chain constant region.
32. The protein of claim 31, wherein the antibody heavy chain constant region is a human IgG heavy chain constant region.
33. The protein of claim 32, wherein the antibody heavy chain constant region is a human IgG1 heavy chain constant region.
34. The protein of claim 32 or 33, wherein each polypeptide chain of the antibody heavy chain constant region comprises an amino acid sequence at least 90% identical to SEQ ID NO:21.
35. The protein of any one of claims 32-34, wherein at least one polypeptide chain of the antibody heavy chain constant region comprises one or more mutations, relative to SEQ ID

NO:21, at one or more positions selected from Q347, Y349, L351, S354, E356, E357, K360, Q362, S364, T366, L368, K370, N390, K392, T394, D399, S400, D401, F405, Y407, K409, T411, and K439, numbered according to the EU numbering system.

36. The protein of any one of claims 32-35, wherein at least one polypeptide chain of the antibody heavy chain constant region comprises one or more mutations, relative to SEQ ID NO:21, selected from Q347E, Q347R, Y349S, Y349K, Y349T, Y349D, Y349E, Y349C, L351K, L351D, L351Y, S354C, E356K, E357Q, E357L, E357W, K360E, K360W, Q362E, S364K, S364E, S364H, S364D, T366V, T366I, T366L, T366M, T366K, T366W, T366S, L368E, L368A, L368D, K370S, N390D, N390E, K392L, K392M, K392V, K392F, K392D, K392E, T394F, D399R, D399K, D399V, S400K, S400R, D401K, F405A, F405T, Y407A, Y407I, Y407V, K409F, K409W, K409D, T411D, T411E, K439D, and K439E, numbered according to the EU numbering system.

37. The protein of any one of claims 32-36, wherein one polypeptide chain of the antibody heavy chain constant region comprises one or more mutations, relative to SEQ ID NO:21, at one or more positions selected from Q347, Y349, L351, S354, E356, E357, K360, Q362, S364, T366, L368, K370, K392, T394, D399, S400, D401, F405, Y407, K409, T411 and K439; and the other polypeptide chain of the antibody heavy chain constant region comprises one or more mutations, relative to SEQ ID NO:21, at one or more positions selected from Q347, Y349, L351, S354, E356, E357, S364, T366, L368, K370, N390, K392, T394, D399, D401, F405, Y407, K409, T411, and K439, numbered according to the EU numbering system.

38. The protein of claim 37, wherein one polypeptide chain of the antibody heavy chain constant region comprises K360E and K409W substitutions relative to SEQ ID NO:21; and the other polypeptide chain of the antibody heavy chain constant region comprises Q347R, D399V and F405T substitutions relative to SEQ ID NO:21, numbered according to the EU numbering system.

39. The protein of claim 37 or 38, wherein one polypeptide chain of the antibody heavy chain constant region comprises a Y349C substitution relative to SEQ ID NO:21; and the other polypeptide chain of the antibody heavy chain constant region comprises an S354C substitution relative to SEQ ID NO:21, numbered according to the EU numbering system.

40. An antibody-drug conjugate comprising the protein of any one of claims 30-39 and a drug moiety.
41. The antibody-drug conjugate of claim 40, wherein the drug moiety is selected from the group consisting of auristatin, N-acetyl- γ calicheamicin, maytansinoid, pyrrolobenzodiazepine, and SN-38.
42. An immunocytokine comprising the antigen-binding site of any one of claims 1-29 and a cytokine.
43. The immunocytokine of claim 42, wherein the cytokine is selected from the group consisting of IL-2, IL-4, IL-10, IL-12, IL-15, TNF, and IFN α .
44. A bispecific T-cell engager comprising the antigen-binding site of any one of claims 1-29 and an antigen-binding site that binds CD3.
45. A chimeric antigen receptor (CAR) comprising:
(a) the antigen-binding site of any one of claims 1-29;
(b) a transmembrane domain; and
(c) an intracellular signaling domain.
46. The CAR of claim 45, wherein the transmembrane domain is selected from the transmembrane regions of the alpha, beta or zeta chain of the T-cell receptor, CD28, CD3 epsilon, CD45, CD4, CD5, CD8, CD9, CD16, CD22, FLT3, CD37, CD64, CD80, CD86, CD134, CD137, CD152, and CD154.
47. The CAR of claim 45 or 46, wherein the intracellular signaling domain comprises a primary signaling domain comprising a functional signaling domain of CD3 zeta, common FcR gamma (FCER1G), Fc gamma RIIa, FcR beta (Fc Epsilon R1b), CD3 gamma, CD3 delta, CD3 epsilon, CD79a, CD79b, DAP10, and DAP12.
48. The CAR of any one of claims 45-47, wherein the intracellular signaling domain further comprises a costimulatory signaling domain comprising a functional signaling domain of a costimulatory receptor.
49. The CAR of claim 48, wherein the costimulatory receptor is selected from the group consisting of OX40, CD27, CD28, CD30, CD40, PD-1, CD2, CD7, CD258, NKG2C, B7-H3,

a ligand that binds to CD83, ICAM-1, LFA-1 (CD11a/CD18), ICOS and 4-1BB (CD137), or any combination thereof.

50. An isolated nucleic acid encoding the CAR of any one of claims 45-49.
51. An expression vector comprising the isolated nucleic acid of claim 50.
52. An immune effector cell comprising the nucleic acid of claim 50 or the expression vector of claim 51.
53. An immune effector cell expressing the CAR of any one of claims 45-49.
54. The immune effector cell of claim 52 or 53, wherein the immune effector cell is a T cell.
55. The immune effector cell of claim 54, wherein the T cell is a CD8⁺ T cell, a CD4⁺ T cell, or an NKT cell.
56. The immune effector cell of claim 52 or 53, wherein the immune effector cell is an NK cell.
57. A pharmaceutical composition comprising the protein of any one of claims 30-39, the antibody-drug conjugate of claim 40 or 41, the immunocytokine of claim 42 or 43, the bispecific T-cell engager of claim 44, or the immune effector cell of any one of claims 52-56; and a pharmaceutically acceptable carrier.
58. A method of treating cancer, the method comprising administering to a subject in need thereof an effective amount of the protein of any one of claims 30-39, the antibody-drug conjugate of claim 40 or 41, the immunocytokine of claim 42 or 43, the bispecific T-cell engager of claim 44, the immune effector cell of any one of claims 52-56, or the pharmaceutical composition of claim 57.
59. The method of claim 58, wherein the cancer is a hematologic malignancy.
60. The method of claim 59, wherein the hematologic malignancy is leukemia.
61. The method of claim 59 or 60, wherein the cancer is selected from the group consisting of acute myeloid leukemia (AML), acute lymphoblastic leukemia (ALL), myelodysplasia, acute T-lymphoblastic leukemia, and acute promyelocytic leukemia.

62. The method of any one of claims 58-61, wherein the cancer expresses FLT3.