

WHAT IS CLAIMED IS:

1. A protein comprising a D domain that specifically binds an AFP P26 polypeptide, wherein the AFP P26 polypeptide comprises the amino acid sequence of SEQ ID NO: 16, 1117, 1118, 1119, 1120, 1121, 1122, or 1123.
2. The protein of claim 1, wherein the D domain comprises the amino acid sequence of SEQ ID NO: 841-984.
3. The protein of claim 1 or claim 2 wherein the D domain is fused to a heterologous polypeptide.
4. A chimeric antigen receptor (CAR) which comprises a target binding domain comprising the protein according to any one of claims 1 to 3.
5. An isolated nucleic acid encoding the protein according to any one of claims 1 to 3 or the CAR according to claim 4.
6. A host cell comprising the nucleic acid according to claim 5.
7. The cell according to claim 6, wherein the cell is an immune effector cell.
8. A fusion protein comprising an AFP P26 polypeptide, wherein the AFP P26 polypeptide comprises the amino acid sequence of SEQ ID NO: 16, 1117, 1118, 1119, 1120, 1121, 1122, or 1123.
9. The fusion protein of claim 8, which is a chimeric antigen receptor (CAR).
10. A host cell comprising a nucleic acid encoding the protein according to claim 9.
11. The fusion protein of claim 8, further comprising an Antigenic Determinant Binding Domain (ADBD).
12. The fusion protein of claim 11, wherein the Antigenic Determinant Binding Domain (ADBD) is a D domain.
13. Use of (a) an immune effector cell expressing a chimeric antigen receptor (CAR) or (b) an Adapter in the manufacture of a medicament comprising the immune cell or a medicament comprising the Adapter, respectively, for killing a target cell, wherein the killing comprises contacting the target cell with the immune cell and the Adapter, wherein
 - the CAR comprises a D domain that binds to a first antigenic determinant (AD),
 - the Adapter comprises (i) said first AD and (ii) an antigenic determinant binding domain (ADBD) that binds to a second AD on the target cell,
 - the immune effector cell used in combination with the Adapter is capable of directing an

- immune response to a cell expressing the second AD in an in vitro assay, and
- the medicament comprising the immune effector cell and the medicament comprising the Adapter can be administered to a patient simultaneously or consecutively in any order.
14. The use of claim 13, wherein
- the first AD is AFP P26, AFP, CD123, BCMA, or CS1, and the second AD is CS1, BCMA, CD19, CD22, CD45, CD123, HER2, TACI, BAFFR, or PDL1,
 - the first AD is AFP P26 comprising the amino acid sequence of SEQ ID NO: 16, 1117, 1118, 1119, 1120, 1121, 1122, or 1123,
 - the D domain comprises the amino acid sequence of SEQ ID NO: 841-984,
 - the ADBD is a D domain, and/or
 - the target cell is a tumor cell.
15. Use of (a) an immune effector cell expressing a chimeric antigen receptor (CAR) comprising a D domain that binds to a first antigenic determinant (AD) or (b) an Adapter comprising (i) said first AD and (ii) an antigenic determinant binding domain (ADBD) that binds to a second AD on a target cell in the manufacture of a medicament comprising the immune effector cell or a medicament comprising the Adapter, respectively, for
- killing a target cell;
 - redirecting target cell killing;
 - delivering an immune response to a target cell;
 - directing an immune response to a target cell;
 - treating a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
 - redirecting treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
 - directing treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
 - treating hematological cancer;
 - redirecting treatment of a hematological cancer; or
 - directing treatment of a hematological cancer

in a patient, wherein the immune effector cell used in combination with the Adapter is capable of directing an immune response to a cell expressing the second AD in an in vitro assay, and wherein the medicament comprising the immune effector cell and the medicament comprising the Adapter can be administered to the patient simultaneously or consecutively in any order.

16. The use of claim 15, wherein

- the first AD is AFP P26, AFP, CD123, BCMA, or CS1, and the second AD is CS1, BCMA, CD19, CD22, CD45, CD123, HER2, TACI, BAFFR, or PDL1,
- the first AD is AFP P26 comprising the amino acid sequence of SEQ ID NO: 16, 1117, 1118, 1119, 1120, 1121, 1122, or 1123,
- the D domain comprises the amino acid sequence of SEQ ID NO: 841-984,
- the ADBD is a D domain, and/or
- the proliferative disorder, cancer, or hematological cancer is selected from: acute leukemia, chronic leukemia, polycythemia vera, lymphoma, Hodgkin's disease, non-Hodgkin's lymphoma, multiple myeloma, Waldenstrom's macroglobulinemia, heavy chain disease, myelodysplastic syndrome, hairy cell leukemia, myelodysplasia, breast cancer, prostate cancer, ovarian cancer, pancreatic cancer, colon cancer, and lung cancer.

17. Use of an Adapter in the manufacture of a medicament for

- killing a target cell;
- redirecting target cell killing;
- delivering an immune response to a target cell;
- directing an immune response to a target cell;
- treating a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
- redirecting treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
- directing treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
- treating hematological cancer;
- redirecting treatment of a hematological cancer; or

- directing treatment of a hematological cancer
- in a patient, wherein
- the patient has been administered an immune effector cell expressing a chimeric antigen receptor (CAR) comprising a D domain that binds to a first antigenic determinant (AD),
 - the Adapter comprises (i) said first AD and (ii) an antigenic determinant binding domain (ADBD) that binds to a second AD on a target cell, and
 - the immune effector cell used in combination with the Adapter is capable of directing an immune response to a cell expressing the second AD in an in vitro assay.
18. The use of claim 17, wherein
- the first AD is AFP P26, AFP, CD123, BCMA, or CS1, and the second AD is CS1, BCMA, CD19, CD22, CD45, CD123, HER2, TACI, BAFFR, or PDL1,
 - the first AD is AFP P26 comprising the amino acid sequence of SEQ ID NO: 16, 1117, 1118, 1119, 1120, 1121, 1122, or 1123,
 - the D domain comprises the amino acid sequence of SEQ ID NO: 841-984,
 - the ADBD is a D domain, and/or
 - the proliferative disorder, cancer, or hematological cancer is selected from: acute leukemia, chronic leukemia, polycythemia vera, lymphoma, Hodgkin's disease, non-Hodgkin's lymphoma, multiple myeloma, Waldenstrom's macroglobulinemia, heavy chain disease, myelodysplastic syndrome, hairy cell leukemia, myelodysplasia, breast cancer, prostate cancer, ovarian cancer, pancreatic cancer, colon cancer, and lung cancer.
19. Use of an immune effector cell expressing a chimeric antigen receptor (CAR) comprising a D domain that binds to a first antigenic determinant (AD) in the manufacture of a medicament for making a patient receptive to Adapter mediated
- killing of a target cell,
 - redirected target cell killing,
 - delivering of an immune response to a target cell,
 - directing of an immune response to a target cell,
 - treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft

rejection,

- redirecting treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection,
- directing of treatment of a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection,
- treating of hematological cancer,
- redirecting treatment of a hematological cancer, or
- directing of treatment,

wherein the Adapter comprises (i) said first AD and (ii) an antigenic determinant binding domain (ADBD) that binds to a second AD on a target cell, and

wherein the immune effector cell used in combination with the Adapter is capable of directing an immune response to a cell expressing the second AD in an in vitro assay.

20. The use of claim 19, wherein

- the first AD is AFP P26, AFP, CD123, BCMA, or CS1, and the second AD is CS1, BCMA, CD19, CD22, CD45, CD123, HER2, TACI, BAFFR, or PDL1,
- the first AD is AFP P26 comprising the amino acid sequence of SEQ ID NO: 16, 1117, 1118, 1119, 1120, 1121, 1122, or 1123,
- the D domain comprises the amino acid sequence of SEQ ID NO: 841-984,
- the ADBD is a D domain, and/or
- the proliferative disorder, cancer, or hematological cancer is selected from: acute leukemia, chronic leukemia, polycythemia vera, lymphoma, Hodgkin's disease, non-Hodgkin's lymphoma, multiple myeloma, Waldenstrom's macroglobulinemia, heavy chain disease, myelodysplastic syndrome, hairy cell leukemia, myelodysplasia, breast cancer, prostate cancer, ovarian cancer, pancreatic cancer, colon cancer, and lung cancer.

21. An engineered human immune effector cell comprising

- a. a chimeric antigen receptor (CAR) comprising (1) an antigenic determinant binding domain (ADBD) that specifically binds to a human CD45 antigenic determinant (AD), (2) a transmembrane domain, and (3) an intracellular domain; and

- b. a genetic modification that eliminates the expression of the human CD45 AD on the engineered cell,
- wherein the engineered cell is capable of directing an immune response to a CD45 AD expressing cell in an in vitro assay, and wherein the engineered cell does not express the CD45 AD.
22. Use of the engineered cell according to claim 21 in the manufacture of a medicament for killing a target cell or delivering an immune response to a target cell, wherein the target cell expresses human CD45.
23. Use of the engineered cell according to claim 21 in the manufacture of a medicament for
- directing an immune response to a target cell;
 - treating a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
 - depleting lymphocytes;
 - depleting memory T cell;
 - treating an autoimmune disease or disorder;
 - treating a hematological cancer in a subject; or
 - conditioning a subject for transplantation.
24. An engineered human immune effector cell comprising
- a. a chimeric antigen receptor (CAR) comprising (1) a first antigenic determinant binding domain (ADBD) that specifically binds to a first antigenic determinant (AD), (2) a transmembrane domain, and (3) an intracellular domain; and
- b. a genetic modification that eliminates the expression of at least one human CD45 AD on the engineered cell,
- wherein the first AD is not the at least one human CD45 AD, wherein the engineered cell used in combination with an Adapter is capable of directing an immune response to a CD45 AD expressing cell in an in vitro assay, wherein the Adapter comprises the first AD and a second ADBD that specifically binds to the at least one human CD45 AD, and wherein the engineered cell does not express the at least one human CD45 AD.
25. Use of (a) the engineered cell according to claim 24 or (b) an Adapter comprising the first AD and a second ADBD that specifically binds to a human CD45 AD in the manufacture of a medicament comprising the engineered cell or a medicament comprising the Adapter for killing a target cell or

delivering an immune response to a target cell, wherein the killing the target cell or delivering an immune response to the target cell comprises contacting the engineered cell with the Adapter and the target cell, wherein the target cell expresses CD45, and optionally wherein the target cell is a hematological cancer cell.

26. Use of (a) the engineered cell according to claim 24 or (b) Adapter comprising the first AD and a second ADBD that specifically binds to a human CD45 AD in the manufacture of a medicament comprising the engineered cell or a medicament comprising the Adapter for

- directing an immune response to a target cell;
- treating a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection;
- depleting lymphocytes; depleting memory T cell;
- treating an autoimmune disease or disorder;
- treating a hematological cancer in a subject; or
- conditioning a subject for transplantation,

wherein the directing the immune response to the target cell; treating the proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection; depleting lymphocytes; depleting memory T cell; treating the autoimmune disease or disorder; treating the hematological cancer in the subject; or conditioning the subject for transplantation comprises

- a. the subject to be administered the medicament comprising the engineered cell and the medicament comprising the Adapter, wherein the medicament comprising the engineered cell and the medicament comprising the Adapter can be administered simultaneously or consecutively in any order;
- b. the subject to be administered the medicament comprising the engineered cell, wherein the subject has been administered the Adapter; or
- c. a subject to be administered the medicament comprising the Adapter, wherein the subject has been administered the engineered cell.

27. Use of the engineered cell according to claim 24 in the manufacture of a medicament for making a patient receptive to Adapter mediated

- directing of an immune response to a target cell,
- treating a proliferative disorder, cancer, autoimmune disease, infection, or allograft rejection,

- depletion of lymphocytes,
- depletion of memory T cell,
- treatment of an autoimmune disease or disorder,
- treatment of a hematological cancer, or
- conditioning a patient for transplantation,

wherein the Adapter comprises the first AD and a second ADBD that specifically binds to a human CD45 AD.