variable region comprising the sequences of SEQ ID NOS: 6, 7, 9, 10, 11, 13, and 15 or SEQ ID NOS; 6, 8, 9, 10, 12, 14, and 16.

[0004] The disclosure provides chimeric antigen receptors (CARs) comprising an antigen binding domain specific for thymic stromal lymphopoietin receptor (TSLPR), a transmembrane domain, and an intracellular T cell signaling domain. The CAR may further comprise a 4-1BB intracellular domain, a spacer, or both.

[0004a] In yet another aspect, there is provided a nucleic acid comprising a nucleotide sequence encoding the CAR as described herein.

[0004b] In yet another aspect, there is provided a recombinant expression vector comprising the nucleic acid as described herein.

[0004c] In yet another aspect, there is provided an isolated host cell comprising the recombinant expression vector as described herein.

[0004d] In yet another aspect, there is provided a population of cells comprising at least one host cell as described herein.

[0004e] In yet another aspect, there is provided an antibody, or antigen binding portion thereof, which specifically binds to an epitope within the antigen binding domain of a CAR as described herein.

[0004f] In yet another aspect, there is provided a pharmaceutical composition comprising the CAR as described herein, the nucleic acid as described herein, the recombinant expression vector as described herein, the host cell as described herein, the population of cells as described herein, or the antibody, or antigen binding portion thereof, as described herein, and a pharmaceutically acceptable carrier.

[0005] Also disclosed are nucleic acids, recombinant expression vectors, host cells, populations of cells, antibodies, or antigen binding portions thereof, and pharmaceutical compositions relating to the CARs of the invention.

[0005a] In yet another aspect, there is provided a method of detecting the presence of cancer, comprising: (a) contacting a sample comprising one or more cells with the CAR as described herein, the nucleic acid as described herein, the recombinant expression vector as described herein, the host cell as described herein, the population of cells as described herein, or the antibody, or antigen binding portion thereof, as described herein, or the pharmaceutical

composition as described herein, thereby forming a complex, and (b) detecting the complex, wherein detection of the complex is indicative of the presence of cancer.

[0005b] In yet another aspect, there is provided the CAR as described herein, the nucleic acid as described herein, the recombinant expression vector as described herein, the host cell as described herein, the population of cells as described herein, or the pharmaceutical composition as described herein, for use in the treatment or prevention of cancer in a mammal, wherein the cancer is associated with increased TSLPR expression.

[0005c] In yet another aspect, there is provided the CAR as described herein, the nucleic acid as described herein, the recombinant expression vector as described herein, the host cell as described herein, the population of cells as described herein, or the pharmaceutical composition as described herein, for use in the treatment or prevention of a proliferative disorder in a mammal, wherein the proliferative disorder is associated with a mutation in the IKZF gene and is associated with increased TSLPR expression.

[0006] Also disclosed are methods of detecting the presence of a proliferative disorder, e.g., cancer, and methods of treating or preventing a proliferative disorder, e.g., cancer, in a mammal.

CLAIM(S):

1. A chimeric antigen receptor (CAR) comprising an antigen binding domain specific for TSLPR, a transmembrane domain, and an intracellular T cell signaling domain, wherein the antigen binding domain comprises the light chain variable region comprising the sequences of SEQ ID NOS: 18, 20, 22, 24, 25, 27, and 29 or SEQ ID NOS: 19, 21, 23, 24, 26, 28, and 29.

2. A chimeric antigen receptor (CAR) comprising an antigen binding domain specific for TSLPR, a transmembrane domain, and an intracellular T cell signaling domain, wherein the antigen binding domain comprises the heavy chain variable region comprising the sequences of SEQ ID NOS: 6, 7, 9, 10, 11, 13, and 15 or SEQ ID NOS; 6, 8, 9, 10, 12, 14, and 16.

3. The CAR according to claim 1 or 2, wherein the antigen binding domain comprises the linker sequence of SEQ ID NO: 17.

4. The CAR according to any one of claims 1-3, wherein the antigen binding domain comprises SEQ ID NO: 1.

5. The CAR according to any one of claims 1-4, wherein the transmembrane domain comprises a CD8 amino acid sequence.

6. The CAR according to any one of claims 1-5, wherein the transmembrane domain comprises CD8 amino acid sequence comprising the CD8α hinge sequence of SEQ ID NO: 35 and the transmembrane domain of sequence SEQ ID NO: 36.

7. The CAR according to any one of claims 1-6, wherein the intracellular T cell signaling domain comprises 4-1BB, CD3 zeta, or both.

8. The CAR according to any one of claims 1-7, wherein the intracellular T cell signaling domain comprises the 4-1BB amino acid sequence of SEQ ID NO: 37.

9. The CAR according to any one of claims 1-8, wherein the intracellular T cell signaling domain comprises the CD3 zeta amino acid sequence of SEQ ID NO: 38.

10. The CAR according to any one of claims 1-9, wherein the CAR further comprises the spacer comprising SEQ ID NOS: 30-33.

11. The CAR according to claim 1 or 2, wherein the CAR comprises any one of the sequences of SEQ ID NO: 39-46.

12. A nucleic acid comprising a nucleotide sequence encoding the CAR according to any one of claims 1-11.

13. The nucleic acid according to claim 12, wherein the nucleotide sequence is codon-optimized.

14. A recombinant expression vector comprising the nucleic acid according to claim 12 or 13.

15. The recombinant expression vector according to claim 14, wherein the recombinant expression vector is a lentiviral vector.

16. An isolated host cell comprising the recombinant expression vector of claim 14 or 15.

17. A population of cells comprising at least one host cell of claim 16.

18. An antibody, or antigen binding portion thereof, which specifically binds to an epitope within the antigen binding domain of a CAR according to any one of claims 1-11.

19. A pharmaceutical composition comprising the CAR of any one of claims 1-11, the nucleic acid of claim 12 or 13, the recombinant expression vector of claim 14 or 15, the host cell of claim 16, the population of cells of claim 17, or the antibody, or antigen binding portion thereof, of claim 18, and a pharmaceutically acceptable carrier.

20. A method of detecting the presence of cancer, comprising:

(a) contacting a sample comprising one or more cells with the CAR of any one of claims 1-11, the nucleic acid of claim 12 or 13, the recombinant expression vector of claim 14

or 15, the host cell of claim 16, the population of cells of claim 17, or the pharmaceutical composition of claim 19, thereby forming a complex, and

(b) detecting the complex, wherein detection of the complex is indicative of the presence of cancer.

21. The method of claim 20, where the cancer is ALL.

22. The method of claim 20, wherein the cancer is BCP-ALL.

23. The CAR of any one of claims 1-11, the nucleic acid of claim 12 or 13, the recombinant expression vector of claim 14 or 15, the host cell of claim 16, the population of cells of claim 17, or the pharmaceutical composition of claim 19, for use in the treatment or prevention of cancer in a mammal, wherein the cancer is associated with increased TSLPR expression.

24. The CAR, nucleic acid, recombinant expression vector, host cell, population of cells, or pharmaceutical composition of claim 23, wherein the cancer is ALL.

25. The CAR, nucleic acid, recombinant expression vector, host cell, population of cells, or pharmaceutical composition of claim 23, wherein the cancer is BCP-ALL.

26. The CAR of any one of claims 1-11, the nucleic acid of claim 12 or 13, the recombinant expression vector of claim 14 or 15, the host cell of claim 16, the population of cells of claim 17, or the pharmaceutical composition of claim 19, for use in the treatment or prevention of a proliferative disorder in a mammal, wherein the proliferative disorder is associated with a mutation in the IKZF gene and is associated with increased TSLPR expression.