

What is claimed is:

1. A T-cell receptor (TCR), wherein the TCR is capable of specifically binding to a VVGAVGVGK-HLA A1101 complex, the TCR comprises a TCR α chain variable domain and a TCR β chain variable domain, an amino acid sequence of CDR3 of the TCR α chain variable domain is ASLKGNNDMR (SEQ ID NO: 12); and an amino acid sequence of CDR3 of the TCR β chain variable domain is ASSSSRWEQQF (SEQ ID NO: 15);

preferably, three complementarity determining regions (CDRs) of the TCR α chain variable domain are:

α CDR1- DRVSQS (SEQ ID NO: 10);

α CDR2- IYSNGD (SEQ ID NO: 11); and

α CDR3- ASLKGNNDMR (SEQ ID NO: 12); and/or

three CDRs of the TCR β chain variable domain are:

β CDR1- SGHVS (SEQ ID NO: 13);

β CDR2- FQNEAQ (SEQ ID NO: 14); and

β CDR3- ASSSSRWEQQF (SEQ ID NO: 15).

2. The TCR of claim 1, comprising a TCR α chain variable domain and a TCR β chain variable domain, wherein the TCR α chain variable domain is an amino acid sequence having at least 90% of sequence identity with SEQ ID NO: 1; and/or the TCR β chain variable domain is an amino acid sequence having at least 90% of sequence identity with SEQ ID NO: 5.

3. The TCR of claim 1, wherein the TCR is capable of specifically binding to a VVGAVGVGK-HLA A1101 complex;

preferably, the TCR comprises an α chain variable domain amino acid sequence SEQ ID NO: 1, and/or

the TCR comprises a β chain variable domain amino acid sequence SEQ ID NO: 5.

4. The TCR of claim 1, wherein the TCR is an $\alpha\beta$ heterodimer and comprises a TCR α chain constant region TRAC*01 and a TCR β chain constant region TRBC1*01 or TRBC2*01;

preferably, the α chain amino acid sequence of the TCR is SEQ ID NO: 3 and/or the β chain amino acid sequence of the TCR is SEQ ID NO: 7.

5. The TCR of any one of claims 1 to 3, wherein the TCR is soluble;

preferably, the TCR is a single chain;

preferably, the TCR is formed by linking the α chain variable domain and the β chain variable domain by a peptide linker sequence;

preferably, the TCR has one or more mutations in an α chain variable region amino acid at position 11, 13, 19, 21, 53, 76, 89, 91 or 94, and/or an α chain J gene short peptide amino acid at reciprocal position 3, 5 or 7; and/or the TCR has one or more mutations in a β chain variable region amino acid at position 11, 13, 19, 21, 53, 76, 89, 91 or 94, and/or a β chain J gene short peptide amino acid at reciprocal position 2, 4 or 6, wherein the positions in an amino acid sequence are numbered according to the position numbers listed in the International Immunogenetics Information System (IMGT);

preferably, the α chain variable domain amino acid sequence of the TCR comprises SEQ ID NO: 32 and/or the β chain variable domain amino acid sequence of the TCR comprises SEQ ID NO: 34;

and more preferably, the amino acid sequence of the TCR is SEQ ID NO: 30.

6. The TCR of claim 1, wherein the TCR comprises (a) all or part of the TCR α chain other than its transmembrane domain, and (b) all or part of the TCR β chain other than its transmembrane domain; and

(a) and (b) each comprise a functional variable domain, or comprise at least part of a functional variable domain and also comprise the TCR chain constant domain.

7. The TCR of claim 1, wherein cysteine residues form an artificial disulfide bond between the α and β chain constant domains of the TCR;

preferably, the cysteine residues forming the artificial disulfide bond in the TCR are substituted for one or more groups of amino acids selected from the following:

Thr48 of TRAC*01 exon 1 and Ser57 of TRBC1*01 or TRBC2*01 exon 1;

Thr45 of TRAC*01 exon 1 and Ser77 of TRBC1*01 or TRBC2*01 exon 1;

Tyr10 of TRAC*01 exon 1 and Ser17 of TRBC1*01 or TRBC2*01 exon 1;

Thr45 of TRAC*01 exon 1 and Asp59 of TRBC1*01 or TRBC2*01 exon 1;

Ser15 of TRAC*01 exon 1 and Glu15 of TRBC1*01 or TRBC2*01 exon 1;

Arg53 of TRAC*01 exon 1 and Ser54 of TRBC1*01 or TRBC2*01 exon 1;

Pro89 of TRAC*01 exon 1 and Ala19 of TRBC1*01 or TRBC2*01 exon 1; and

Tyr10 of TRAC*01 exon 1 and Glu20 of TRBC1*01 or TRBC2*01 exon 1;

more preferably, the α chain amino acid sequence of the TCR is SEQ ID NO: 26 and/or the β chain amino acid sequence of the TCR is SEQ ID NO: 28.

8. The TCR of claim 1, wherein an artificial interchain disulfide bond is contained between an α chain constant region and a β chain constant region of the TCR;

preferably, cysteine residues forming the artificial interchain disulfide bond in the TCR are substituted for one or more groups of amino acids selected from the following:

an amino acid at position 46 of TRAV and an amino acid at position 60 of TRBC1*01 or TRBC2*01 exon 1;

an amino acid at position 47 of TRAV and an amino acid at position 61 of TRBC1*01 or TRBC2*01 exon 1;

an amino acid at position 46 of TRAV and an amino acid at position 61 of TRBC1*01 or TRBC2*01 exon 1; or

an amino acid at position 47 of TRAV and an amino acid at position 60 of TRBC1*01 or TRBC2*01 exon 1;

and more preferably, the TCR comprises an α chain variable domain, a β chain variable domain and all or part of a β chain constant domain other than its transmembrane domain, which, however, does not comprise an α chain constant domain, and the α chain variable domain of the TCR and the β chain form a heterodimer.

9. The TCR of claim 1, wherein a conjugate binds to the α chain and/or β chain of the TCR at C- or N-terminal;

preferably, the conjugate that binds to the TCR is a detectable label, a therapeutic agent, a PK modified moiety or a combination of any of these substances; preferably, the therapeutic agent is an anti-CD3 antibody.

10. A multivalent TCR complex, comprising at least two TCR molecules, wherein at least one TCR molecule is the TCR of any one of the above claims.

11. A nucleic acid molecule, comprising a nucleic acid sequence encoding the TCR molecule of any one of the above claims or a complement sequence thereof;

preferably, the nucleic acid molecule comprises a nucleotide sequence SEQ ID NO: 2 or SEQ ID NO: 33 encoding the TCR α chain variable domain;

preferably, the nucleic acid molecule comprises a nucleotide sequence SEQ ID NO: 6 or SEQ ID NO: 35 encoding the TCR β chain variable domain;

and more preferably, the nucleic acid molecule comprises a nucleotide sequence SEQ ID NO: 4 encoding the TCR α chain and/or comprises a nucleotide sequence SEQ ID NO: 8 encoding the TCR β chain.

12. A vector, comprising the nucleic acid molecule of claim 11; preferably, the vector is a virus vector; and more preferably, the vector is a lentiviral vector.

13. An isolated host cell, comprising the vector of claim 12 or having the exogenous nucleic acid molecule of claim 11 integrated into its genome.

14. A cell, wherein the cell is transduced with the nucleic acid molecule of claim 11 or the vector of claim 12; preferably, the cell is a T cell or a stem cell.

15. A pharmaceutical composition, comprising a pharmaceutically acceptable carrier, and the TCR of any one of claims 1 to 9, or the TCR complex of claim 10, or the cell of claim 14.

16. A medicament for treating tumor or autoimmune diseases using the T-cell receptor (TCR) of any one of claims 1 to 9, or the TCR complex of claim 10, or the cell of claim 14;

preferably, the tumor is lung cancer, colorectal cancer, pancreatic cancer or gastric cancer.