

## **WHAT IS CLAIMED IS:**

1. Use of a therapeutically effective amount of an engineered T cell having substantially suppressed surface expression of endogenous CD7 and expressing an anti-CD7 chimeric antigen receptor (CAR) in the preparation of a medicament for the treatment of T-cell acute lymphoblastic leukemia (T-ALL) or early T-cell progenitor acute lymphoblastic leukemia (ETP-ALL) in a patient in need thereof, wherein the medicament is to be administered to said patient, thereby treating T-ALL or ETP-ALL in the patient in need thereof,

wherein said engineered T cell comprises:

i) a nucleic acid comprising a nucleotide sequence encoding a first single chain variable fragment (scFv) that specifically binds to CD7 linked to an intracellular localizing domain,

wherein said first scFv comprises:

a heavy chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:1 and a light chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:2,

a heavy chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:14 and a light chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:15, or

a heavy chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:16 and a light chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:17, and

wherein said localizing domain comprises an endoplasmic reticulum (ER) retention sequence comprising an amino acid sequence of SEQ ID NO:8; and

wherein said first scFv linked to said intracellular localizing domain intracellularly retains endogenous CD7 in said engineered T cell; and

ii) a nucleic acid comprising a nucleotide sequence encoding said anti-CD7 chimeric antigen receptor (CAR), wherein said CAR comprises a 4-1BB intracellular signaling domain, a CD3 $\zeta$  intracellular signaling domain, and a second scFv that specifically binds to CD7.

2. The use of claim 1, wherein said 4-1BB intracellular signaling domain comprises an amino acid sequence of SEQ ID NO:3 and wherein the CD3 $\zeta$  intracellular signaling domain comprises an amino acid sequence of SEQ ID NO:4.

3. The use of claim 1 or 2, wherein said CAR further comprises a hinge and transmembrane domain.
4. The use of claim 3, wherein said hinge and transmembrane domain comprises an amino acid sequence of SEQ ID NO:10.
5. The use of any one of claims 1 to 4, wherein said second scFv comprises a heavy chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:1 and a light chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:2; said second scFv comprises a heavy chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:14 and a light chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:15; or said second scFv comprises a heavy chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:16 and a light chain variable domain having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:17.
6. The use of any one of claims 1 to 5, wherein said engineered T cell is to be administered to said patient by intravenous infusion, intra-arterial infusion, intraperitoneal infusion, direct injection into tumor and/or perfusion of tumor bed after surgery, implantation at a tumor site in an artificial scaffold, or intrathecal administration.