Claims

1. A nucleic acid encoding a switch receptor comprising

   a) a TGFβ - binding domain that is an scFv,
   b) a hinge domain,
   c) a transmembrane domain,
   d) an intracellular costimulatory signaling domain, wherein, after binding of the switch receptor to TGFβ, the intracellular costimulatory signaling domain is not capable of activating a T cell in the absence of further stimulation.

   wherein, optionally, the intracellular signaling domain comprises an intracellular signaling domain of CD137, CD28, CD4 and/or CD8.

2. The nucleic acid of claim 1, wherein the intracellular signaling domain is the intracellular signaling domain of CD137 or a combination of an intracellular part of human CD8 and the intracellular signaling domain of human CD137.

3. The nucleic acid of any of the preceding claims, wherein the scFv comprises a variable heavy (VH) and a variable light (VL) domain, wherein

   a) the VH domain comprises a CDR1 of SEQ ID NO: 1, a CDR2 of SEQ ID NO: 2 and a CDR3 of SEQ ID NO: 3 and the VL domain comprises a CDR1 of SEQ ID NO: 4, a CDR2 of SEQ ID NO: 5 and a CDR3 of SEQ ID NO: 6, or

   b) the VH domain comprises a CDR1 of SEQ ID NO: 11, a CDR2 of SEQ ID NO: 12 and a CDR3 of SEQ ID NO: 13 and the VL domain comprises a CDR1 of SEQ ID NO: 14, a CDR2 of SEQ ID NO: 15 and a CDR3 of SEQ ID NO: 16, or

   c) the VH domain comprises a CDR1 of SEQ ID NO: 21, a CDR2 of SEQ ID NO: 22 and a CDR3 of SEQ ID NO: 23 and the VL domain comprises a CDR1 of SEQ ID NO: 24, a CDR2 of SEQ ID NO: 25 and a CDR3 of SEQ ID NO: 26,

   preferably, a).

4. The nucleic acid of claim 3, wherein the scFv comprises

   a) a variable heavy (VH) domain of SEQ ID NO: 7 and a variable light (VL) domain of SEQ ID NO: 8, wherein the scFv optionally has SEQ ID NO: 9, or

   b) a variable heavy (VH) domain of SEQ ID NO: 17 and a variable light (VL) domain of SEQ ID NO: 18, wherein the scFv optionally has SEQ ID NO: 19, or

   c) a variable heavy (VH) domain of SEQ ID NO: 27 and a variable light (VL) domain of SEQ ID NO: 28, wherein the scFv optionally has SEQ ID NO: 29,
   preferably, a).

5. The nucleic acid of claim 4, wherein the scFv is PET1073G12 of SEQ ID NO: 9 or a variant thereof having at least 90% sequence identity to SEQ ID NO: 9, preferably, PET1073G12 of SEQ ID NO: 9.

6. The nucleic acid of any of the preceding claims, wherein the hinge domain is an IgG hinge domain, e.g., an IgG4 hinge domain, a CD28 hinge domain or a CD8 hinge domain, preferably, an IgG4 hinge domain.

7. The nucleic acid of any of the preceding claims, wherein the transmembrane domain is selected from the group comprising transmembrane domains of CD8, CD28 or CD137, preferably, the transmembrane domain of CD8.

8. The nucleic acid of any of the preceding claims, wherein the switch receptor comprises the intracellular signaling domain of CD137 or a combination of an intracellular part of human CD8 and the intracellular signaling domain of human CD137.

9. The nucleic acid of any of the preceding claims, wherein the switch receptor further comprises an extracellular tag, optionally, a FLAG tag N-terminal to the TGFβ-binding domain and/or

   wherein the switch receptor further comprises an N-terminal leader sequence, optionally, a murine kappa light chain leader sequence.

10. The nucleic acid of any of the preceding claims, wherein the switch receptor has the sequence of any of SEQ ID NO: 41-55 or at least 90% sequence identity to any of SEQ ID NO: 41-55, preferably, SEQ ID NO: 42.

11. The nucleic acid of any of the preceding claims, wherein the scFv comprises a variable heavy (VH) and a variable light (VL) domain, wherein

    - the VH domain comprises a CDR1 of SEQ ID NO: 1, a CDR2 of SEQ ID NO: 2 and a CDR3 of SEQ ID NO: 3 and the VL domain comprises a CDR1 of SEQ ID NO: 4, a CDR2 of SEQ ID NO: 5 and a CDR3 of SEQ ID NO: 6,

    - the hinge domain is an IgG4 hinge domain, a CD28 hinge domain or a CD8 hinge domain,

    - the transmembrane domain is the transmembrane domains of CD8, or CD28, and

    - the switch receptor comprises the intracellular signaling domain of CD137 or a combination of an intracellular part of human CD8 and the intracellular signaling domain of human CD137.

12. A switch receptor encoded by the nucleic acid of any of claims 1-11.

13. A cell comprising the nucleic acid of any of claims 1-11,

wherein the cell optionally is a human T cell, NK cell or NKT cell, e.g., an alpha beta T cell.

14. The cell of claim 13, wherein the cell expresses the switch receptor, preferably, the switch receptor having at least 90%, optionally, 100% sequence identity to SEQ ID NO: 42.

15. The cell of claim 14, wherein said cell further expresses a transgenic T cell receptor or a chimeric antigen receptor.

16. The cell of any of claims 13-15 that is a gamma delta T cell.

17. A pharmaceutical composition comprising the nucleic acid of any of claims 1-11, the switch receptor of claim 12 and/or the cell of any of claims 13-16 that is a human T cell, NK cell or NKT cell,

wherein the pharmaceutical composition optionally further comprises a pharmaceutically acceptable buffer or excipient.

18. Use of the nucleic acid of any of claims 1-11, the switch receptor of claim 12 and/or the cell of any of claims 13-16 that is a human T cell, NK cell or NKT cell, in the manufacture of a pharmaceutical composition for the treatment of cancer and infectious diseases,

optionally wherein the treatment comprises adoptive T cell therapy.

19. The use of claim 18, wherein the adoptive T cell therapy is allogeneic adoptive T cell therapy, wherein preferably, the T cells are gamma delta T cells.