Claims

1. A regulatory T cell comprising an artificial immune receptor, wherein said artificial immune receptor comprises

    a) an extracellular domain of a member of the tumor necrosis factor receptor superfamily,
    b) a transmembrane domain,
    c) a cytoplasmic costimulatory signaling domain, and
    d) a cytoplasmic CD3 T cell receptor signaling domain,

    wherein said extracellular domain of said member of the tumor necrosis factor receptor superfamily binds to a membrane-bound form of a TNF family member.

2. A regulatory T cell according to claim 1, wherein said member of the tumor necrosis factor receptor superfamily is selected from TNFR2, DR3, LTBR and CD40.

3. An artificial immune receptor comprising

    a) an extracellular domain of a member of the tumor necrosis factor receptor superfamily;
    b) a transmembrane domain,
    c) a cytoplasmic costimulatory signaling domain, and
    d) a cytoplasmic T cell receptor signaling domain,

wherein said member of the tumor necrosis factor receptor superfamily is selected from TNFR2, DR3, LTBR and CD40.

4. A regulatory T cell according to claim 1 or 2 or an artificial immune receptor according to claim 3, wherein said cytoplasmic costimulatory signaling domain is selected from 4-IBB (CD137), BAFFR, OX40, CD27, CD28, ICOS, CD40, 2B4, GITR, HVEM, OX40, RELT, TACI, TROY, TWEAK, KIR receptors, TLR1 to TLR9 receptors, IL-2, IL-7 and IL-15 receptors, preferably wherein said cytoplasmic costimulatory signaling domain is selected from 4-IBB (CD137), CD28 and ICOS.

5. A regulatory T cell according to claim 1 or 2 or an artificial immune receptor according to claim 3 or 4, wherein said cytoplasmic CD3 T cell receptor signaling domain is selected from CD3 zeta, CD3 gamma and CD3 epsilon, preferably CD3 zeta.

6. A regulatory T cell according to claim 1 or 2 or an artificial immune receptor according to any one of claims 3-5, wherein

a) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain are from TNFR2, said cytoplasmic costimulatory signaling domain is CD28 and said cytoplasmic T cell receptor signaling domain is CD3 zeta,

b) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain are from DR3, said cytoplasmic costimulatory signaling domain is CD28 and said cytoplasmic T cell receptor signaling domain is CD3 zeta,

c) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain are from LTBR, said cytoplasmic costimulatory signaling domain is CD28 and said cytoplasmic T cell receptor signaling domain is CD3 zeta, or

d) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain are from CD40, said cytoplasmic costimulatory signaling domain is CD28 and said cytoplasmic T cell receptor signaling domain is CD3 zeta.

7. A regulatory T cell according to claim 1 or 2 or an artificial immune receptor according to any one of claims 3-6, wherein

a) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain comprise the amino acid sequence of SEQ ID No. 39, said cytoplasmic costimulatory signaling domain comprise the amino acid sequence of SEQ ID No. 35 and said cytoplasmic T cell receptor signaling domain comprise the amino acid sequence of SEQ ID No. 37,

b) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain comprise the amino acid sequence of SEQ ID No. 4, said cytoplasmic costimulatory signaling domain comprise the amino acid sequence of SEQ ID No. 35 and said cytoplasmic T cell receptor signaling domain comprise the amino acid sequence of SEQ ID No. 37,

c) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain comprise the amino acid sequence of SEQ ID No. 33, said cytoplasmic costimulatory signaling domain comprise the amino acid sequence of SEQ ID No. 35 and said cytoplasmic T cell receptor signaling domain comprise the amino acid sequence of SEQ ID No. 37, or

d) said member of the tumor necrosis factor receptor superfamily and said transmembrane domain comprise the amino acid sequence of SEQ ID No. 39, said cytoplasmic costimulatory signaling domain comprise the amino acid sequence of

SEQ ID No. 35 and said cytoplasmic T cell receptor signaling domain comprise the amino acid sequence of SEQ ID No. 37.

8. A nucleic acid encoding an artificial immune receptor according to any one of claims 3-7.

9. A vector comprising a nucleic acid according to claim 8.

10. A regulatory T cell according to claim 1 or 2 or an artificial immune receptor according to any one of claims 3-7 for use in medicine.

11. A regulatory T cell or an artificial immune receptor for use according to claim 10, wherein said use in medicine is the treatment of an inflammatory disorder, an autoimmunity disorder, graft versus host disease or the use in solid organ transplantation.

12. A regulatory T cell or an artificial immune receptor for use according to claim 10, wherein said use in medicine is the use in safeguarding tissue homeostasis and tissue regeneration.