Claims

1. A CD19 specific chimeric antigen receptor comprising at least one extracellular ligand binding domain, a transmembrane domain and at least one intracellular signalling domain wherein said extracellular domain comprises a single chain FV fragment derived from the monoclonal antibody 4G7, specific for CD19, said single chain FV fragment comprising the variable fragment of the CD19 monoclonal antibody 4G7 immunoglobulin gamma 1 heavy chain of SEQ ID NO: 3 and the variable fragment of the CD19 monoclonal antibody 4G7 immunoglobulin kappa light chain of SEQ ID NO: 4 or SEQ ID NO: 5.

2. The CD19 specific chimeric antigen receptor of claim 1 wherein said single chain FV fragment comprises the amino acid sequence of SEQ ID NO: 7 or 8.

3. The CD19 specific chimeric antigen receptor of claim 1 or 2 wherein said intracellular signalling domain comprises a CD3 zeta signalling domain.

4. The CD 19 specific chimeric antigen receptor according to any one of claims 1 to 3 wherein said intracellular signalling domain comprises a 4-1BB domain.

5. The CD19 specific chimeric antigen receptor according to any one of claims 1 to 4 comprising an human CD8 alpha chain transmembrane and stalk domain.

6. The CD19 specific chimeric antigen receptor according to any one of claims 1 to 5 comprising an amino acid sequence having at least 75%, preferably 80%, 85%, 90%, 95% sequence identity with the amino acid sequence SEQ ID NO: 14 or 15.

7. The CD19 specific chimeric antigen receptor according to any one of claims 1 to 6 further comprising another extracellular ligand binding domain which is not specific for CD19.

8. A polynucleotide encoding said chimeric antigen receptor according to any one of claims 1 to 7.

9. A polynucleotide of claim 8 comprising a nucleic acid sequence having at least 75%, preferably 80%, 85%, 90%, 95% sequence identity with the nucleic acid sequence

SEQ ID NO: 17.

10. An expression vector comprising a nucleic acid of claim 8 or 9.

11. A genetically engineered immune cell expressing at the cell surface membrane a CD19 specific chimeric antigen receptor comprising at least one extracellular ligand binding domain and at least one intracellular signalling domain wherein said extracellular domain comprises a single chain FV fragment derived from a monoclonal antibody 4G7, specific for CD19, said single chain FV fragment comprising the variable fragments of the CD19 monoclonal antibody 4G7 immunoglobulin gamma 1 heavy chain of SEQ ID NO: 3 and the variable fragments of the CD19 monoclonal antibody 4G7 immunoglobulin kappa light chain of SEQ ID NO: 4 or SEQ ID NO: 5.

12. The genetically engineered immune cell of claim 10, wherein said single chain FV fragment comprises the amino acid sequence of SEQ ID NO: 7 or 8.

13. A genetically engineered immune cell expressing at the cell surface membrane a CD19 specific chimeric antigen receptor according to any one of claims 1 to 7.

14. The genetically engineered immune cell of any one of claims 11 to 13 further comprising another chimeric antigen receptor which is not specific for CD19.

15. The genetically engineered immune cell according to any one of claims 11 to 14 derived from inflammatory T-lymphocytes, cytotoxic T-lymphocytes, regulatory T-lymphocytes or helper T-lymphocytes.

16. The genetically engineered immune cell according to any one of claims 11 to 15, wherein said cell is derived from a healthy donor.

17. The genetically engineered immune cell according to any one of claims 11 to 15, wherein said cell is derived from a patient diagnosed with cancer.

18. A method of engineering an immune cell comprising:
    (a) Providing an immune cell,

(b) Expressing at the surface of said cell at least one CD19 specific chimeric antigen receptor according to any one of claims 1 to 7.

19. The method of engineering an immune cell of claim 18 comprising:

(a) Providing an immune cell,

(b) Introducing into said cell at least one polynucleotide encoding said CD19 specific chimeric antigen receptor,

(c) Expressing said polynucleotide into said cell.

20. The method of engineering an immune cell of claim 18 comprising:

(a) Providing an immune cell,

(b) Introducing into said cell at least one polynucleotide encoding said CD19 specific chimeric antigen receptor,

(c) Introducing at least one other chimeric antigen receptor which is not specific for CD19.