CLAIMS

1. A chimeric cytokine receptor (CCR) comprising:

an exodomain which binds to a ligand selected from a tumour secreted factor, a chemokine and a cell-surface antigen; and

a cytokine receptor endodomain.

2. A chimeric cytokine receptor according to Claim 1, which comprises two polypeptides:

(i) a first polypeptide which comprises:

(a) a first antigen-binding domain which binds a first epitope of the ligand

(b) a first chain of the cytokine receptor endodomain; and

(ii) a second polypeptide which comprises:

(a) a second antigen-binding domain which binds a second epitope of the ligand

(b) a second chain of the cytokine-receptor endodomain.

3. A chimeric cytokine receptor according to Claim 2, in which each of the first and second antigen-binding domains are single-chain variable fragments (scFvs).

4. A chimeric cytokine receptor according to Claim 2, in which each of the first and second antigen-binding domains are single domain binders (dAbs).

5. A chimeric cytokine receptor according to Claim 1, which comprises two polypeptides:

(i) a first polypeptide which comprises:

(a) a heavy chain variable domain (V_H)

(b) a first chain of the cytokine receptor endodomain; and

(ii) a second polypeptide which comprises:

(a) a light chain variable domain (V_L)

(b) a second chain of the cytokine-receptor endodomain.

6. A chimeric cytokine receptor according to Claim 5, in which the first and second chains for the cytokine receptor endodomains are different and are selected from type I cytokine receptor endodomain α-, β-, and γ-chains.

7. A chimeric cytokine receptor according to Claim 5, in which the first and second chains for the cytokine receptor endodomains are the same and are selected from type I cytokine receptor endodomain α-, β-, and γ-chains.

8. A chimeric cytokine receptor according to any preceding claim, in which the cytokine receptor endodomain comprises:

(i) IL-2 receptor β-chain endodomain

(ii) IL-7 receptor α-chain endodomain; or

(iii) IL-15 receptor α-chain endodomain; and/or

(iv) common γ-chain receptor endodomain.

9. A cell which comprises a chimeric cytokine receptor according to any preceding claim.

10. A cell according to Claim 9, which comprises a first chimeric cytokine receptor and a second chimeric cytokine receptor which bind different epitopes on the same ligand.

11. A cell according to Claim 10, in which the first chimeric cytokine receptor comprises a type I cytokine receptor endodomain α- or β-chain, and the second chimeric cytokine receptor comprises a type I cytokine receptor endodomain γ-chain, such that when the first chimeric cytokine receptor and the second cytokine receptor bind the ligand, combined signalling through the α-/β-chain and γ-chain occurs.

12. A cell according to any of Claims 9 to 11, which also comprises a chimeric antigen receptor.

13. A nucleic acid sequence encoding a chimeric cytokine receptor (CCR) according to any of Claims 1 to 8.

14. A nucleic acid construct which comprises a first nucleic acid sequence encoding a first CCR and a second nucleic acid sequence encoding a second CCR, the nucleic acid construct having the structure:

AgB1-spacer1-TM1-endo1-coexpr-AbB2-spacer2-TM2-endo2

in which

AgB1 is a nucleic acid sequence encoding the antigen-binding domain of the first CCR;

spacer 1 is a nucleic acid sequence encoding the spacer of the first CCR;

TM1 is a nucleic acid sequence encoding the transmembrane domain of the first CCR;

endo 1 is a nucleic acid sequence encoding the endodomain of the first CCR;

coexpr is a nucleic acid sequence enabling co-expression of both CCRs

AgB2 is a nucleic acid sequence encoding the antigen-binding domain of the second CCR;

spacer 2 is a nucleic acid sequence encoding the spacer of the second CCR;

TM2 is a nucleic acid sequence encoding the transmembrane domain of the second CCR;

endo 2 is a nucleic acid sequence encoding the endodomain of the second CCR.

15. A vector comprising a nucleic acid construct according to Claim 14.

16. A kit which comprises:

(i) a vector comprising a nucleic acid sequence encoding a first CCR as defined in any of Claims 1 to 8; and

(ii) a vector comprising a nucleic acid sequence encoding a second CCR as defined in any of Claims 1 to 8; or

(i) a vector comprising a nucleic acid sequence encoding a CCR as defined in any of Claims 1 to 8; and

(ii) a vector comprising a nucleic acid sequence encoding a chimeric antigen receptor.

17. A method for making a cell according to any of Claims 9 to 12, which comprises the step of introducing: a nucleic acid sequence according to Claim 13; a nucleic acid construct according to Claim 14; a vector according to Claim 15; or a kit of vectors according to Claim 16, into a cell.

18. A pharmaceutical composition comprising a plurality of cells according to any of Claims 9 to 12.

19. A pharmaceutical composition according to Claim 18 for use in treating and/or preventing a disease.

20. The use of a cell according to any of Claims 9 to 12 in the manufacture of a medicament for treating and/or preventing a disease.