

CLAIMS

1. A chimeric antigen receptor (CAR)-forming polypeptide comprising:
 - (i) an antigen-binding domain;
 - (ii) a coiled-coil spacer domain;
 - 5 (iii) a transmembrane domain; and
 - (iv) an endodomain.
2. An accessory polypeptide comprising:
 - (i) a coiled-coil spacer domain;
 - (ii) a transmembrane domain; and
 - 10 (iii) an endodomain.
3. A CAR-forming polypeptide according to Claim 1 or an accessory polypeptide according to Claim 2, in which the coiled-coil spacer domain enables the multimerization of at least three CAR-forming polypeptides/accessory polypeptides.
4. A CAR-forming polypeptide or accessory polypeptide according to Claim 3, in which

15 the coiled-coil spacer domain is from: cartilage-oligomeric matrix protein (COMP), mannose-binding protein A, coiled-coil serine-rich protein 1, polypeptide release factor 2, SNAP-25, SNARE, Lac repressor or apolipoprotein E.
5. A multimeric chimeric antigen receptor (CAR) comprising a plurality of CAR-forming polypeptides as defined in any preceding claim.
- 20 6. A multimeric chimeric antigen receptor (CAR) comprising one or more CAR-forming polypeptides as defined in any of Claims 1 to 4 and one or more accessory polypeptides as defined in any of Claims 2 to 4.
7. An engaged complex which comprises first and second multimeric CARs according to Claim 5 or 6, in which the first multimeric CAR forms a bridge with the second multimeric

25 CAR, such that the first and second multimeric CARs engage to form a complex.
8. A chimeric antigen receptor (CAR) signalling system, which comprises:

(i) a multimeric CAR comprising a CAR-forming polypeptide according to Claim 1 or accessory polypeptide according to Claim 2 in which the endodomain comprises a first heterodimerization domain; and

(ii) an intracellular signalling component comprising a signalling domain and a second heterodimerization domain;

in which heterodimerization between the first and second heterodimerization domains causes the multimeric CAR and signalling component to form a functional CAR complex.

9. A nucleic acid sequence which encodes a CAR-forming polypeptide or accessory polypeptide according to any of Claims 1 to 4.

10. A nucleic acid construct which encodes two or more CAR forming polypeptides according to Claim 1.

11. A nucleic acid construct which encodes at least one CAR-forming polypeptide according to Claim 1 and at least one accessory polypeptide according to Claim 2.

12. A nucleic acid construct which encodes:

(i) at least one CAR-forming polypeptide or accessory polypeptide which forms a CAR signalling system according to Claim 8; and

(ii) an intracellular signalling component.

13. A vector which comprises a nucleic acid sequence according to Claim 9 or a nucleic acid construct according to any of Claims 10 to 12.

14. A cell which expresses a CAR-forming polypeptide or accessory polypeptide according to any of Claims 1 to 4; a CAR signalling system according to Claim 8; a multimeric CAR according to Claim 5 or 6; or an engaged complex according Claim 7.

15. A pharmaceutical composition which comprises a cell according to Claim 14.

16. A cell according to Claim 14 for use in treating a disease.

17. Use of a cell according to Claim 14 in the manufacture of a medicament for treating a disease.

18. A cell for use according to Claim 16 or use according to Claim 17, in which the disease is cancer.
19. A cell or use according to Claim 18, in which the cancer is Chronic lymphocytic leukaemia (CLL), melanoma or myeloma.
- 5 20. A method for making a cell according to Claim 16, which comprises the step of introducing a nucleic acid sequence according to Claim 9, a nucleic acid construct according to Claim 10, 11 or 12 or a vector according to Claim 13 into the cell.