Claims

1. A coreceptor-CAR (CoCAR), comprising
   (i) a first extracellular antigen-recognition domain,
   (ii) a first hinge domain,
   (iii) a first transmembrane domain, and
   (iv) at least one cytosolic domain
   capable of binding LCK;
   wherein the CoCAR does not comprise a CD3zeta domain.

2. The CoCAR according to claim 1, wherein the at least one cytosolic domain capable of binding LCK
   (1) is an intracellular signaling domain derived from a CD28, CD44, CD146, CD4, CD8α, or CD3ε intracellular signaling domain, or a variant or fragment thereof, or
   (2) comprises one or more motifs capable of binding LCK.

3. The CoCAR according to claim 1 or 2, wherein the first antigen-recognition domain is a scFv.

4. The CoCAR according to any one of the preceding claims, capable of specifically binding to an antigen on a target cell.

5. The CoCAR according to any one of the preceding claims, wherein the first hinge domain is derived from a CD4, CD8, CD28, IgG-Fc domain.

6. The CoCAR according to any one of the preceding claims, wherein the first transmembrane domain is derived from a CD4, CD8, CD28, CD44, CD146 or CD3zeta transmembrane domain.

7. The CoCAR according to any one of claims 2-6, wherein the motif capable of binding LCK is derived from a CD28, CD44, CD146, CD4, CD8α, or CD3ε intracellular signaling domain.

8. A combination of
   (a) the CoCAR of any one of the claims 1-7, and
   (b) a chimeric antigen receptor (CAR).

9. A nucleic acid or a combination of a first and second nucleic acid, wherein
   (a) the nucleic acid encodes the CoCAR according to any one of claims 1 to 7 or the combination of claim 8, or
   (b) the combination of a first and second nucleic acid encodes the combination of claim 8, wherein the first nucleic acid encodes the CoCAR (a), and the second nucleic acid encodes the CAR (b).

10. A nucleic acid construct or a combination of a first and second nucleic acid construct, wherein
   (a) the nucleic acid construct comprises the nucleic acid or the combination of a first and second nucleic acid of claim 9, wherein the nucleic acid and/or the first and second nucleic acids are functionally linked to at least one expression control sequence, and
   (b) in the combination of the first and second nucleic acid construct, the first nucleic construct comprises the first nucleic acid of claim 9, and the second nucleic construct comprises the second nucleic acid of claim 9, wherein the first and second nucleic acids independently are functionally linked to at least one expression control sequence.

11. A vector or a combination of a first and second vector, wherein
   (a) the vector comprises the nucleic acid or a combination of a first and second nucleic acid of claim 9 and/or the nucleic acid construct or combination of nucleic acid constructs of claim 10, and/or
   (b) in the combination, the first vector comprises the first nucleic acid and/or the first nucleic acid construct, and the second vector comprises the second nucleic acid and/or the second nucleic acid construct of claims 9 and 10.

12. A recombinant cell, comprising the nucleic acid construct according to claim 10.

13. The recombinant cell of claim 12, which is an immune effector cell.

14. The recombinant cell of any one of the claims 12-13, expressing the CoCAR and/or the combination of claim 8 on the cell surface.

15. The recombinant cell of any one of the claims 12-14, wherein (i) the CAR and (ii) the CoCAR recognize different epitopes located in the same antigen expressed on the surface of a target cell.

16. The recombinant cell of any one of the claims 12-14, wherein (i) the CAR and (ii) the CoCAR recognize different antigens expressed on the surface of a target cell.

17. A pharmaceutical composition comprising
    (i) the CoCAR according to any one of claims 1-7,
    (ii) the combination of claim 8,
    (iii) the nucleic acid or the combination of nucleic acids according to claim 9, the nucleic acid construct or the combination of nucleic constructs according to claim 10, the vector or the combination of vectors according to claim 11, and/or
    (iv) the recombinant cell according to any one of the claims 12-16,
    and a pharmaceutically acceptable carrier.

18. The CoCAR according to any one of claims 1-7, the combination of claim 8, nucleic acid or the combination of nucleic acids according to claim 9, the nucleic acid construct or the combination of nucleic constructs according to claim 10, the vector or the combination of vectors according to claim 11, the recombinant cell according to any one of the claims 12-16, and/or the pharmaceutical composition according to claim 17, for use in therapy.

19. Use of (i) the CoCAR according to any one of claims 1-7, (ii) the combination of claim 8, (iii) the nucleic acid, or the combination of nucleic acids according to claim 9, the nucleic acid construct, or the combination of nucleic constructs according to claim 10, the vector, or the combination of vectors according to claim 11, and/or (iv) the recombinant cell according to any one of the claims 12-16 in the manufacture of a medicament for treating cancer in a subject in need thereof.

20. The use according to claim 19, wherein the cancer is a malignancy positive for at least one tumor-associated antigen selected from the group consisting of B7-H3 (CD276), BCMA, CD3, CD5, CD19, CD20, CD22, CD23, CD30, CD33, CD38, CD44, CD44v6, CD52, CD70, CD79A, CD79B, CD123, CD138, CD171, CEA, Claudin-6, Claudin-18.2, CLL1, CXCR5, EGFR, EGFRvIII, EPH-receptor A2, IGLV3-21, GP-2, GP-40, HER2, ErbB3, ErbB4, FBP, AchR, Fr-a, GD2, GD3, HMW-MAA, IL13Ra2, Kappa-LC,

IGLV3-21-R110, Lewis Y, Mesothelin, MUC1, MUC16, NKG2D Ligands, NCAM, NY-ESO1, Oncofetal antigen h5T4, PSCA, PSMA, ROR1, TAG-72, VEGFR, GOLPH2, and SLAMF7.

21. The use according to claim 19 or 20, wherein the cancer is a B cell malignancy.