

## CLAIMS

### WHAT IS CLAIMED IS:

1. A cell surface polypeptide consisting of:
  - (a) a truncated non-immunogenic HER1 polypeptide comprising: a HER1 Domain III comprising an amino acid sequence having at least 90% identity with the sequence of SEQ ID NO: 200; and a truncated HER1 Domain IV comprising an amino acid sequence having at least 90% identity with a sequence of any one of SEQ ID NOs: 203–209;
  - (b) a truncated non-immunogenic CD20 polypeptide comprising an amino acid sequence having at least 90% identity with the sequence of any one of SEQ ID NOs: 218–220;
  - (c) a truncated non-immunogenic CD52 polypeptide comprising an amino acid sequence having at least 90% identity with the sequence of SEQ ID NO: 143; or
  - (d) a truncated non-immunogenic LNGFR polypeptide comprising an amino acid sequence having at least 90% identity with the sequence of any one of SEQ ID NOs: 156, 158, and 160.
2. The cell surface polypeptide of claim 1, consisting of a truncated non-immunogenic HER1 polypeptide comprising: a HER1 Domain III comprising an amino acid sequence having at least 90% identity with the sequence of SEQ ID NO: 200; and a truncated HER1 Domain IV comprising an amino acid sequence having at least 90% identity with a sequence of any one of SEQ ID NOs: 203–209.
3. The cell surface polypeptide of claim 2, wherein: the HER1 Domain III comprises an amino acid sequence having at least 95% identity with the sequence of SEQ ID NO: 200; and the truncated HER1 Domain IV comprises an amino acid sequence having at least 95% identity with a sequence of any one of SEQ ID NOs: 203–209.
4. The cell surface polypeptide of claim 1, consisting of a truncated non-immunogenic CD20 polypeptide comprising an amino acid sequence having at least 90% identity with the sequence of SEQ ID NO: 109.

5. The cell surface polypeptide of claim 1, consisting of a truncated non-immunogenic CD52 polypeptide comprising an amino acid sequence having at least 95% identity with the sequence of SEQ ID NO: 143.
6. The cell surface polypeptide of claim 1, consisting of a truncated non-immunogenic HER1 polypeptide that has at least 90% identity with an amino acid sequence of any one of SEQ ID NOs: 211–217.
7. The cell surface polypeptide of claim 1, consisting of a truncated non-immunogenic CD20 polypeptide having at least 95% identity with an amino acid sequence of any one of SEQ ID NOs: 218–220.
8. The cell surface polypeptide claim 1, consisting of a truncated non-immunogenic LNGFR polypeptide having least 95% identity with an amino acid sequence of any one of SEQ ID NOs: 156, 158, and 160.
9. A polypeptide construct comprising: (a) the cell surface polypeptide of any one of claims 1 to 8; and (b) a transmembrane domain comprising: a glycoporphin A transmembrane domain or a functional fragment or variant thereof; a glycoporphin A-integrin  $\beta 3$  chimeric transmembrane domain or a functional fragment or variant thereof; a CD3 zeta transmembrane domain; or a non-HER1 transmembrane domain.
10. The polypeptide construct of claim 9, comprising a non-HER1 transmembrane domain.
11. The polypeptide construct of claim 9, comprising a peptide linker that links the cell surface polypeptide to the transmembrane domain.
12. The polypeptide construct of claim 11 comprising:
  - (a) the cell surface polypeptide is a truncated non-immunogenic HER1 polypeptide consisting of a HER1 Domain III and a truncated HER1 Domain IV, wherein the HER1 polypeptide binds an anti-HER1 antibody; and

- (b) the trans-membrane domain is a CD28 trans-membrane domain or a functional fragment or variant thereof.
13. The polypeptide construct of claim 9, comprising an amino acid sequence having at least 90% identity with the sequence of SEQ ID NO: 57.
  14. A polynucleotide encoding the polypeptide construct of claim 9.
  15. A vector comprising the polynucleotide of claim 14.
  16. An engineered cell comprising the polynucleotide of claim 14.
  17. The engineered cell of claim 16, further comprising a polypeptide comprising: an IL-15 or functional fragment or variant thereof; and an IL-15R $\alpha$  or functional fragment or variant thereof.
  18. The engineered cell of claim 16, further comprising a chimeric antigen receptor or a T-cell receptor.
  19. The engineered cell of claim 16, further comprising a chimeric antigen receptor.
  20. The engineered cell of claim 19, wherein the chimeric antigen receptor binds CD19, CD33, BCMA, CD44,  $\alpha$ -Folate receptor, CAIX, CD30, ROR1, CEA, EGP-2, EGP-40, HER2, HER3, Folate-binding Protein, GD2, GD3, IL-13R-a2, KDR, EDB-F, mesothelin, CD22, EGFR, MUC-1, MUC-16, MAGE-A1, h5T4, PSMA, TAG-72, EGFRvIII, CD123, and/or VEGF-R2.
  21. The engineered cell of claim 16, wherein the cell is a T-cell or a natural killer cell.
  22. A composition for use in treating cancer, the composition comprising the engineered cell of claim 18.
  23. The composition of claim 22, comprising the engineered cell in an amount of from  $10^4$  to  $10^9$  cells/kg of the weight of the subject to which the composition is to be administered.

24. The composition of claim 23, comprising the engineered cell in an amount of from  $10^4$  to  $10^7$  cells/kg of the weight of the subject to which the composition is to be administered.
25. The composition of claim 22, wherein the cancer is associated with the expression of CD19, CD33, BCMA, CD44,  $\alpha$ -Folate receptor, CAIX, CD30, ROR1, CEA, EGP-2, EGP-40, HER2, HER3, Folate-binding Protein, GD2, GD3, IL-13R-a2, KDR, EDB-F, mesothelin, CD22, EGFR, MUC-1, MUC-16, MAGE-A1, h5T4, PSMA, TAG-72, EGFRvIII, CD123, and/or VEGF-R2.
26. The composition of claim 22, wherein the cancer is anal cancer, appendix cancer, bile duct cancer, bladder cancer, brain tumor, breast cancer, cervical cancer, colon cancer, cancer of Unknown Primary (CUP), esophageal cancer, eye cancer, fallopian tube cancer, gastroenterological cancer, kidney cancer, liver cancer, lung cancer, medulloblastoma, melanoma, oral cancer, ovarian cancer, pancreatic cancer, parathyroid disease, penile cancer, pituitary tumor, prostate cancer, rectal cancer, skin cancer, stomach cancer, testicular cancer, throat cancer, thyroid cancer, uterine cancer, vaginal cancer, or vulvar cancer.
27. The engineered cell of claim 16, further comprising a polypeptide having at least 90% identity with the sequence of SEQ ID NO: 178.