WHAT IS CLAIMED IS:

1. A polynucleotide encoding a chimeric receptor for expression in host Natural Killer (NK) cells, the chimeric receptor comprising (a) a CD3 zeta cytoplasmic domain, and (b) a fragment of a Natural Killer Group 2 member D (NKG2D) receptor, wherein the CD3 zeta cytoplasmic domain comprises a derivative of the amino acid sequence of SEQ ID NO: 10, wherein the CD3 zeta derivative is at least 98% homologous to the amino acid sequence of SEQ ID NO: 10, wherein the fragment of the NKG2D receptor is encoded by a fragment of the nucleic acid sequence of SEQ ID NO. 11, and wherein the fragment of the NKG2D receptor is capable of binding one or more native NKG2D ligands.

2. The polynucleotide of claim 1, wherein the CD3 zeta derivative is at least 99% homologous to the amino acid sequence of SEQ ID NO: 10.

3. The polynucleotide of claim 1 or 2, wherein the fragment of the NKG2D receptor comprises a fragment of the amino acid sequence of SEQ ID NO: 12, and wherein the one or more native ligand is selected from MICA, MICB, ULBP1, ULBP2, ULBP3, ULBP4, ULBP5 and/or ULBP6, and wherein upon expression of the chimeric receptor encoded by the polynucleotide in Natural Killer (NK) cells, said NK cells are able to induce an enhanced immune response in a subject receiving said NK cells, said immune response being at least 10% enhanced as compared to an immune response resulting from NK cells not expressing the chimeric receptor.

4. The polynucleotide according to any one of claims 1 to 3, further comprising a DNAX-activating protein 10 (DAP10) polypeptide.

5. The polynucleotide of claim 4, wherein the DAP10 polypeptide comprises the amino acid sequence of SEQ ID NO: 14.

6. The polynucleotide of claim 5, wherein the DAP10 polypeptide is encoded by the nucleic acid sequence of SEQ ID NO: 13.

7. The polynucleotide of any one of claims 1-6 which is an mRNA.

8. A vector comprising the polynucleotide of any one of claims 1-6, wherein the polynucleotide is operably linked to at least one regulatory element for expression of the chimeric receptor complex.

9. The vector of claim 8, wherein the CD3 zeta cytoplasmic domain and the fragment of the NKG2D receptor are expressed as a single chimeric receptor protein.

10. The vector of claim 8 or 9, wherein the DAP10 polypeptide is expressed as a separate molecule from the CD3 zeta cytoplasmic domain and the fragment of the NKG2D receptor.

11. The vector of claim 10, wherein the nucleotide sequence encoding the DAP10 polypeptide is operably linked to a nucleotide sequence comprising an internal ribosome entry site (IRES).

12. An isolated genetically engineered cell comprising the polynucleotide of any one of claims 1-7 or the vector of any one of claims 8-11.

13. The genetically engineered cell of claim 12, which is a natural killer (NK) cell.

14. Use of a therapeutic effective amount of natural killer (NK) cells expressing a chimeric receptor complex encoded by the polynucleotide of any one of claims 1-7 for the manufacture of a medicament for treating or preventing cancer.

15. The use of claim 14, wherein the medicament is prepared to be administered to mammal NK cells to enhance the natural killer (NK) cells cytotoxicity.

16. The use of claim 14 or 15, wherein said NK cells are autologous NK cells.

17. An isolated genetically engineered cell according to any one of claims 12 or 13 for use in medicine.

18. A polynucleotide according to any one of claims 1 to 7, wherein the CD3 zeta derivative comprises the amino acid sequence of SEQ ID NO: 10.