Claims

1. An immunoconjugate comprising a first and a second Fab molecule, an Fc domain consisting of two subunits, and a cytokine, wherein said first and said second Fab molecule and said Fc domain are part of an immunoglobulin molecule and wherein not more than one cytokine molecule is present.

2. The immunoconjugate of claim 1, wherein said Fc domain comprises a modification promoting heterodimerization of two non-identical polypeptide chains.

3. The immunoconjugate of claim 2, wherein said modification is a knob-into-hole modification, comprising a knob modification in one of the subunits of the Fc domain and a hole modification in the other one of the two subunits of the Fc domain, wherein the knob modification comprises a protuberance constructed by replacing an amino acid with a small side chain with an amino acid with a larger side chain, and the hole modification comprises a cavity of identical or similar size to the protuberance constructed by replacing an amino acid with a large side chain with an amino acid with a smaller side chain.

4. The immunoconjugate of claim 3, wherein said ~~effector moiety~~cytokine is fused to the amino- or carboxy-terminal amino acid of the subunit of the Fc domain comprising the knob modification.

Carcinoembryonic Antigen (CEA), and Melanoma-associated Chondroitin Sulfate Proteoglycan (MCSP).

~~12. The immunoconjugate of any one of claims 1 to 11, wherein said first and said second Fab molecule is directed to CEA.~~

~~13. The immunoconjugate of claim 12, wherein said first and said second Fab molecule comprises a heavy chain variable region sequence that is at least about 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to the sequence of SEQ ID NO: 191, and a light chain variable region sequence that is at least about 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to the sequence of SEQ ID NO: 189.~~

~~14~~12. The immunoconjugate of any one of claims 1 to ~~13~~11, wherein said cytokine is a single chain cytokine.

~~15~~13. The immunoconjugate of any one of claims 1 to ~~14~~12, wherein said cytokine is IL-2.

~~16. The immunoconjugate of any one of claims 1 to 15, wherein said cytokine is a mutant IL-2 polypeptide having reduced binding affinity to the α subunit of the IL-2 receptor.~~

~~17. The immunoconjugate of claim 16, wherein said mutant IL-2 polypeptide comprises an amino acid substitution at one or more positions selected from the positions corresponding to residues 42, 45 and 72 of human IL-2.~~

~~18. The immunoconjugate of claim 17, wherein said mutant IL-2 polypeptide comprises the amino acid substitutions F42A, Y45A and L72G.~~

~~19. The immunoconjugate of any one of claims 1 to 18, comprising the polypeptide sequences of SEQ ID NO: 277, SEQ ID NO: 281 and SEQ ID NO: 283, or variants thereof that retain functionality.~~

~~20~~14. An isolated polynucleotide encoding the immunoconjugate of any one of claims 1 to ~~19~~13~~or a fragment thereof~~.

~~21~~15. An expression vector comprising the isolated polynucleotide of claim ~~20~~14.

~~22~~16. A host cell comprising the isolated polynucleotide of claim ~~20~~ 14 or the expression vector of claim ~~21~~15.

~~23~~17. A method of producing an immunoconjugate comprising a first and a second antigen binding Fab molecule, an Fc domain, and a single cytokine, comprising culturing the host cell of claim ~~22~~ 16 under conditions suitable for the expression of the immunoconjugate and optionally recovering the immunoconjugate.

~~24. An immunoconjugate comprising a first and a second antigen binding Fab molecule, an Fc domain and a single cytokine, wherein said immunoconjugate is produced by the method of claim 23.~~

~~25~~18. A pharmaceutical composition comprising the immunoconjugate of any one of claims 1 to ~~19~~ 13 ~~or claim 24~~ and a pharmaceutically acceptable carrier.

~~26~~19. The immunoconjugate of any one of claims 1 to ~~19~~ 13~~or claim 24~~, or the pharmaceutical composition of claim ~~25~~18, for use in the treatment of a disease in an individual in need thereof.

~~27~~20. ~~The~~ Use of the immunoconjugate of any one of claims 1 to ~~19~~ 13~~or claim 24~~, or the pharmaceutical composition of claim ~~25~~18, ~~for~~ in the manufacture of a medicament for the treatment of a disease in an individual in need thereof.

~~28~~21. The immunoconjugate or the pharmaceutical composition of claim~~s 26 or~~ ~~27~~19, wherein said disease is cancer.

22. The use of claim 20, wherein said disease is cancer.