Claims

1. A fusion protein comprising:

domain (a) which is a functional fragment of hTRAIL protein sequence ~~(SEQ. No. 16)~~, which fragment begins with an amino acid at a position not lower than hTRAIL95, or a sequence ~~homolog of said functional fragment~~ having at least 70% ~~sequence~~ identity with said functional fragment; and

domain (b) which is a sequence of an immunostimulating effector peptide, and is selected from the group consisting of

- the fragment of interferon alfa 2b of SEQ. No. 17;
- the fragment of interferon gamma of SEQ. No. 18;
- the pseudodimer of interferon gamma of SEQ. No. 19;
- the pseudodimer of interferon alpha 2b of SEQ. No. 46;
- the consensus sequence of interferon alpha of SEQ. No. 47

wherein the sequence of domain (b) is attached at the C-terminus or N-terminus of domain (a) ; and

wherein said hTRAIL protein sequence is the SEQ. No. 16.

2. The fusion protein according to claim 1 wherein domain (a) comprises the fragment of hTRAIL protein sequence ~~(SEQ. No. 16)~~ which begins with an amino acid from the range hTRAIL95 to hTRAIL122, inclusive, and ends with the amino acid hTRAIL281.

3. The fusion protein according to claim 1 or 2 wherein domain (a) is selected from the group consisting of sequences corresponding to hTRAIL95-281, hTRAIL114-281, hTRAIL116-281, hTRAIL120-281, hTRAIL121-281 and hTRAIL122-281~~fragments of hTRAIL114-281 (SEQ. No. 16), beginning with an amino acid in position 95, 116, 120, 121 or 122~~.

~~4. The fusion protein according to claims 1 to 3, wherein domain (b) is selected from the group consisting of~~

- ~~the fragment of interferon alfa 2b of SEQ. No. 17;~~
- ~~the fragment of interferon gamma of SEQ. No. 18;~~
- ~~the pseudodimer of interferon gamma of SEQ. No. 19;~~

~~- the pseudodimer of interferon alpha 2b of SEQ. No. 46;~~

~~- the consensus sequence of interferon alpha of SEQ. No. 47.~~

~~5.~~ 4. The fusion protein according to any of claims ~~1 to 4~~1 to 3, which between domain (a) and domain (b) contains at least one domain (c) comprising a protease cleavage site selected from the group consisting of a sequence recognized by metalloprotease MMP, sequence recognized by urokinase uPA, and combinations thereof.

~~6.~~ 5. The fusion protein according to claim ~~5~~4, wherein the sequence recognized by metalloprotease MMP is SEQ. No. 20, and the sequence recognized by urokinase uPA is SEQ. No. 21.

~~7.~~ 6. The fusion protein according to claims ~~5 or 6~~4 or 5, wherein domain (c) is a combination of the sequence recognized by metalloprotease MMP and the sequence recognized by urokinase uPA located next to each other.

~~8.~~ 7. The fusion protein according to any one of claims~~.~~ ~~5 to 7~~4 to 6, which between two domains (c) contains a domain (d) of a linker for attachment of PEG molecule, selected from the group consisting of SEQ. No. 22, SEQ. No. 23, SEQ. No. 24 and SEQ. No. 25.

~~9.~~ 8. The fusion protein according to any one of claims ~~5 to 8~~4 to 7 which additionally comprises a glycine-serine flexible steric linker between domains (a), (b), (c) and/or (d).

~~10.~~ 9. The fusion protein according to claim ~~1~~69, wherein the glycine-serine linker is selected from the group consisting of SEQ. No. 26, SEQ. No. 27, SEQ. No. 28, and SEQ. No. 50.

~~11.~~ 10. The fusion protein according to claim 1 the amino acid sequence of which is selected from the group consisting of SEQ. No. 1; SEQ. No. 2; SEQ. No. 3; SEQ. No. 4; SEQ. No. 5; SEQ. No. 6; SEQ. No. 7; SEQ. No. 8; SEQ. No. 9; SEQ. No. 10; SEQ. No. 11; SEQ. No. 12; SEQ. No. 13; SEQ. No. 14; SEQ. No. 15; SEQ. No. 44, and SEQ. No. 45.

~~12.~~ 11. The fusion protein according to any one of the preceding claims, which is a recombinant protein.

~~13.~~ 12. A polynucleotide sequence, coding the fusion protein defined as in any one of claims 1 to ~~11~~10.

~~14.~~ 13. The polynucleotide sequence according to claim ~~13~~12, optimized for genetic expression in E. coli.

~~15.~~ 14. The polynucleotide sequence according to claim ~~14~~13, selected from the group consisting of SEQ. No. 29; SEQ. No. 30; SEQ. No. 31; SEQ. No. 32; SEQ. No. 33; SEQ. No. 34; SEQ. No. 35; SEQ. No. 36; SEQ. No. 37; SEQ. No. 38; SEQ. No. 39; SEQ. No. 40; SEQ. No. 41; SEQ. No. 42; SEQ. No. 43; SEQ. No. 48, and SEQ. No. 49.

~~16.~~ 15. An expression vector, comprising the polynucleotide sequence according to any one of claims ~~13 to 15~~12 to 14.

~~17.~~ 16. A host cell, comprising the expression vector as defined in claim ~~16~~15; wherein the host cell is not within a human body.

~~18.~~ 17. The host cell according to claim~~.~~ 16 ~~17~~, which is a E. coli cell.

~~19.~~ 18. A pharmaceutical composition, comprising as an active ingredient the fusion protein as defined in any one of claims 1 to ~~12~~ 11 in combination with a pharmaceutically acceptable carrier.

~~20.~~ 19. A pharmaceutical composition as defined in claim ~~19~~ 18 in a form for parenteral administration.

~~21.~~ 20. Use of the fusion protein as defined in any one of claims 1 to ~~12~~ 11 for the preparation of a medicament for the treatment of cancer diseases in mammals, including humans.

~~22. A method of treatment of cancer diseases in mammal, including human, comprising administration to a subject in a need thereof of an anti-cancer effective amount of the fusion protein as defined in claims 1 to 12 or the pharmaceutical composition as defined in claims 19 or 20.~~