

complement complex/membrane attack complex (TCC/MAC) and an array of biologically active products.

Human cells and organs have a family of membrane-bound complement regulatory proteins to protect them from homologous complement-mediated lysis. These complement regulatory proteins include CD55 (decay-accelerating factor, DAF), CD46 (membrane cofactor protein, MCP), CD35 (complement receptor 1, CR1), and CD59 (membrane inhibitor of reactive lysis) (Carroll et al., 1988; Rey-Campos et al., 1988; Lublin et al., 1989; Morgan et al., 1994; Kim and Song, 2006).

CD55 is a glycosylphosphatidylinositol (GPI)-anchored protein and attaches to a cell plasma membrane through a glycolipid moiety (GPI anchor) at its C-terminus. The GPI-anchored proteins such as CD55 can be endocytosed and degraded or cleaved and released from cell plasma membrane (Censullo and Davitz, 1994a, 1994b; Turner 1994). For example, The GPI-anchored proteins including CD55 can be released from the cell surface by the action of GPI-specific phospholipases C and D (Turner 1994). These enzymatic activities likely control the catabolism of GPI-anchored proteins and regulate the cell surface expression of these proteins (Censullo and Davitz, 1994b).

SUMMARY

In one aspect, the present disclosure refers to a fusion protein comprising: (a) a CD55 peptide sequence comprising four short consensus repeats (SCR) of CD55, (b) a (G4S1)₃ linker sequence C-terminal to the CD55 sequence, (c) a CD8 transmembrane domain C-terminal to the linker sequence, and (d) a truncated CD8 intracellular domain C-terminal to the transmembrane domain; wherein the fusion protein does not contain a glycosylphosphatidylinositol (GPI) anchor. In another aspect, the present disclosure refers to a nucleic acid encoding the protein as disclosed herein. In another aspect, the present disclosure refers to an expression vector comprising the nucleic acid as disclosed herein, operatively linked to a control sequence. In another aspect, the present disclosure refers to a cell line stably expressing the protein as disclosed herein on the cell surface. In yet another aspect, the present disclosure refers to enveloped virus incorporating the protein as disclosed herein

CLAIMS

What is claimed is:

1. A fusion protein comprising: (a) a CD55 peptide sequence comprising four short consensus repeats (SCR) of CD55, (b) a (G4S1)₃ linker sequence C-terminal to the CD55 sequence, (c) a CD8 transmembrane domain C-terminal to the linker sequence, and (d) a truncated CD8 intracellular domain C-terminal to the transmembrane domain; wherein the fusion protein does not contain a glycosylphosphatidylinositol (GPI) anchor.
2. The protein of claim 1, wherein the CD55 peptide sequence is a human CD55 peptide sequence.
3. The protein of claim 1, wherein the CD55 peptide sequence of (a) is covalently bonded to the (G4S1)₃ linker sequence of (b) by a single peptide bond.
4. The protein of claim 1, wherein the CD55 peptide sequence of (a) is covalently bonded to the (G4S1)₃ linker sequence of (b) by a spacer.
5. The protein of claim 1, wherein the (G4S1)₃ linker sequence of (b) is covalently bonded to the CD8 transmembrane domain of (c) by a single peptide bond.
6. The protein of claim 1, wherein the (G4S1)₃ linker sequence of (b) is covalently bonded to the CD8 transmembrane domain of (c) by a spacer.
7. The protein of claim 1, wherein the CD8 transmembrane domain of (c) is covalently bonded to the truncated CD8 intracellular domain of (d) by a single peptide bond.
8. The protein of claim 1, wherein the CD8 transmembrane domain of (c) is covalently bonded to the truncated CD8 intracellular domain of (d) by a spacer.
9. The protein of claim 1, wherein the fusion protein further comprises a secretory signal peptide N-terminal to the CD55 peptide sequence of (a).

10. The protein of claim 9, wherein the secretory signal peptide is a secretory signal peptide of CD55.
11. The protein of claim 9, wherein the secretory signal peptide is covalently bonded to the CD55 peptide sequence of (a) by a single peptide bond.
12. The protein of claim 9, wherein the secretory signal peptide is covalently bonded to the CD55 peptide sequence of (a) by a spacer.
13. The protein of claim 1, having the sequence SEQ ID NO:2.
14. The protein of claim 1, having the sequence SEQ ID NO:3.
15. A nucleic acid encoding the protein of any one of claims 1 through 14.
16. The nucleic acid of claim 15, wherein the nucleic acid is DNA.
17. The nucleic acid of claim 16, further comprising one or more introns.
18. The nucleic acid of claim 15, encoding a protein having the sequence SEQ ID NO:2.
19. The nucleic acid of claim 18, having the sequence SEQ ID NO:1.
20. An expression vector comprising the nucleic acid of any one of claims 15 through 19, operatively linked to a control sequence.
21. A cell line stably expressing the protein of any one of claims 1 through 14 on the cell surface.
22. The cell line of claim 21, wherein the cell line is a mammalian cell line.
23. The cell line of claim 21, wherein the cell line is a DF-1 chicken embryonic fibroblast cell line.
24. An enveloped virus incorporating the protein of any one of claims 1 through 14 on the virus membrane.

25. The virus of claim 24, wherein the virus is an oncolytic virus.
26. The virus of claim 25, wherein the oncolytic virus is a Newcastle Disease Virus.
27. A pharmaceutical composition comprising the virus of claim 25 or 26 and a pharmaceutically acceptable carrier.
28. Use of the virus of claim 26 in the manufacture of a medicament for treating a neoplastic condition in a mammalian subject.
29. The use of claim 28, wherein the virus is to be administered intratumorally.
30. The use of claim 28, wherein the virus is to be administered intravenously.