CLAIMS

What is claimed is:

1. A fusion protein comprising a human fms related tyrosine kinase 3 ligand (FLT3L) extracellular domain operably linked to an immunoglobulin fragment crystallizable region (Fc region), wherein the fusion protein comprises the amino acid sequence of SEQ ID NO: 14.

2. The fusion protein of claim 1, further comprising a second polypeptide.

3. A conjugate comprising the fusion protein of claim 1 or claim 2 attached to a therapeutic agent.

4. A polynucleotide encoding a fusion protein of claim 1or claim 2.

5. The polynucleotide of claim 4, wherein the polynucleotide is selected from the group consisting of DNA, cDNA, RNA or mRNA.

6. The polynucleotide of claim 4, comprising a nucleic acid sequence that is at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, or at least 99% identical to a nucleic acid sequence of SEQ ID NO: 54.

7. A pharmaceutical composition comprising the fusion protein of claim 1 or claim 2, and a pharmaceutically acceptable carrier.

8. An *in vitro* method of promoting, and/or inducing, and/or increasing the expansion and/or proliferation of a cell or a population of cells that express fms related tyrosine kinase 3 (FLT3, CD135), comprising contacting the cell or population of cells with an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7.

9. A method of expanding hematopoietic stem cells (HSCs) ex vivo, comprising culturing HSCs *in vitro* in the presence of mesenchymal lineage precursor or stem cells (MLPSCs) and an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7; such that HSCs having the phenotype CD34+ are expanded.

10. Use of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7, in the manufacture of a medicament for inducing the immune system in a subject in need thereof.

11. Use of an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7, in the manufacture of a medicament for preventing, and/or reducing and/or inhibiting one or more of the recurrence, growth, proliferation, migration and/or metastasis of a cancer cell or population of cancer cells in a subject in need thereof.

12. Use of an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7, in the manufacture of a medicament for enhancing, and/or promoting, and/or increasing the tumor infiltration of T-cells and/or NK cells in a subject in need thereof.

13. Use of an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7, in the manufacture of a medicament for enhancing, and/or promoting, and/or accelerating the recovery from or reversing the effects of lymphopenia in a subject in need thereof.

14. Use of an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7, in the manufacture of a medicament for enhancing, and/or improving, and/or increasing the response to an anticancer therapy in a subject in need thereof; wherein the medicament is to be co-administered with an effective amount of an anticancer agent.

15. Use of an effective amount of the fusion protein of claim 1 or claim 2, the conjugate of claim 3, the polynucleotide of any one of claims 4-6, or the pharmaceutical composition of claim 7, in the manufacture of a medicament for treating or preventing a virus infection in a subject in need thereof.

16. The use of claim 15, wherein the virus infection is an HIV infection.

17. The use of claim 15, wherein the virus infection is a human hepatitis B virus (HBV) infection.