WHAT IS CLAIMED IS:

1. Use of an NK cell-stimulating exosome for preparing a composition for increasing the number of NK cells, comprising,

obtaining at least one NK cell-stimulating exosome from an exosome-secreting cell, wherein the exosome is an extracellular product of the exosome-secreting cells and comprises a fusion protein comprising one or more NK cell stimulatory peptides coupled to a membrane-inserting peptide selected from a segment of IgG, a segment of CD4, human Fc, GPI, trans-membrane T-cell receptor, pHLIP, and any combination thereof; and

contacting at least one NK cell with at least one NK-stimulating exosome.

2. The use of Claim 1, wherein the one or more stimulatory peptides are selected from the group consisting of 4-1BBL, IL-7, IL-2, IL-12, IL-18, IL-21, MICA/B, ULBP2, ICAM-1, 2B4, BCM1/SLAMF2, CD155, CD112, CCR7, DAP12, and DAP10.

3. The use of Claim 1, wherein the fusion protein is encoded by a recombinant or transgenic DNA molecule.

4. The use of Claim 3, further comprising preparing the fusion protein by introducing to the exosome-secreting cell the recombinant or transgenic DNA molecule.

5. The use of Claim 1, wherein the one or more stimulatory peptides coupled to a membrane-inserting peptide comprise a fusion protein encoded by recombinant DNA.

6. The use of Claim 1, wherein the NK cells are present in a population of cells obtained from unselected peripheral blood mononuclear cells (PBMCs), umbilical cord blood, lymphoid tissues, tumor infiltrated cells; NK cells derived from iPSCs or ESCs; or any combination thereof.

7. The use of Claim 1, wherein the exosome-secreting cell is obtained from a genetically engineered cell line which exhibits improved expression or formation of exosomes.

8. The use of claim 7, wherein the cell line is K562-mb15-41BBL, K562-mb21-41BBL or a derivative of K562-mb15-41BBL or K562-mb21-41BBL.

9. The use of Claim 1, wherein the contacting of the NK cells comprises contacting the NK cells with the at least one NK cell-stimulating exosome *in vitro*, *in vivo*, or *ex vivo*.

10. The use of Claim 9, wherein the contacting of the NK cells comprises contacting *in vivo* in the intraperitoneal cavity, subcutaneously, or intravenously in the epidural space.

11. The use of Claim 9, wherein the contacting comprises contacting the NK cell-stimulating exosomes in an allogeneic transplant procedure, a haploidentical transplant procedure, or an *in vivo* immunotherapy procedure.

12. The use of Claim 11, in an allogeneic transplant, a haploidentical transplant, or an *in vivo* immunotherapy to avoid or prophylaxis of acute or chromic graft-versus-host-disease (GVHD).

13. The use of claim 1, wherein the resulting composition comprises a plurality of NK cells for preparing a composition to treat cancer cells susceptible to NK cell mediated lysis.

14. The use of Claim 13, wherein the cells susceptible to NK mediated lysis are infected with a virus.

15. The use of Claim 13, wherein the cancer cells susceptible to NK mediated lysis comprise cells of a cancer selected from a leukemia a lymphoma, breast cancer, bladder cancer, colon and rectum cancer, kidney cancer, lung cancer, prostate cancer, thyroid cancer, brain cancer, ovarian cancer , an osteosarcoma, a melanoma, a glioma, and uterine cancer.

16. The use of claim 1, wherein the resulting composition comprises a plurality of NK cells for preparing a composition to lower the risk of relapse after stem cell transplantation.

17. A method of producing NK cell-stimulating exosomes, comprising, embedding one or more stimulatory peptides in the membrane of an exosome, wherein the one or more stimulatory peptide is fused to a membrane-inserting peptide with affinity for a lipid bilayer.

18. The method of Claim 17, wherein the one or more stimulatory peptides are selected from the group consisting of 4-1BBL, IL-2, IL-12, IL-18, IL-21, MICA/B, ULBP2, ICAM-1, 2B4, BCM1/SLAMF2, CD155, CD112, CCR7, DAP12, and DAP10.

19. The method of Claim 17, wherein the stimulatory peptide and the membrane-inserting peptide comprise a fusion protein encoded by a recombinant or transgenic DNA molecule.

20. The method of Claim 19, wherein the membrane-inserting peptide comprises a peptide selected from a segment of CD4, a segment of IgG, human Fc, GPI, trans-membrane T-cell receptor, pHLIP, and any combination thereof .

21. The method of Claim 19, wherein the one or more stimulatory peptides coupled to a membrane-inserting peptide is a fusion protein encoded by recombinant DNA.

22. The method of Claim 19, wherein the membrane-inserting peptide comprises human Fc, GPI, trans-membrane T-cell receptor, or pHLIP.

23. The method of Claim 17, wherein the exosome is obtained from an exosome-secreting cell from a genetically engineered cell line which exhibits improved expression of exosomes.

24. Use of a composition comprising NK-stimulating exosomes comprising one or more stimulatory peptides fused to a membrane-inserting peptide with affinity for a lipid bilayer, for the manufacture of a composition for treating cancer.

25. The use of Claim 24 , wherein the use comprises (a) contacting NK cells *ex vivo* with the composition comprising NK-stimulating exosomes to obtain a contacted NK cell population; and (b) using a composition comprising the contacted NK cell population to prepare a composition for treating the cancer.

26. A composition comprising NK stimulating exosomes comprising a fusion protein comprising 4-1BBL or IL-21 stimulatory peptides coupled to a membrane-inserting peptide [with affinity for a lipid bilayer] selected from a segment of IgG, a segment of CD4, human Fc, GPI, trans-membrane T-cell receptor, pHLIP, and any combination thereof.

27. The composition of Claim 26, further comprising one or more stimulatory peptides selected from the group consisting of IL-2, IL-12, IL-18, MICA/B, ULBP2, ICAM-1, 2B4, BCM1/SLAMF2, CD155, CD112, CCR7, DAP12, and DAP10.

28. The composition of Claim 26, wherein the fusion protein is encoded by a recombinant or transgenic DNA molecule .

29. The composition of Claim 28, wherein the fusion protein is obtained from an exosome-secreting cell comprising the recombinant or transgenic DNA molecule.

30. The composition of Claim 28, wherein the exosome-secreting cell line is K562-mb15-41BBL, K562-mb21-41BBL or a derivative of K562-mb15-41BBL or K562-mb21-41BBL.

31. The composition of Claim 28, wherein the membrane-inserting peptide comprises a segment of CD4 or an IgG with affinity for a lipid bilayer.

32. The composition of Claim 26, wherein the NK stimulating exosomes are obtained from a genetically engineered cell line which exhibits improved expression of exosomes.

33. The composition of Claim 26, further comprising a pharmaceutical carrier.

34. Use of the composition of claim 26 for modifying NK cell function , the use comprising, contacting at least one NK cell with the composition of claim 26, wherein the NK-stimulating exosomes comprise a functional nucleic acid capable of stimulating NK cell cytotoxic function.

35. The use of claim 34, wherein the functional nucleic acid comprises a microRNA (miRNA), a siRNA, a shRNA, an antisense nucleic acid, an aptamer, a ribozyme, an external guide sequence, or any combination thereof.