CLAIMS

1. A method of enforcing expression of an E-selectin and/or L-selectin ligand on a surface of a mesenchymal stem cell to increase extravasation of the mesenchymal stem cell to a site expressing E-selection and/or L-selectin in a subject, the method comprising the steps of: providing to the mesenchymal stem cell a nucleic acid encoding a glycosyltransferase, and culturing the mesenchymal stem cell under conditions sufficient to express the glycosyltransferase, wherein the expressed glycosyltransferase modifies a terminal sialylated lactosamine present on a glycoprotein of the cell to enforce expression of the E-selectin and/or L-selectin ligand to increase extravasation of the mesenchymal stem cell to a site expressing E-selectin and/or L-selectin.

2. The method of claim 1, wherein the glycosyltransferase is an alpha 1,3-fucosyltransferase.

3. The method of claim 2, wherein the alpha 1,3-fucosyltransferase is alpha 1,3-fucosyltransferase FTIII, FTIV, FTV, FTVI, FTVII, and combinations thereof.

4. The method of claim 2, wherein the glycosyltransferase modifies the terminal sialylated lactosamine intracellularly.

5. A method of enabling and/or increasing binding of a mesenchymal stem cell to E-selectin and/or L-selectin to increase extravasation of the mesenchymal stem cell to a site expressing E-selectin and/or L-selectin, the method comprising the steps of: providing to the mesenchymal stem cell a nucleic acid encoding an alpha 1,3-fucosyltransferase, and culturing the mesenchymal stem cell under conditions sufficient for expression of the alpha 1,3-fucosyltransferase by the mesenchymal stem cell; wherein the alpha 1,3-fucosyltransferase modifies a glycan chain present on a glycoprotein to create an E-selectin and/or L-selectin ligand and thereby enable and/or increase the binding of the mesenchymal stem cell to E- selectin and/or L-selectin and increase extravasation of the mesenchymal stem cell.

6. The method of claim 5, wherein the cell is a mammalian cell.

7. The method of claim 6, wherein the mammalian cell is a human cell.

8. The method of claim 5, wherein the nucleic acid is provided to the cell by transfection.

9. The method of claim 5, wherein the nucleic acid is provided to the cell by transduction.

10. The method of claim 5, wherein the nucleic acid is selected from the group consisting of a DNA, an RNA, a DNA/RNA hybrid, a cDNA, an mRNA, modified versions thereof, and combinations thereof.

11. The method of claim 10, wherein the nucleic acid is a modified RNA.

12. The method of claim 11, wherein the modified RNA is modRNA.
The method of claim 5, wherein the alpha 1,3-fucosyltransferase is a human alpha 1,3-fucosyltransferase.

14. The method of claim 5, wherein the alpha 1,3-fucosyltransferase is human FTVI.

15. The method of claim 5, wherein the alpha 1,3-fucosyltransferase fucosylates a glycoprotein selected from the group consisting of PSGL-1, CD43, CD44, and combinations thereof.

16. A method of producing modified mesenchymal stem cells having enforced E- selectin and/or L-selectin ligand expression for transplanting into a subject in need thereof, the method comprising the steps of: obtaining a population of mesenchymal stem cells to be modified; providing to the population of mesenchymal stem cells a nucleic acid encoding an alpha 1,3-fucosyltransferase; and culturing the population of mesenchymal stem cells under conditions sufficient for expression of the alpha 1,3-fucosyltransferase by one or more mesenchymal stem cells within the population to produce modified mesenchymal stem cells, wherein the alpha 1,3-fucosyltransferase modifies a glycan chain present on a glycoprotein to create an E-selectin and/or L-selectin ligand and wherein the modified mesenchymal stem cells have increased extravasation at a site expressing E-selectin and/or L-selectin in the subject.

17. The method of claim 16, wherein the population of cells is a population of mammalian cells.

18. The method of claim 17, wherein the population of mammalian cells is a population of human cells.

19. The method of claim 16, wherein the nucleic acid is provided to the population of cells by transfection.

20. The method of claim 16, wherein the nucleic acid is provided to the population of cells by transduction.

21. The method of claim 16, wherein the alpha 1,3-fucosyltransferase is a human alpha 1,3-fucosyltransferase.

22. The method of claim 16, wherein the alpha 1,3-fucosyltransferase is human FTVI.

23. The method of claim 16, wherein the alpha 1,3-fucosyltransferase fucoylates a glycoprotein selected from the group consisting of PSGL-1, CD43, CD44, and combinations thereof.

24. A method of producing modified mesenchymal stem cells for transplanting into a subject, the method comprising the steps of: obtaining a population of mesenchymal stem cells to be modified; providing to the population of mesenchymal stem cells a cDNA or modified RNA encoding an alpha 1,3-fucosyltransferase; and culturing the population of mesenchymal stem cells under conditions sufficient for expression of the alpha 1,3-fucosyltransferase by one or more mesenchymal stem cells within the population to produce the modified mesenchymal stem cells, wherein the expressed alpha 1,3-fucosyltransferase fucosylates CD44 present on or in the one or more modified mesenchymal stem cells and wherein the modified mesenchymal stem cells have increased extravasation at a site expressing E-selectin and/or L-selectin in the subject.

25. The method of claim 24, wherein the alpha 1,3-fucosyltransferase is human FTVI.

26. The method of claim 24, wherein the stem cells are human stem cells.

27. The method of claim 24, wherein the cDNA or modified RNA is provided by transduction.

28. The method of claim 27, wherein the modified RNA is modRNA.

29. The method of any one of claims 1-27, further comprising the step of carrying out extracellular fucosylation of CD44 on the surface of the stem cells.

30. A kit for treating or ameliorating the effects of a symptom, a disease or an injury in a subject in need thereof comprising a composition comprising a population of cells produced by the method of any one of claims 16-29, packaged together with instructions for its use.

31. A population of modified mesenchymal stem cells having enforced E-selectin and/or L-selectin ligand expression for use in a method of inducing and/or enhancing extravasation of a population of mesenchymal stem cells to a therapeutic target in a subject in need thereof, comprising: a nucleic acid encoding a polypeptide, which enforces transient expression of a ligand that binds to a receptor at the therapeutic target wherein the population of mesenchymal stem cells is provided with the composition and expresses the polypeptide, wherein upon expression of the polypeptide extravasation of one or more mesenchymal stem cells in the population to a therapeutic target is induced and/or enhanced.

32. The population according to claim 31, wherein the population of cells is culture-expanded prior to step (a).

33. The population according to claim 31, wherein the therapeutic target is a tumor.