## CLAIMS

1. A method of obtaining a population of hematopoietic stem cells, the method comprising (i) a CXCR2 agonist selected from the group consisting of Gro-β, Gro-β T, and (ii) a CXCR4 antagonist to be administered intravenously or subcutaneously to the donor, wherein the CXCR4 antagonist is to be administered to the mammalian donor prior to administration of the CXCR2 agonist.

2. The method of claim 1, wherein the CXCR2 agonist is Gro-β T.

3. The method of claim 1 or 2, wherein the CXCR2 agonist is to be administered to the donor at a dose of from 50 μg/kg to 300 μg/kg or from 100 μg/kg to 250 μg/kg.

4. The method of claim 3, wherein the CXCR2 agonist is to be administered to the donor at a dose of from 125 μg/kg to 225 μg/kg.

5. The method of claim 4, wherein the CXCR2 agonist is to be administered to the donor at a dose of about 150 μg/kg.

6. The method of any one of claims 1-5, wherein the CXCR2 agonist is to be administered intravenously to the donor.

7. The method of any one of claims 1-6, wherein the CXCR4 antagonist is to be administered subcutaneously to the donor.

8. The method of any one of claims 1-7, wherein the CXCR4 antagonist is plerixafor or a pharmaceutically acceptable salt thereof.

9. The method of claim 8, wherein the plerixafor or pharmaceutically acceptable salt thereof is to be administered to the donor at a dose of from 50 μg/kg to 500 μg/kg.

10. The method of claim 9, wherein the plerixafor or pharmaceutically acceptable salt thereof is to be administered to the donor at a dose of from 200 μg/kg to 300 μg/kg.

11. The method of claim 10, wherein the plerixafor or pharmaceutically acceptable salt thereof is to be administered to the donor at a dose of about 240 μg/kg.

12. Allogeneic hematopoietic stem cells for use in a method of performing an allogeneic hematopoietic stem cell transplant in a patient, wherein a therapeutically effective amount of allogeneic hematopoietic stem cells are to be infused into the patient, wherein the hematopoietic stem cells were obtained by a method comprising (i) a CXCR2 agonist selected from the group consisting of Gro-β, Gro-β T, and (ii) a CXCR4 antagonist to be administered to the donor,

wherein the CXCR4 antagonist is to be administered to the donor prior to administration of the CXCR2 agonist.

13. Use of a therapeutically effective amount of hematopoietic stem cells in the manufacture of a medicament for preventing, reducing the risk of developing, or reducing the severity of a post-transplant infection in a patient receiving an allogenic hematopoietic cell transplant, wherein the hematopoietic stem cells were obtained, the method comprising (i) a CXCR2 agonist selected from the group consisting of Gro-β, Gro-β T, and (ii) a CXCR4 antagonist to be administered to the human donor, wherein the CXCR4 antagonist is to be administered to the donor prior to administration of the CXCR2 agonist, and wherein the medicament is to be infused into the patient.

14. Use of a therapeutically effective amount of hematopoietic stem cells in the manufacture of a medicament for preventing, reducing the risk of developing, or reducing the severity of graft versus host disease (GVHD) in a patient receiving an allogenic hematopoietic cell transplant, wherein the hematopoietic stem cells were obtained, the method comprising (i) a CXCR2 agonist selected from the group consisting of Gro-β, Gro-β T, and (ii) a CXCR4 antagonist to be administered to the human donor, wherein the CXCR4 antagonist is to be administered to the donor prior to administration of the CXCR2 agonist, and wherein the medicament is to be infused into the patient.

15. The use of any one of claims 13 or 14, wherein the CXCR2 agonist is Gro-β T.

16. The use of any one of claims 13-15, wherein the CXCR2 agonist is to be administered to the donor at a dose of from 50 μg/kg to 1000 μg/kg.

17. The use of any one of claims 13-16, wherein the CXCR2 agonist is to be administered to the donor at a dose of from 100 μg/kg to 250 μg/kg.

18. The use of claim 17, wherein the CXCR2 agonist is to be administered to the donor at a dose of from 125 μg/kg to 225 μg/kg.

19. The use of claim 18, wherein the CXCR2 agonist is to be administered to the donor at a dose of 150 μg/kg.

20. The use of any one of claims 13-19, wherein the CXCR2 agonist is to be administered intravenously or subcutaneously to the donor.

21. The use of any one of claims 13-20, wherein the CXCR4 antagonist is plerixafor or a pharmaceutically acceptable salt thereof.

22. The use of claim 21, wherein the plerixafor or pharmaceutically acceptable salt thereof is to be administered to the donor at a dose of from 50 µg/kg to 500 µg/kg.

23. The use of claim 22, wherein the plerixafor or pharmaceutically acceptable salt thereof is to be administered to the donor at a dose of from 200 µg/kg to 300 µg/kg.

24. The use of claim 22, wherein the plerixafor or pharmaceutically acceptable salt thereof is to be administered to the donor at a dose of about 240 µg/kg.