CLAIMS

What is claimed is:

1. A method of stem cell transplantation in a subject in need thereof comprising:

   (a) expanding hematopoietic stem or progenitor cells (HSPCs) by contacting the HSPCs with endothelial cells (ECs) at an initial EC/HSPC ratio for a first time period under conditions allowing for expansion of the HSPCs, to produce an expanded cell population comprising HSPCs and ECs at an expanded HSPC/EC ratio; and

   (b) transfusing the expanded cell population obtained from step (a) into the subject; wherein a continuous interaction is maintained between the HSPCs and the ECs throughout the expansion and the transfusion steps.

2. The method according to claim 1, wherein the HSPCs are allogeneic with respect to the subject.

3. The method according to claim 2, wherein the HSPCs are umbilical cord blood HSPCs.

4. The method according to claim 1, wherein the HSPCs are autologous with respect to the subject.

5. The method according to claim 4, wherein the HSPCs are gene-modified steady state bone marrow derived HSPCs.

6. The method according to claim 1, wherein the ECs are E4ORF1+ engineered ECs.

7. The method according to claims 1, wherein the ECs are E4ORF1+ ETV2+ engineered ECs.

8. The method according to claim 1, wherein the ECs are primary ECs.

9. The method according to claim 1, wherein the ECs are human umbilical vein ECs (HUVECs).

10. The method according to claim 1, wherein the initial EC/HSPC ratio is at least about 200:1.

11. The method according to claim 1, wherein the first time period is about 1 day to about 24 days.

12. The method according to claim 1, wherein the continuous interaction between the HSPCs and the ECs comprises continuous contact between the HSPCs and the ECs during the expansion step, and continuous proximity of the HSPCs and the ECs during the expansion and transfusion steps combined.

13. The method according to claim 1, wherein the subject has a deficiency in hematopoiesis caused by a myeloablative treatment, or a disorder selected from: a hematologic disease, a disorder that requires bone marrow hematopoietic stem cell transplantation, an infectious immunodeficiency, an infectious disease affecting T cells, HIV, a genetic immunodeficiency, severe combined immunodeficiency, a genetic disease affecting erythrocytes, an anemia, and Fanconi anemia.

14. A composition comprising HSPCs and ECs for use in stem cell transplantation in a subject in need thereof, wherein the stem cell transplantation comprises the method according to claim 1.

15. The composition according to claim 14, wherein the ECs are E4ORF1+ engineered ECs.

16. The composition according to claim 14, wherein the ECs are E4ORF1+ ETV2+ engineered ECs.

17. The composition according to claim 14, wherein the initial EC/HSPC ratio is at least about 200:1.

18. The composition according to claim 14, wherein the continuous interaction between the HSPCs and the ECs comprises continuous contact between the HSPCs and the ECs during the expansion step, and continuous proximity of the HSPCs and the ECs during the expansion and transfusion steps combined.

19. The composition according to claim 14, wherein the subject has a deficiency in hematopoiesis caused by a myeloablative treatment, or a disorder selected from: a hematologic disease, a disorder that requires bone marrow hematopoietic stem cell transplantation, an infectious immunodeficiency, an infectious disease affecting T cells, HIV, a genetic immunodeficiency, severe combined immunodeficiency, a genetic disease affecting erythrocytes, an anemia, and Fanconi anemia.

20. The method of claim 1, wherein the initial EC/HSPC ratio is at least about 100:1.

21. The composition according to claim 14, wherein the initial EC/HSPC ratio is at least about 100:1.