Claims

1. A method for cell separation, comprising:

(a) plating an umbilical cord blood sample on a surface;

(b) allowing adhesion of cells in said umbilical cord blood sample to said surface for about 5 minutes, about 10 minutes, about 15 minutes, about 20 minutes, about 25 minutes, about 30 minutes, about 35 minutes, about 40 minutes, about 45 minutes, about 50 minutes, about 55 minutes, or about 60 minutes, to generate an adherent fraction and a non-adherent fraction of said umbilical cord blood sample; and

(c) separating said non-adherent fraction from said adherent fraction, wherein said non-adherent fraction comprises a hematogenic progenitor cell or a hematopoetic stem cell, and wherein said adherent fraction comprises at least one of an endothelial cell and an endothelial progenitor cell.

2. The method of claim 1, further comprising processing the non-adherent fraction separated in step (c).

3. The method of claim 1 or 2, wherein step (c) does not cause significant detachment of cells in said adherent fraction from the surface, and optionally wherein at least about 60%,
about 70%, about 80%, or about 90% of cells in said adherent fraction remain attached to the surface following step (c).

4. The method of any one of claims 1 - 3, wherein said umbilical cord blood sample is from a human.

5. The method of any one of claims 1 - 4, wherein said umbilical cord blood sample is a freshly harvested, or a frozen sample which is thawed before the plating step.

6. The method of any one of claims 1 - 5, wherein said umbilical cord blood sample is processed for mononuclear cell enrichment before the plating step,

processed for hematogenic progenitor and/or hematopoietic stem cell enrichment before the plating step, and/or processed using a magnetic bead before the plating step.

7. The method of any one of claims 1 - 6, wherein the said umbilical cord blood sample is plated at a temperature between about 0°C and about 37°C.

8. The method of any one of claims 1 - 7, wherein the surface is coated with collagen I, or gelatin, or a similar extracellular matrix component, or any combination thereof.

9. The method of any one of claims 1 - 8, wherein the cell viability, primitivity, proliferation ability, differentiation ability, and/or repopulating ability of the hematogenic progenitor cell or hematopoetic stem cell is maintained, and/or the cell viability and/or primitivity of cells in the adherent fraction is maintained.

10. The method of any one of claims 1 - 9, further comprising isolating an adherent cell from the adherent fraction and reprogramming the isolated adherent cell to a stem cell or progenitor cell.

11. The method of any one of claims 1 - 10, further comprising expanding the hematogenic progenitor cell or hematopoietic stem cell, and optionally: (1) isolating a more primitive cell from said expanded hematogenic progenitor cell or hematopoietic stem cell population, or (2) reprogramming said hematogenic progenitor cell or hematopoietic stem cell to a stem cell or progenitor cell.

12. The method of any one of claims 1 - 11, further comprising isolating an adherent cell from the adherent fraction, and:

(a) reprogramming the isolated adherent cell to a stem cell or progenitor cell, and differentiating said stem cell or progenitor cell to a somatic cell; or

(b) reprogramming the isolated adherent cell to a somatic cell directly.

13. The method of any one of claims 1 - 12, wherein a device is used for cell separation from the umbilical cord blood sample, the device comprising a first

vessel, a second vessel, and a sterile tubing with stopcock flow regulation for the transfer of cells in suspension between the vessels, and

wherein one of the vessels is pre-coated for attachment of cells in the adherent fraction, and the other vessel is a collection vessel for cells in the non-adherent fraction.

14. The method of claim 13, wherein the device further comprises a media chamber attached in a closed system with stopcock flow regulation to facilitate wash steps and cell transfer to the vessels, and/or one or more auxiliary chambers to facilitate the administration of a cryoprotectant to the vessels.

15. The method of 13 or 14, wherein the device is prefilled with a hypoxic, normoxic, or hyperoxic gas.