Claims

1. Use of a homogeneous population of umbilical cord tissue-derived cells derived from human umbilical cord tissue substantially free of blood, in the manufacture of a medicament for treating a patient having peripheral ischemia, wherein the population of cells is capable of self-renewal and expansion in culture and has the potential to differentiate into cells of at least a skeletal muscle, vascular smooth muscle, pericyte, or vascular endothelium phenotype; wherein the population of cells comprises the following characteristics:

a) potential for at least 40 doublings in culture;

b) production of CD10, CD13, CD44, CD73, CD90, PDGFr-alpha, PD-L2 and HLA-A,B,C;

c) lack of production of CD31, CD34, CD45, CD80, CD86, CD117, CD141, CD178, B7-H2, HLA-G, and HLA-DR,DP,DQ as detected by flow cytometry;

d) increased expression of endogenous genes encoding interleukin 8 and reticulon 1 relative to endogenous expression of interleukin 8, and reticulon 1 in a human cell that is a fibroblast, a mesenchymal stem cell, or an iliac crest bone marrow cell.

2. The use of claim 1, wherein the population of cells is genetically engineered to produce a gene product that promotes treatment of peripheral vascular disease.

3. The use of claim 1, wherein the treatment comprises administering the population of cells with at least one other cell type.

4. The use of claim 3, wherein the other cell type is a skeletal muscle cell, skeletal muscle progenitor cell, vascular smooth muscle cell, vascular smooth muscle progenitor cell, pericyte, vascular endothelial cell, vascular endothelium progenitor cell, or other multipotent or pluripotent stem cell.

5. The use of claim 3, wherein the at least one other cell type is administered simultaneously with, or before, or after, the umbilical cord tissue-derived cells.

6. The use of claim 1, wherein the treatment comprises administering the population of cells with at least one other agent.

7. The use of claim 6, wherein the agent is an antithrombogenic agent, an anti-inflammatory agent, an immunosuppressive agent, an immunomodulatory agent, pro-angiogenic, or an antiapoptotic agent.

8. The use of claim 6, wherein the agent is administered simultaneously with, or before, or after, the population of cells.

9. The use of claim 1, wherein the treatment comprises administering the population of cells at the sites of the peripheral ischemia.

10. The use of claim 1, wherein the treatment comprises administering the population of cells by injection, infusion, a device implanted in the patient, or by implantation of a matrix or scaffold containing the cells.

11. The use of claim 1 wherein the population of cells exerts a trophic effect on the skeletal muscle of the patient.

12. The use of claim 1, wherein the population of cells exerts a trophic effect on the vascular smooth muscle of the patient.

13. The use of claim 12, wherein the trophic effect is proliferation of the vascular smooth muscle cells

14. The use of claim 1, wherein the population of cells exerts a trophic effect on the vascular endothelium of the patient.

15. The use of claim 14, wherein the trophic effect is proliferation of the vascular endothelial cells.

16. The use of claim 1, wherein the population of cells induces migration of vascular endothelial cells, vascular endothelium progenitor cells, vascular smooth muscle cells, vascular smooth muscle progenitor cells and/or pericytes to the sites of the peripheral vascular disease.

17. Use of a pharmaceutical composition in the manufacture of a medicament for treating a patient having peripheral ischemia, wherein the pharmaceutical composition comprises a pharmaceutically acceptable carrier and the homogeneous population of umbilical cord tissue-derived cells according to any one of claims 1 to 16.

18. The use of claim 17, comprising at least one other cell type.

19. The use of claim 18, wherein the other cell type is a skeletal muscle cell, skeletal muscle progenitor cell, vascular smooth muscle ceil, vascular smooth muscle progenitor cell, pericyte, vascular endothelial cell, vascular endothelium progenitor cell, or other multipotent or pluripotent stem cell.

20. The use of claim 17, wherein the pharmaceutical composition comprises at least one other agent.

21. The use of claim 20, wherein the agent is an antithrombogenic agent, an anti-inflammatory agent, an immunosuppressive agent, an immunomodulatory agent, or an antiapoptotic agent.

22. The use of claim 17, wherein the pharmaceutical composition is formulated for administration by injection or infusion.

23. The use of claim 17, wherein the population of cells is encapsulated within an implantable device.

24. The use of claim 17, wherein the population of cells is contained within a matrix or scaffold.

25. A kit for treating a patient having peripheral ischemia, the kit comprising a pharmaceutically acceptable carrier, a homogeneous population of umbilical cord tissue-derived cells derived from human umbilical cord tissue substantially free of blood, wherein the population of cells is capable of self-renewal and expansion in culture, has the potential to differentiate into cells of at least a skeletal muscle, vascular smooth muscle, pericyte, or vascular endothelium phenotype, and comprises the following characteristics:

a) potential for at least 40 doublings in culture;

b) production of CD10, CD13, CD44, CD73, CD90, PDGFR-alpha, PD-L2 and HLA-A,B,C;

c) lack of production of CD31, CD34, CD45, CD80, CD86, CD117, CD141, CD178, B7-H2, HLA-G, and HLA-DR,DP,DQ, as detected by flow cytometry; and

d) increased expression of endogenous genes encoding interleukin 8, reticulon 1 and chemokine (C-X-C motif) ligand 3 relative to expression of endogenous genes encoding interleukin 8, reticulon 1 and chemokine (C-X-C motif) ligand 3 in a human cell that is a fibroblast, a mesenchymal stem cell, or an iliac crest bone marrow cell;

and instructions for using the kit in a method of treating the patient.

26. The kit of claim 25, which further comprises at least one reagent and instructions for culturing the population of cells.

27. The kit of claim 25, which further comprises a population of at least one other cell type.

28. The kit of claim 25 which further comprises at least one other agent for treating peripheral vascular disease.

29. The kit of claim 25, wherein the population of cells induces migration of vascular endothelium progenitor cells to the sites of the peripheral vascular disease.

30. Use of a pharmaceutical composition in the manufacture of a medicament for treating a patient having peripheral ischemia, wherein the pharmaceutical composition comprises a pharmaceutically acceptable carrier and a preparation made from a homogeneous population of

umbilical cord tissue-derived cells, wherein the population of cells is derived from human umbilical cord tissue substantially free of blood, is capable of self-renewal and expansion in culture, has the potential to differentiate into cells of at least a skeletal muscle, vascular smooth muscle, pericyte, or vascular endothelium phenotype, and comprises the following characteristics:

a) potential for at least 40 doublings in culture;

b) production of CD10, CD13, CD44, CD73, CD90, PDGFr-alpha, PD-L2 and HLA-A,B,C;

c) lack of production of CD31, CD34, CD45, CD80, CD86, CD117, CD141, CD178, B7-H2, HLA-G, and HLA-DR,DP,DQ, as detected by flow cytometry;

d) increased expression of endogenous genes encoding interleukin 8, reticulon 1 and chemokine (C-X-C motif) ligand 3 relative to expression of endogenous genes encoding interleukin 8, reticulon 1 and chemokine (C-X-C motif) ligand 3 in a human cell that is a fibroblast, a mesenchymal stem cell, or an iliac crest bone marrow cell;

and wherein the preparation comprises a cell lysate of the population of cells, an extracellular matrix of the population of cells or a conditioned medium in which the population of cells was grown.

31. The use of claim 30, wherein the preparation made from the population of cells exerts a trophic effect on the vascular endothelium.

32. The use of claim 31, wherein the trophic effect is proliferation of the vascular endothelial cells.

33. The use of claim 30, wherein the preparation made from the population of cells induces migration of vascular endothelial cells, vascular endothelium progenitor cells, vascular smooth muscle cells, vascular smooth muscle progenitor cells to the sites of the peripheral vascular disease.

34. The use of claim 30, wherein the composition comprises FGF and HGF.

35. The use of any one of claims 1 and 30, wherein the population of cells further has the following characteristics:

e) secretion of MCP-1, IL-6, IL-8, GCP-2, HGF, KGF, FGF, HB-EGF, BDNF, TPO, MIP lb, RANTES, and TIMP1; and

f) lack of secretion of TGF-beta2, ANG2, PDGFbb and VEGF, as detected by ELISA.

CLAIMS

1. Use of a homogeneous population of umbilical cord tissue-derived cells derived from human umbilical cord tissue substantially free of blood, in the manufacture of a medicament for increasing proliferation and migration of endothelial cells in a patient having peripheral ischemia, wherein the population of cells is capable of self-renewal and expansion in culture and has the potential to differentiate into cells of at least a skeletal muscle, vascular smooth muscle, pericyte, or vascular endothelium phenotype; wherein the population of cells comprises the following characteristics:

a) potential for at least 40 doublings in culture;

b) production of CD10, CD13, CD44, CD73, CD90, PDGFr-alpha, PD-L2 and HLA-A,B,C; and

c) lack of production of CD31, CD34, CD45, CD80, CD86, CD117, CD141, CD178, B7-H2, HLA-G, and HLA-DR,DP,DQ, as detected by flow cytometry

2. The use of claim 1, wherein the population of cells is genetically engineered to produce a gene product that promotes treatment of peripheral vascular disease.

3. The use of claim 1, wherein the treatment comprises administering the population of cells with at least one other cell type.

4. The use of claim 3, wherein the other cell type is a skeletal muscle cell, skeletal muscle progenitor cell, vascular smooth muscle cell, vascular smooth muscle progenitor cell, pericyte, vascular endothelial cell, vascular endothelium progenitor cell, or other multipotent or pluripotent stein cell.

5. The use of claim 3, wherein the at least one other cell type is administered simultaneously with, or before, or after, the umbilical cord tissue-derived cells.

6. The use of claim 1, wherein the treatment comprises administering the population of cells with at least one other agent.

7. The use of claim 6, wherein the agent is an antithrombogenic agent, an anti-inflammatory agent, an immunosuppressive agent, an immunomodulatory agent, pro-angiogenic, or an antiapoptotic agent.

8. The use of claim 6, wherein the agent is administered simultaneously with, or before, or after, the population of cells.

9. The use of claim 1, wherein the treatment comprises administering the population of cells at the sites of the peripheral ischemia.

10. The use of claim 1, wherein the treatment comprises administering the population of cells by injection, infusion, a device implanted in the patient, or by implantation of a matrix or scaffold containing the cells.

11. Use of a pharmaceutical composition in the manufacture of a medicament for increasing proliferation and migration of endothelial cells in a patient having peripheral ischemia, wherein the pharmaceutical composition comprises a pharmaceutically acceptable carrier and the homogeneous population of umbilical cord tissue-derived cells according to any one of claims 1 to 10.

12. The use of claim 11, comprising at least one other cell type.

13. The use of claim 12, wherein the other cell type is a skeletal muscle cell, skeletal muscle progenitor cell, vascular smooth muscle ceil, vascular smooth muscle progenitor cell, pericyte, vascular endothelial cell, vascular endothelium progenitor cell, or other multipotent or pluripotent stem cell.

14. The use of claim 11, wherein the pharmaceutical composition comprises at least one other agent.

15. The use of claim 14, wherein the agent is an antithrombogenic agent, an anti-inflammatory agent, an immunosuppressive agent, an immunomodulatory agent, or an antiapoptotic agent.

16. The use of claim 11, wherein the pharmaceutical composition is formulated for administration by injection or infusion.

17. The use of claim 11, wherein the population of cells is encapsulated within an implantable device.

18. The use of claim 11, wherein the population of cells is contained within a matrix or scaffold.

19. A kit for increasing proliferation and migration of endothelial cells in a patient having peripheral ischemia, the kit comprising a pharmaceutically acceptable carrier, a homogeneous population of umbilical cord tissue-derived cells derived from human umbilical cord tissue substantially free of blood, wherein the population of cells is capable of self-renewal and expansion in culture, has the potential to differentiate into cells of at least a skeletal muscle, vascular smooth muscle, pericyte, or vascular endothelium phenotype, and comprises the following characteristics:

a) potential for at least 40 doublings in culture;

b) production of CD10, CD13, CD44, CD73, CD90, PDGFr-alpha, PD-L2 and HLA A,B,C; and

c) lack of production of CD31, CD34, CD45, CD80, CD86, CD117, CD141, CD178, B7-H2, HLA-G, and HLA-DR,DP,DQ, as detected by flow cytometry; and instructions for using the kit in a method of treating the patient.

20. The kit of claim 19, which further comprises at least one reagent and instructions for culturing the population of cells.

21. The kit of claim 19, which further comprises a population of at least one other cell type.

22. The kit of claim 19, which further comprises at least one other agent for treating peripheral vascular disease.

23. The kit of claim 19, wherein the population of cells induces migration of vascular endothelium progenitor cells to the sites of the peripheral vascular disease.

24. The use of any one of claims 1 and 18, wherein the population of cells further has the following characteristics:

e) secretion of MCP-1, IL-6, IL-8, GCP-2, HGF, KGF, FGF, HB-EGF, BDNF, TPO, MIPlb, RANTES, and TIMP1; and

f) lack of secretion of TGF-beta2, ANG2, PDGFbb and VEGF, as detected by ELISA.