

Claims

1. A composition comprising umbilical cord tissue-derived cells and a cryopreservation medium, wherein said cryopreservation medium comprises:

the amino acids L-Arginine, L-Glutamine, Glycine, L-Isoleucine, L-Leucine, L-Lysine HCl, L-Methionine, L-Phenylalanine, L-Serine, L-Threonine, L-Tryptophan, and L-Valine;

the vitamins D-calcium pantothenate, choline chloride, folic acid, niacinamide, pyridoxine HCl, riboflavin and thiamine HCl;

the inorganic salts potassium chloride, sodium bicarbonate, sodium chloride, and sodium phosphate monobasic H₂O;

the inorganic salts calcium chloride dihydrate, magnesium chloride, potassium bicarbonate, and potassium monophosphate; and

lactobionic acid, glutathione, dextrose, sucrose, mannitol, and from about 5 to about 10% v/v of DMSO,

wherein the composition lacks serum, and

wherein the composition comprises about 3.2 mg/L of calcium chloride dihydrate, about 458 mg/L of magnesium chloride, about 225 mg/L of potassium bicarbonate, and about 612 mg/L of potassium monophosphate.

2. The composition of claim 1, wherein the cryopreservation medium comprises:

at least about 37.8 mg/L of L-Arginine, at least about 262.8 mg/L of L-Glutamine, at least about 13.5 mg/L of L-Glycine, at least about 47.16 mg/L of L-Isoleucine, at least about 47.16 mg/L of L-Leucine, at least about 65.79 mg/L of L-Lysine HCl, at least about 13.5 mg/L of L-Methionine, at least about 29.7 mg/L of L-Phenylalanine, at least about 18.9 mg/L of L-Serine, at least about 42.75 mg/L of L-Threonine, at least about 7.2 mg/L of L-Tryptophan, and 41.85 mg/L of L-Valine;

at least about 0.18 mg/L of riboflavin and at least about 1.8 mg/L of each of the vitamins, D-calcium pantothenate, choline chloride, folic acid, niacinamide, pyridoxine HCl, and thiamine;

at least about 432 mg/L of potassium chloride, about 2565 mg/L of sodium bicarbonate, about 2880 of sodium chloride, at least about 56.25 mg/L of sodium phosphate monobasic H₂O, about 3.2 mg/L of calcium chloride dihydrate, about 458 mg/L of magnesium chloride, about 225 mg/L of potassium bicarbonate, and about 612 mg/L of potassium monophosphate; and

from about 5 to about 10% v/v of DMSO, at least about 855 mg/L of dextrose, at least about 415 mg/L of glutathione; at least about 3081 mg/L sucrose and at least about 1639 mg/L of mannitol.

3. The composition of claim 1, wherein the umbilical cord tissue-derived cells are isolated from human umbilical cord tissue substantially free of blood, are capable of self-renewal and expansion in culture, have the potential to differentiate, lack the production of CD117 and CD45, and do not express hTERT or telomerase.

4. The composition of claim 3, wherein the umbilical cord tissue-derived cells further comprise one or more of the following characteristics:

express oxidized low density lipoprotein receptor 1, reticulon, chemokine receptor ligand 3, and/or granulocyte chemotactic protein;

do not express CD31 or CD34; and

express CD10, CD13, CD44, CD73, and CD90.

5. A kit comprising the composition of claim 1, wherein the umbilical cord tissue-derived cells are isolated from human umbilical cord tissue substantially free of blood, are capable of self-renewal and expansion in culture, have the potential to differentiate, lack the production of CD117 and CD45, and do not express hTERT or telomerase.

6. A method of cryopreserving human umbilical cord tissue-derived cells comprising:

providing a formulation comprising the composition for cryopreservation of claim 1 and umbilical cord tissue-derived cells;

cooling the cryopreservation composition from a starting temperature of about 4 °C at a rate of -1.0 °C/min until the composition achieves a temperature of about -45.0 °C; and

further cooling the cryopreservation composition until the composition achieves a storage temperature of about -120.0 °C;

wherein the umbilical cord tissue-derived cells are isolated from human umbilical cord tissue substantially free of blood, are capable of self-renewal and expansion in culture, have the potential to differentiate, lack the production of CD117 and CD45, and do not express hTERT or telomerase.

7. The method of claim 6, wherein the method further comprises cooling the cryopreservation composition to a starting temperature of about 4 °C and/or maintaining the starting temperature of about 4 °C for about 15 minutes.

8. A method of cryopreserving human umbilical cord tissue-derived cells comprising:
providing a formulation comprising the composition for cryopreservation of claim 2 and umbilical cord tissue-derived cells;

cooling the cryopreservation composition from a starting temperature of about 4 °C at a rate of -1.0 °C/min until the composition achieves a temperature of about -45.0 °C; and

further cooling the cryopreservation composition until the composition achieves a storage temperature of about -120.0 °C;

wherein the umbilical cord tissue-derived cells are isolated from human umbilical cord tissue substantially free of blood, are capable of self-renewal and expansion in culture, have the potential to differentiate, lack the production of CD117 or CD45, and do not express hTERT or telomerase.

9. The method of claim 8, wherein the umbilical cord tissue-derived cells further comprise one or more of the following characteristics:

express oxidized low density lipoprotein receptor 1, reticulon, chemokine receptor ligand 3, and/or granulocyte chemotactic protein;

do not express CD31 or CD34;

express, relative to a human fibroblast, mesenchymal stem cell, or iliac crest bone marrow cell, increased levels of interleukin 8 or reticulon 1; and

express CD10, CD13, CD44, CD73, and CD90.

10. The composition of claim 1, wherein the cryopreservation medium comprises from about 5 to about 10% v/v of DMSO, from about 12,000 to about 20,000 mg/L of lactobionic acid, from about 329 to about 495 mg/L of glutathione, dextrose, from about 2460 to about 3695 mg/L of sucrose, and from about 1310 to about 1967 mg/L of mannitol.

11. The composition of claim 1, wherein the composition prevents cellular swelling, controls free radical accumulation, and maintains acidosis.