Claims

1. A method of culturing isolated umbilical cord tissue-derived cells comprising:

   a. growing umbilical cord tissue-derived cells seeded on microcarriers in a culture medium comprising amino acids, vitamins, salts, nucleosides, lipoic/thioctic acid, ethanolamine, insulin, transferrin, sodium selenium, and one or more energy substrate, wherein the culture medium is supplemented with serum, for a sufficient period of time to allow for the cells to achieve a desired initial population density;

   b. adding a serum-free nutrient solution after the cells have achieved the desired initial population density, wherein the serum-free nutrient solution comprises amino acids, vitamins, salts, insulin, transferrin, ethanolamine, lipoic acid/thioctic acid, sodium selenium; and

   c. growing the cells for a sufficient period of time to allow for the cells to achieve a desired final population density;

   wherein the one or more energy substrate is D-glucose and/or sodium pyruvate, and

   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, express CD13, CD90, HLA-ABC, and do not express CD34, CD117 and HLA-DR.

2. The method of claim 1, wherein the method further comprises seeding the cells on the microcarriers.

3. The method of claim 1, wherein the method further comprises isolating the cells after step c.

4. The method of claim 1, wherein the method does not require medium exchange.

5. The method of claim 1, wherein the method is carried out in a spinner flask culture system.

6. The method of claim 1, wherein the characteristics of the cells before and after culturing are substantially the same.

7. The method of claim 6, wherein the characteristics of the cells before and after culturing are the same.

8. The method of claim 1, wherein the desired initial population density is achieved after 3 to 4 days.

9. The method of claim 1, wherein the microcarriers have an amine treated surface.

10. The method of claim 1, wherein the culture medium comprises:

the amino acids L-Arginine; L-Cystine; L-Cysteine; L-Glutamine; Glycine; L-Histidine; L-Isoleucine; L-Leucine; L-Lysine; L-Methionine; L-Phenylalanine; L-serine; L-Threonine; L-tryptophan; L-tyrosine; L-Valine; L-Alanine; L-Asparagine; L-Aspartic Acid; L-Glutamic Acid; L-Proline; and L-Taurine;

the vitamins D-calcium pantothenate; choline chloride; folic acid; I-inositol; niacinamide; pyridoxal; riboflavin; thiamine; d-Biotin; pyridoxine; and Vitamin B_{12} (cyanocobalamin);

the salts calcium chloride, potassium chloride, magnesium sulfate, sodium chloride, and one or more sodium phosphate salts;

the nucleosides thymidine, adenosine, cytidine, uridine and guanosine; and

insulin; transferrin; lipoic acid/thioctic acid; ethanolamine; sodium selenite; and one or more energy substrate, wherein the one or more energy substrate is D-glucose and/or sodium pyruvate.

11. The method of claim 10, wherein the culture medium comprises:

at least 0.05 g/L of L-Arginine; at least 0.02 g/L of L-Cystine; at least 0.2 g/L of L-Glutamine; at least 0.01 g/L Glycine; at least 0.02 g/L of L-Histidine; at least 0.09 g/L of L-Isoleucine; at least 0.09 g/L of L-Leucine; at least 0.09 g/L of L-Lysine; at least 0.02 g/L of L-Methionine; at least 0.05 g/L of L-Phenylalanine; at least 0.03 g/L of L-serine; at least 0.08 g/L of L-Threonine; at least 0.009 g/L of L-tryptophan; at least 0.08 g/L of L-tyrosine; at least 0.08 g/L of L-Valine; at least 0.005 g/L L-Cysteine; at least 0.0004 g/L of L-Alanine; at least 0.01 g/L

of Asparagine; at least 0.006 g/L of L-Aspartic Acid; at least 0.03 g/L of L-Glutamic Acid; at least 0.005 g/L L-Proline; and at least 0.0003 g/L of L-Taurine;

from 5 x 10^{-6} g/L to 0.015 g/L of each of the vitamins;

at least 0.05 g/L of Calcium Chloride, Anhydrous, at least 0.1 g/L of potassium chloride; at least 0.2 g/L of magnesium sulfate, at least 0.08 g/L of sodium phosphate, monobasic, H_2O and at least 0.0005 g/L of sodium phosphate, dibasic heptahydrate ($Na_2HPO_4.7H_2O$);

at least 0.0001 g/L of thymidine and least 0.005 g/L of each of adenosine, cytidine, uridine, and guanosine; and

at least 0.003 g/L of insulin, at least 0.05 g/L of transferrin, at least 5 x 10^{-6} g/L of lipoic acid/thioctic acid, at least 0.05 g/L of ethanolamine and at least 0.00004 g/L of sodium selenite.

12. The method of claims 10 or 11, wherein the culture medium is supplemented with 2 to 20% of FBS.

13. The method of claims 10 or 11, wherein the culture medium is supplemented with 7.5%, 10%, or 15% of FBS.

14. The method of claims 10 or 11, wherein the culture medium further comprises putrescine, a stabilizer, and/or an anti-foaming agent.

15. The method of claim 1, wherein in the serum-free nutrient solution comprises:

the amino acids L-Arginine, L-Cystine, L-Cysteine, Glycine, L-Histidine, L-Isoleucine, L-Leucine, L-Lysine, L-Methionine, L-Phenylalanine, L-serine, L-Threonine, L-tryptophan, L-tyrosine, L-Valine, L-Alanine, L-Asparagine, L-Aspartic Acid, L-Glutamic Acid, L-Proline and L-Taurine;

the vitamins D-calcium pantothenate; choline chloride; folic acid; I-inositol; niacinamide; pyridoxal; riboflavin; thiamine; d-Biotin; pyridoxine; and Vitamin B_{12} (cyanocobalamin);

the salts sodium phosphate, monobasic and sodium phosphate, dibasic heptahydrate;

the trace minerals Copper(II)sulfate pentahydrate ($CuSO_4.5H_2O$), Zinc sulfate, heptahydrate, ($ZnSO_4.7H_2O$);

the nucleosides adenosine, cytidine, uridine and guanosine; and

insulin; transferrin; ethanolamine; lipoic acid/thioctic acid; and sodium selenite.

16. The method of claim 15, wherein the serum-free solution further comprises putrescine, a stabilizer, and/or an anti-foaming agent.

17. The method of claim 1, wherein the serum-free nutrient solution lacks D-glucose and sodium pyruvate.