CLAIMS

1. A method of expanding cells *ex vivo*, the method comprising the steps of: a) seeding the cells on a hollow fiber substrate so that the cells adhere to the substrate; b) expanding the adhered cells on the substrate; and c) removing the expanded cells from the substrate, wherein the cells are non-embryonic stem, non-germ cells, wherein the cells express telomerase, are not transformed, and have a normal karotype.

2. The method of claim 1 further comprising d) reseeding the removed cells on the same or different substrate; and e) repeating steps b) - d) until a desired number of expanded cells is reached.

3. The method of claim 2 further comprising administering the removed cells to a subject.

4. The method of claim1 in which the hollow fiber substrate is in a closed continuous perfusion bioreactor.

5. The method of claim 3 in which the cells are expanded about 10-100 fold.

6. The method of claims 1-5 wherein the hollow fiber is coated.

7. The method of claim 6 wherein the coating is fibronectin.

8. The method of claim 7 wherein the wall material in fiber is PA/PAES/PVP.

9. The method of claims 1-8 wherein the cells in step (a) comprise a substantially homogeneous population.

10. The method of claims 1-8 wherein step (a) comprises seeding cells from a tissue, the tissue selected from bone marrow, umbilical cord blood, umbilical cord matrix, peripheral blood, placenta, placental blood, muscle, brain, kidney, or other solid organs.

11. The method of claim 1 wherein the non-embryonic stem, non-germ cells further express one or more of oct4, rex-1, rox-1, or sox-2.

12. The method of claim 1and claim 11, wherein the non-embryonic stem, non-germ cells can differentiate into at least one cell type of at least two of the endodermal, ectodermal, and mesodermal embryonic lineages.

13. The method of claim 12 wherein the non-embryonic stem, non-germ cells that can differentiate into at least one cell type of each of the endodermal, ectodermal, and mesodermal embryonic lineages.

CLAIMS

1. A method of expanding cells *ex vivo,* the method comprising the steps of: a) seeding the cells on a hollow fiber substrate so that the cells adhere to the substrate; b) expanding the adhered cells on the substrate; c) removing the expanded cells from the substrate, wherein the cells are non-embryonic stem, non-germ cells, wherein the cells express telomerase, are not transformed, and have a normal karyotype; d) reseeding the removed cells on the same or different substrate; and e) repeating steps b) - d) until a desired number of expanded cells is reached; and administering the removed cells to a subject.