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, are capable of expanding to over 40 cell doublings in cell culture, and have a normal karyotype.

2. The method of claim 1 wherein the cells are derived from human cells or tissue.

3. The method of claim 1 or 2, wherein the cells are derived from bone marrow.

4. The method of any of claims 1-3, wherein the non-embryonic stem, non-germ cells further express one or more of oct4, rex-1, rox-1 or sox-2.

5. The method of any of claims 1-4, 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.

6. The method of claim 5 wherein the non-embryonic stem, non-germ cells can differentiate into at least one cell type of each of the endodermal, ectodermal, and mesodermal embryonic lineages.

7. The method of any of claims 1-6 further comprising the steps of: d) reseeding the removed cells on the same or different substrate; and e) repeating steps b) to d) until a desired number of expanded cells is reached.

8. The method of claim 7 further comprising administering the removed cells to a subject.

9. The method of any of claims 1-8 in which the hollow fiber substrate is in a closed continuous perfusion bioreactor.

10. The method of claim 8 in which the cells are expanded about 10-100 fold.

11. The method of any one of claims 1 to 10 wherein the hollow fiber is coated.

12. The method of claim 11 wherein the coating is fibronectin.

13. The method of any of claims 1-12 wherein the hollow fiber has a wall material which is PA/PAES/PVP.

14. The method of any one of claims 1 to 13 wherein the cells in step a) comprise a substantially homogeneous population.

15. The method of any one of claims 1 to 14 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.