added to the cultured population. This method produces expanded cells wherein the number of the total nucleated cells is increased.

It has been found that the method of the invention produces expanded cells showing an enrichment for the subset of cells which are HSC.

Synergy has been observed by using a combination of a HDAC inhibitor and WR1065, an aminothiol compound. The fold expansion of the HSC is more than the additive effect of culturing HSPC in the presence of a HDAC inhibitor alone or WR1065 alone. Data presented herein show that this synergistic effect can produce expanded cells with an enrichment of HSC up to 500 fold.

Therefore, the first aspect of the present invention relates to a method to expand hematopoietic stem and progenitor cells (HSPC) wherein the method comprises;

i) culturing an isolated population of HSPC in the presence of a histone deacetylase inhibitor (HDAC inhibitor), to form a cultured population of HSPC; and

ii) adding an aminothiol compound having the formula $RNH(C_nH_{2n})NH(C_nH_{2n})SX$, wherein R is hydrogen, an aryl, an acyl, or an alkyl group containing from 1 to 7 carbon atoms, each n has a value of from 2 to 6 and X is H or PO_3H_2; or a pharmaceutically acceptable salt thereof, to the cultured population of HSPC to form expanded cells.

A second aspect is a kit for the expansion of HSPC as defined above, wherein the kit comprises; sterile elements for the expansion of HSPC, a HDAC inhibitor and an aminothiol compound having the formula $RNH(C_nH_{2n})NH(C_nH_{2n})SX$, wherein R is hydrogen, an aryl, an acyl, or an alkyl group containing from 1 to 7 carbon atoms, each n has a value of from 2 to 6 and X is H or PO_3H_2; or a pharmaceutically acceptable salt thereof. In a related aspect is a kit when used to expand HSPC according to the method described herein, wherein the kit comprises: sterile elements for the expansion of HSPC, a HDAC inhibitor and an aminothiol compound having the formula $RNH(C_nH_{2n})NH(C_nH_{2n})SX$, wherein R is hydrogen, an aryl, an acyl, or an alkyl group containing from 1 to 7 carbon atoms, each n has a value of from 2 to 6 and X is H or PO_3H_2; or a pharmaceutically acceptable salt thereof.

A third aspect is an expanded population of cells, preferably HSCs, wherein the expanded population is enriched for Lin-, CD38, CD34+, CD133+, CD45RA-, CD90+ and CD49f+.

A fourth aspect is an expanded population of cells obtainable by the method as described above.

Brief Description of the Figures

Figure 1 shows the fold expansion of the total nucleated cells derived from umbilical cord blood, under the conditions; basal media supplemented with

Claims

1. A method to expand hematopoietic stem and progenitor cells (HSPC) wherein the method comprises;

i) culturing an isolated population of HSPC in the presence of a histone deacetylase inhibitor (HDAC inhibitor), to form a cultured population of HSPC; and

ii) adding an aminothiol compound having the formula $RNH(C_nH_{2n})NH(C_nH_{2n})SX$, wherein R is hydrogen, an aryl, an acyl, or an alkyl group containing from 1 to 7 carbon atoms, each n has a value of from 2 to 6 and X is H or PO_3H_2; or a pharmaceutically acceptable salt thereof, to the cultured population of HSPC to form expanded cells.

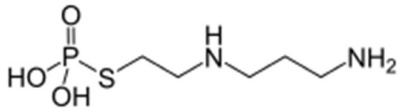
2. The method of claim 1, wherein the isolated population of HSPC has been selected for cells which are CD133+.

3. The method of claim 1 or 2, wherein the isolated population of HSPC has been selected for cells which are CD34+

4. The method of any one of claims 1 to 3, wherein the HDAC inhibitor is scriptaid or quisinostat.

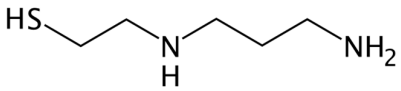
5. The method of claim 4, wherein the HDAC inhibitor is scriptaid.

6. The method of any one of claims 1 to 5, wherein the aminothiol compound is amifostine:



or

WR1065:



7. The method of claim 6, wherein the aminothiol compound is WR1065.

8. The method of any one of claims 1 to 7, wherein the isolated population of HSPC is obtained from umbilical cord blood.

9. The method of any one of claims 1 to 7, wherein the isolated population of HSPC is obtained from peripheral blood.

10. The method of any one of claims 1 to 7, wherein the isolated population of HSPC is obtained from bone marrow.

11. The method of any one of claims 1 to 10, wherein steps i) and ii) are carried out over a total time of 5 to 10 days to form expanded cells.

12. The method of any one of claims 1 to 11, wherein the isolated population of HSPC are cultured in a serum free or feeder free tissue culture system.

13. The method of any one of claims 1 to 12, wherein the isolated population of HSPC are obtained from a mammal, preferably a human.

14. The method of any one of claims 1 to 13, wherein the expanded cells are enriched for hematopoietic stem cells (HSC).

15. The method of any one of claims 1 to 14, wherein the expanded cells are enriched for: Lin-, CD38-, CD34+, CD133+, CD45RA-, CD90+ and CD49f+.

16. The method of any one of claims 1 to 15, wherein the total cell expansion is between 2-fold to 20-fold.

17. The method of any one of claims 1 to 16, wherein the expansion of Lin-, CD38-, CD34+, CD133+, CD45RA-, CD90+ and CD49f+ cells is 500-fold

18. The method of any one of claims 1 to 17, wherein the HDAC inhibitor is used at a concentration of 0.01-50 µM.

19. The method of any one of claims 1 to 18, wherein the aminothiol compound is used at a concentration of 50-500 µM.

20. A kit when used to expand HSPC according to the method of claim 1, wherein the kit comprises; sterile elements for the expansion of HSPC, a HDAC inhibitor and an aminothiol compound having the formula $RNH(C_nH_{2n})NH(C_nH_{2n})SX$, wherein R is hydrogen, an aryl, an acyl, or an alkyl group containing from 1 to 7 carbon atoms, each n has a value of from 2 to 6 and X is H or PO_3H_2; or a pharmaceutically acceptable salt thereof.

21. A kit when used according to claim 20, with any of the additional features of any one of claims 2 to 19.

22. An expanded population of cells obtainable by the method of any one of claims 1 to 19.