WHAT IS CLAIMED IS:

1. Use of a cell population comprising natural killer cells in the manufacture of a medicament for treating an individual having acute myeloid leukemia, wherein the cell population comprising natural killer cells is produced by a method comprising the steps of:

(a) culturing hematopoietic stem or progenitor cells in a first medium comprising a stem cell mobilizing agent and thrombopoietin (Tpo) to produce a first population of cells;

(b) culturing the first population of cells in a second medium comprising a stem cell mobilizing agent and interleukin-15 (IL-15), and lacking Tpo, to produce a second population of cells; and

(c) culturing the second population of cells in a third medium comprising IL-2 and IL-15, and lacking a stem cell mobilizing agent and LMWH, to produce a third population of cells;

wherein the third population of cells comprises natural killer cells that are CD56+, CD3-, CD16– or CD16+, and CD94+ or CD94-, and wherein at least 80% of the natural killer cells are viable;

wherein the cell population comprising natural killer cells is to be administered to the indivisual in combination with an effective amount of IL-2.

2. Use of a cell population comprising natural killer cells in the manufacture of a medicament for treating an individual having multiple myeloma, wherein the cell population comprising natural killer cells is produced by a method comprising the steps of:

(a) culturing hematopoietic stem or progenitor cells in a first medium comprising a stem cell mobilizing agent and thrombopoietin (Tpo) to produce a first population of cells;

(b) culturing the first population of cells in a second medium comprising a stem cell mobilizing agent and interleukin-15 (IL-15), and lacking Tpo, to produce a second population of cells; and

(c) culturing the second population of cells in a third medium comprising IL-2 and IL-15, and lacking a stem cell mobilizing agent and LMWH, to produce a third population of cells;

wherein the third population of cells comprises natural killer cells that are CD56+, CD3-, CD16– or CD16+, and CD94+ or CD94-, and wherein at least 80% of the natural killer cells are viable;

wherein the cell population comprising natural killer cells is to be administered to the individual in combination with an effective amount of IL-2.

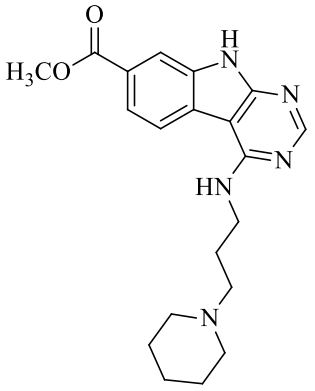
3. The use of any one of claims 1-2, wherein said hematopoietic stem cells are CD34+ hematopoietic stem cells, or wherein said hematopoietic stem cells are placental hematopoietic stem cells.

4. The use of claim 3, wherein said placental hematopoietic stem cells are obtained from, or obtainable from, human placental perfusate, or wherein said placental hematopoietic stem cells are obtained from, or obtainable from, nucleated cells isolated from human placental perfusate.

5. The use of any of claims 1-4, wherein said stem cell mobilizing agent is an aryl hydrocarbon receptor inhibitor.

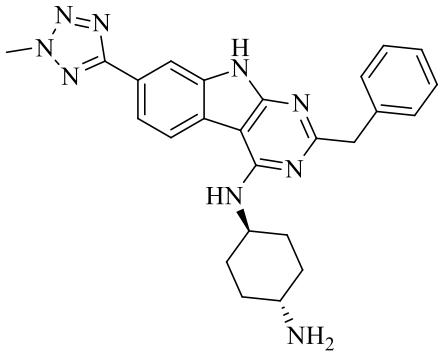
6. The use of claim 5, wherein said aryl hydrocarbon receptor inhibitor is StemRegenin-1 (SR-1) (4-(2-(2-(benzo[b]thiophen-3-yl)-9-isopropyl-9H-purin- 6-ylamino) ethyl) phenol), wherein said aryl hydrocarbon receptor inhibitor is resveratrol, wherein said aryl hydrocarbon receptor inhibitor is the compound CH223191 (1-Methyl-N-[2-methyl-4-[2-(2-methylphenyl) diazenyl] phenyl-1H-pyrazole-5-carboxamide].

7. The use of any claims 1-6, wherein the stem cell mobilizing agent is a pyrimido(4,5-b) indole derivative, preferably wherein said pyrimido(4,5-b) indole derivative has the chemical structure



(UM729).

8. The use of claim 7, wherein said pyrimido(4,5-b) indole derivative has the chemical structure



(UM171).

9. The use of any of claims 1-8, wherein said first medium additionally comprises one or more of Low Molecular Weight Heparin (LMWH), Flt-3 Ligand (Flt-3L), stem cell factor (SCF), IL-6, IL-7, granulocyte colony-stimulating factor (G-CSF), or granulocyte-macrophage-stimulating factor (GM-CSF), or wherein said first medium comprises each of LMWH, Flt-3L, SCF, IL-6, IL-7, G-CSF, and GM-CSF.

10. The use of any of claims 1-9, wherein said second medium additionally comprises one or more of LMWH, Flt-3, SCF, IL-6, IL-7, G-CSF, and GM-CSF, or wherein said second medium additionally comprises each of LMWH, Flt-3, SCF, IL-6, IL-7, G-CSF, and GM-CSF.

11. The use of any of claims 1-10, wherein said third medium additionally comprises one or more of SCF, IL-6, IL-7, G-CSF, or GM-CSF, or wherein said third medium comprises each of SCF, IL-6, IL-7, G-CSF, and GM-CSF.

12. The use of any of claims 9-11, wherein said LMWH, Flt-3, SCF, IL-6, IL-7, G-CSF, and/or GM-CSF are not comprised within an undefined component of the first medium,

second medium or third medium, or wherein said LMWH, Flt-3, SCF, IL-6, IL-7, G-CSF, and/or GM-CSF are not comprised within serum.

13. The use of any of claims 1-12, wherein any of said first medium, second medium or third medium comprises human serum-AB, wherein any of said first medium, second medium or third medium comprises 2-mercaptoethanol, or wherein any of said first medium, second medium or third medium comprises gentamycin.

14. The use of any of claims 1-13, wherein said method comprises culturing the hematopoietic stem cells in the first medium for 7-13 days, wherein said method comprises culturing the hematopoietic stem cells in the first medium for 8-12 days, or wherein said method comprises culturing the hematopoietic stem cells in the first medium for about 10 days.

15. The use of any of claims 1-13, wherein said method comprises culturing said first population of cells in said second medium for 2-6 days, wherein said method comprises culturing said first population of cells in said second medium for 3-5 days, or wherein said method comprises culturing said first population of cells in said second medium for about 4 days.

16. The use of any of claims 1-13, wherein said method comprises culturing said second population of cells in said third medium for 10-30 days, wherein said method comprises culturing said second population of cells in said third medium for 15-25 days, or wherein said method comprises culturing said second population of cells in said third medium for about 21 days.

17. The use of any of claims 1-16, wherein said method produces natural killer cells that comprise at least 20% CD56+CD3– natural killer cells, wherein said method produces natural killer cells that comprise at least 40% CD56+CD3– natural killer cells, wherein said method produces natural killer cells that comprise at least 60% CD56+CD3– natural killer cells, or wherein said method produces natural killer cells that comprise at least 80% CD56+CD3– natural killer cells.

18. The use of any of claims 1-17, additionally comprising cryopreserving said population of cells after step (c), additionally comprising cryopreserving said natural killer cells after step (c), or wherein said natural killer cells have been cryopreserved prior to said contacting or said administering.