CLAIMS:

1. A method for preparing a population of oligopotent and unipotent Lymphocyte progenitors in culture, the method comprising contacting an expanded source of CD34+ cells with a set of Lymphocyte Lineage Modulators in culture, thereby making a population of oligopotent and unipotent Lymphocyte progenitors,

wherein the expanded source of CD34+ cells is derived from an original source of CD34+ cells that has undergone at least a 200-fold increase in the number of CD34+ cells as compared to the original source of the CD34+ cells.

2. A method for preparing populations of oligopotent and unipotent progenitors in culture, the method comprising contacting an expanded source of CD34+ cells with a set of lineage modulators in culture, thereby making a population of oligopotent and unipotent progenitors,

wherein the expanded source of CD34+ cells is derived from an original source of CD34+ cells that has undergone at least a 20-fold increase in the number of CD34+ cells as compared to the original source of the CD34+ cells, and

wherein the set of lineage modulators is a set of Erythroid Lineage Modulators, Megakaryocyte Lineage Modulators, Granulocyte Lineage Modulators, Monocyte Lineage Modulators, or Lymphocyte Lineage Modulators.

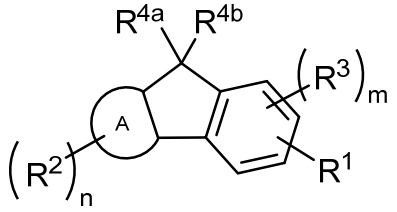
3. The method of claim 1 or 2, wherein the original source of CD34+ cells is selected from the group consisting of bone marrow, cord blood, mobilized peripheral blood, and non-mobilized peripheral blood.

4. The method of claim 1 or 2, wherein the original source of CD34+ cells is cord blood.

5. The method of claim 1 or 2, wherein the expanded source of CD34+ cells is derived from an original source of CD34+ cells that has undergone at least a 500-fold increase in the number of CD34+ cells as compared to the original source of the CD34+ cells, and the original source of CD34+ cells is cord blood.

6. The method of claim 1 or 2 wherein the expanded source of CD34+ cells is derived from an original source of CD34+ cells that has undergone at least a 20-fold increase in the number of CD34+ cells as compared to the original source of the CD34+ cells, and the original source of CD34+ cells is bone marrow or mobilized peripheral blood.

7. The method of any one of claims 1 to 6, wherein the expanded source of CD34+ cells is prepared by contacting the original source of CD34+ cells in culture with an effective amount of a compound of Formula I



(I)

or a pharmaceutically acceptable salt, hydrate, or solvate thereof, thereby increasing the number of CD34+ cells from the original source of CD34+ cells culture;

wherein,

A is a fused cyclic moiety selected from the group consisting of a phenyl, C_{3-6} cycloalkyl, heterocycloalkyl, and heteroaryl;

wherein each heterocycloalkyl comprises from 3 to 6 ring members having 1 to 3 nitrogen atom ring members, and

each heteroaryl comprises 5 to 6 ring members having 1 to 3 nitrogen atom ring members;

R^1 is selected from the group consisting of $–C(O)–NR^b–R^{1a}$, $–NR^b–C(O)–R^{1a}$, $–NR^b–C(O)–R^{1b}$, $–NR^b–X^1–C(O)–R^{1a}$, $–C(O)–X^1–NR^b–R^{1a}$, $–X^1–C(O)–NR^b–R^{1a}$, $–X^1–NR^b–C(O)–R^{1a}$, $–NR^b–C(O)–X^1–C(O)–R^{1b}$, $–C(O)–NR^b–X^1–C(O)–R^{1b}$, $–NR^b–C(O)–O–R^{1a}$, $–O–C(O)–NR^b–R^{1a}$, $–X^1–NR^b–C(O)–O–R^{1a}$, $–X^1–O–C(O)–NR^b–R^{1a}$, $–NR^b–R^{1a}$, and $–C(O)\text{-}R^{1a}$;

R^{1a} is selected from the group consisting of H, C_{1-10} alkyl; C_{1-10} haloalkyl;

R^{1b} is selected from the group consisting of $–OR^a$, $–NR^aR^b$,

each R^2 is independently selected from the group consisting of halogen, –CN, $–C_{1-8}$ alkyl, $–C_{2-8}$ alkenyl, C_{2-8} alkynyl, C_{1-8} haloalkyl, $–C_{1-8}$ alkoxy, $–X^1–C_{1-8}$ alkoxy,

–C(O)–R^{2a}, –NR^b–C(O)–R^{2a},–SR^a, –X^1–SR^a, –OR^a, –X^1–OR^a, –NR^aR^b,

–X^1–NR^aR^b, -$S(O)_2R^a$, -$S(O)_2NR^aR^b$, –X^1-$S(O)_2R^a$, and –X^1-$S(O)_2NR^aR^b$

each R^3 is independently selected from the group consisting of halogen, –CN, –C_{1-8} alkyl,

–C_{2-8} alkenyl, C_{2-8} alkynyl, C_{1-8} haloalkyl, –C_{1-8} alkoxy, –X^1–C_{1-8} alkoxy,

–C(O)–R^{3a}, –SR^a, –X^1–SR^a, –OR^a, –X^1–OR^a, –NR^aR^b,–X^1–NR^aR^b, -$S(O)_2R^a$,

-$S(O)_2NR^aR^b$, –X^1-$S(O)_2R^a$, and –X^1-$S(O)_2NR^aR^b$;

each R^{2a} and R^{3a} is independently selected from the group consisting of H, C_{1-10} alkyl,

C_{1-10} haloalkyl, –OR^a, –X^1–OR^a, –NR^aR^b, and – X^1–NR^aR^b;

R^{4a} is selected from the group consisting of –OR^a, and –NR^aR^b;

R^{4b} is H; or R^{4a} and R^{4b} are combined to form an oxo or an oxime moiety;

each R^a and R^b is independently selected from the group consisting of H and C_{1-4} alkyl;

each X^1 is C_{1-4} alkylene;

the subscript n is an integer from 0 to 3; and

the subscript m is an integer from 0 to 2.

8. The method of claim 7, wherein

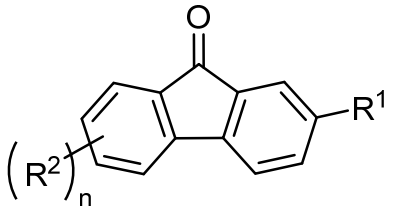
A is a fused phenyl.

9. The method of 7 or 8, wherein

R^1 is –NH–C(O)–R^{1a}.

10. The method of any one of claims claim 7 to 9, wherein R^{4a} is –OH.

11. The method of claim 7, wherein the compound of Formula I has the structure of Formula IIa1



(IIa1)

or a pharmaceutically acceptable salt, hydrate, or solvate thereof.

12. The method of claim 11, wherein

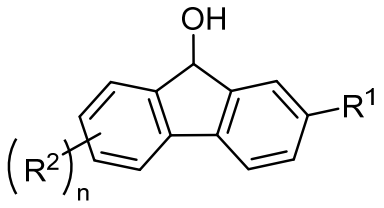
R^1 is selected from the group consisting of –NH–C(O)–R^{1a};

R^2 is independently selected from the group consisting of –NH_2 or –OH;

R^{1a} is selected from the group consisting of C_{1-6} alkyl; and C_{1-6} haloalkyl; and

the subscript n is 0 or 1.

13. The method of claim 7, wherein the compound of Formula I has the structure of Formula IIIa1



(IIIa1)

or a pharmaceutically acceptable salt, hydrate, or solvate thereof.

14. The method of claim 13, wherein

R^1 is –NH–C(O)–R^{1a};

R^2 is selected from the group consisting of –NH_2 or –OH;

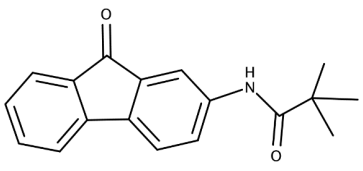
R^{1a} is selected from the group consisting of C_{1-6} alkyl; and C_{1-6} haloalkyl; and

the subscript n is 0 or 1.

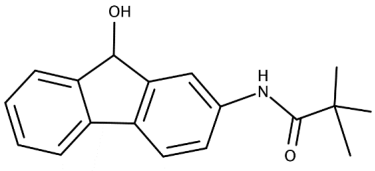
or a pharmaceutically acceptable salt, hydrate, or solvate thereof.

15. The method of claim 7, wherein said compound is selected from **Table 1**.

16. The method of claim 7, wherein said compound is ~~s~~elected from the group consisting of



and



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17. The method of any one of claims 7-16, further comprising contacting the original source of CD34+ cells in culture with fms-related tyrosine kinase 3 ligand (FLT3L), thrombopoietin (TPO), stem cell factor (SCF), interleukin 3 (IL-3), and interleukin 6 (IL-6).

18. The method of any one of claims 7-16, further comprising contacting the original source of CD34+ cells in culture with thrombopoietin (TPO), stem cell factor (SCF), fms-related tyrosine kinase 3 ligand (FLT3L), and interleukin 6 (IL-6).

19. The method of any one of claims 7 to 18, wherein the original source of CD34+ cells is contacted with a Priming Culture prior to culturing with the Compound of Formula I.

20. The method of claim 19, wherein the Priming Culture comprises thrombopoietin (TPO), stem cell factor (SCF), fms-related tyrosine kinase 3 ligand (FLT3L), and interleukin 6 (IL-6).

21. The method of any one of claims 1 to 20, wherein the population of oligopotent and unipotent lymphocyte progenitors comprises a cell surface phenotype of CD7+.

22. The method of any one of claims 1 to 20, wherein the population of oligopotent and unipotent lymphocyte progenitors comprises a cell surface phenotype of CD7+ and CD5+.

23. The method of any one of claims 1 to 20, wherein the population of oligopotent and unipotent lymphocyte progenitors comprises a cell surface phenotype of CD7+/CD5-.

24. The method of any one of claims 1 to 20, wherein the population of oligopotent and unipotent lymphocyte progenitors comprises a cell surface phenotype of $CD56^{bright}$, CD16−, and KIR−.

25. The method of any one of claims 21 to 23, wherein the oligopotent and unipotent lymphocyte progenitors comprise at least 40% of the total cells after 7, 14, or more days in culture.

26. The method of claim 25, wherein the set of Lymphocyte Lineage Modulators comprises IL-7, FLT3L, SCF and TPO.

27. The method of claim 25, wherein the set of Lymphocyte Lineage Modulators comprises a notch ligand, IL-7, FLT3L, SCF and TPO.

28. The method of claim 25, wherein the set of Lymphocyte Lineage Modulators comprises a notch ligand, a cell adhesion molecule, IL-7, FLT3L, SCF and TPO.

29. The method of any one of claims 27 to 28, wherein the notch ligand is Notch ligand Delta-like 4 (DLL4).

30. The method of claim 28, wherein the cell adhesion molecule is the vascular cell adhesion molecule 1 (VCAM-1).

31. The method of any one of claims 27 to 30, wherein the notch ligand and/or the cell adhesion molecule is immobilized on a surface for culturing.

32. A population of oligopotent and unipotent lymphocyte progenitors of any one of claims 21 to 31.

33. A therapeutic agent comprising the population of oligopotent and unipotent lymphocyte progenitors of claim 32.

34. A pharmaceutical composition comprising the therapeutic agent of claim 33 and at least one physiologically acceptable carrier.

35. Use of the therapeutic agent of claim 33 or the pharmaceutical composition of claim 34 in the preparation of a medicament for treating lymphocytopenia or cancer in an individual.