WHAT IS CLAIMED IS:

1. A method of generating mesenchymal stem cells in a suspension culture, comprising culturing human pluripotent stem cells under conditions suitable for differentiation of said human pluripotent stem cells to the mesenchymal stem cells, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{+}/SSEA4^{-}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture,

thereby generating the mesenchymal stem cells in the suspension culture.

2. The method of claim 1, wherein said conditions comprise culturing the human pluripotent stem cells in a suspension culture in the presence of a differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the mesenchymal stem cells.

3. The method of claim 2, wherein said culturing comprises a gradual transfer of the human pluripotent stem cells from a culture medium supporting expansion of said human pluripotent stem cells in an undifferentiation state into said differentiation culture medium.

4. The method of claim 3, wherein said gradual transfer comprises:

(i) culturing for one passage in a medium comprising 25% differentiation medium and 75% of said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state;

(ii) culturing for one passage in a medium comprising 50% differentiation medium and 50% of said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state;

(iii) culturing for one passage in a medium comprising 75% differentiation medium and 25% of said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state; and

(iv) culturing the cells in a differentiation medium.

5. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises interleukin 11 (IL11) and Ciliay Neurotrophic Factor (CNTF).

6. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises basic fibroblast growth factor (bFGF) at a concentration of at least 50 ng/ml and an IL6RIL6 chimera.

7. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises an animal contaminant-free serum replacement and an IL6RIL6 chimera

8. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a serum-free culture medium which comprises a soluble interleukin 6 receptor (sIL6R) and interleukin 6 (IL6), wherein a concentration of said sIL6R is at least 5 ng/ml, and wherein a concentration of said IL6 is at least 3 ng/ml.

9. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises interleukin 11 (IL11) and oncostatin.

10. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises replacement, basic fibroblast growth factor (bFGF) and 100 pg/ml of an IL6RIL6 chimera.

11. The method of any one of claims 2-10, wherein said differentiation culture medium comprises serum or serum replacement.

12. The method of any one of claims 2-10, wherein said differentiation culture medium comprises serum and serum replacement.

13. The method of claim 11 or 12, wherein said differentiation culture medium further comprises L-glutamine, beta-mercaptoethanol, and non-essential amino acids.

14. The method of any one of claims 1-13, wherein said culturing said cells is performed under conditions devoid of substrate adherence.

15. A method of generating a neuronal progenitor cell in a suspension culture, comprising culturing human pluripotent stem cells under conditions suitable for differentiation of said human pluripotent stem cells to neuronal progenitor cell, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{+}/SSEA4^{-}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture,

thereby generating the neuronal progenitor cell in the suspension culture.

16. The method of claim 15, wherein said conditions comprise culturing the human pluripotent stem cells in a suspension culture in the presence of a differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the neuronal progenitor cell.

17. The method of claim 16, wherein said differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the neuronal progenitor cell comprises retinoic acid.

18. The method of claim 16, wherein said differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the neuronal progenitor cell comprises Noggin.

19. The method of any one of claims 16-18, wherein said neuronal progenitor cells expressing Glial fibrillary acidic protein (GFAP), O4, β-Tubulin and/or Nestin.

20. A method of generating an endodermal cell in a suspension culture, comprising culturing human pluripotent stem cells under conditions suitable for differentiation of said human pluripotent stem cells to an endodermal cell lineage, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{+}/SSEA4^{-}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture,

thereby generating the neuronal progenitor cell in the suspension culture.

21. The method of claim 20, wherein said conditions comprise culturing the human pluripotent stem cells in a suspension culture in the presence of a differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the endodermal cell.

22. The method of claim 21, wherein said differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the endodermal cell comprises Activin.

23. The method of any of claims 20 to 22, wherein said endodermal cell expresses PDX1.

24. The method of any of claims 20 to 22, wherein said endodermal cell expresses SOX17.

25. A method of generating lineage-specific cells from human pluripotent stem cells, the method comprising:

(a) culturing the human pluripotent stem cells in a suspension culture, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{+}/SSEA4^{-}$ expression

signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture, to thereby obtain expanded, undifferentiated pluripotent stem cells devoid of clumps; and

(b) subjecting said expanded, undifferentiated pluripotent stem cells devoid of clumps to culturing conditions suitable for differentiating and/or expanding lineage specific cells,

thereby generating lineage-specific cells from human pluripotent stem cells.

WHAT IS CLAIMED IS:

1. A method of generating mesenchymal stem cells in a suspension culture, comprising culturing human pluripotent stem cells under conditions suitable for differentiation of said human pluripotent stem cells to the mesenchymal stem cells, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{-}/SSEA4^{+}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture,

thereby generating the mesenchymal stem cells in the suspension culture.

2. The method of claim 1, wherein said conditions comprise culturing the human pluripotent stem cells in a suspension culture in the presence of a differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the mesenchymal stem cells.

3. The method of claim 2, wherein said culturing comprises a gradual transfer of the human pluripotent stem cells from a culture medium supporting expansion of said human pluripotent stem cells in an undifferentiation state into said differentiation culture medium.

4. The method of claim 3, wherein said gradual transfer comprises:

(i) culturing for one passage in a medium comprising 25% differentiation medium and 75% of said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state;

(ii) culturing for one passage in a medium comprising 50% differentiation medium and 50% of said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state;

(iii) culturing for one passage in a medium comprising 75% differentiation medium and 25% of said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state; and

(iv) culturing the cells in a differentiation medium.

5. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises interleukin 11 (IL11) and Ciliay Neurotrophic Factor (CNTF).

6. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises basic fibroblast growth factor (bFGF) at a concentration of at least 50 ng/ml and an IL6RIL6 chimera.

7. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises an animal contaminant-free serum replacement and an IL6RIL6 chimera.

8. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a serum-free culture medium which comprises a soluble interleukin 6 receptor (sIL6R) and interleukin 6 (IL6), wherein a concentration of said sIL6R is at least 5 ng/ml, and wherein a concentration of said IL6 is at least 3 ng/ml.

9. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises interleukin 11 (IL11) and oncostatin.

10. The method of claim 4, wherein said culture medium supporting expansion of said human pluripotent stem cells in said undifferentiation state comprises a culture medium which comprises replacement, basic fibroblast growth factor (bFGF) and 100 pg/ml of an IL6RIL6 chimera.

11. The method of any one of claims 2-10, wherein said differentiation culture medium comprises serum and/or serum replacement.

12. The method of claim 11, wherein said differentiation culture medium comprises serum and serum replacement.

13. The method of claim 11 or 12, wherein said differentiation culture medium further comprises L-glutamine, beta-mercaptoethanol, and non-essential amino acids.

14. An isolated population of mesenchymal stem cells (MSCs) in a suspension culture generated by the method of any one of claims 1-13.

15. The isolated population of mesenchymal stem cells of claim 14, wherein at least 40% of the cells are characterized by a CD73+/CD31-/CD105+ expression signature.

16. The isolated population of MSCs of claim 14 or 15, wherein said MSCs are capable of differentiation in a suspension culture into a cell lineage selected from the group consisting of an adipogenic lineage, an osteoblastic lineage, and a chrondrogenic lineage.

17. A method of generating a neuronal progenitor cell in a suspension culture, comprising culturing human pluripotent stem cells under conditions suitable for differentiation of said human pluripotent stem cells to neuronal progenitor cell, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}$/TRA1-60$^{-}$/TRA1-81$^{-}$/SSEA1$^{+}$/SSEA4$^{-}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture,

thereby generating the neuronal progenitor cell in the suspension culture.

18. The method of claim 17, wherein said conditions comprise culturing the human pluripotent stem cells in a suspension culture in the presence of a differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the neuronal progenitor cell.

19. The method of claim 18, wherein said differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the neuronal progenitor cell comprises retinoic acid.

20. The method of claim 18, wherein said differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the neuronal progenitor cell comprises Noggin.

21. An isolated population of neuronal progenitor cells in a suspension culture generated by the method of any one of claims 17-20.

22. The method of any one of claims 18-20 or the isolated population of neuronal progenitor cells of claim 21, wherein said neuronal progenitor cells expressing Glial fibrillary acidic protein (GFAP), O4, β-Tubulin and/or Nestin.

23. A method of generating an endodermal cell in a suspension culture, comprising culturing human pluripotent stem cells under conditions suitable for differentiation of said human pluripotent stem cells to an endodermal cell lineage, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{-}/SSEA4^{-}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture,

thereby generating the neuronal progenitor cell in the suspension culture.

24. The method of claim 23, wherein said conditions comprise culturing the human pluripotent stem cells in a suspension culture in the presence of a differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the endodermal cell.

25. The method of claim 24, wherein said differentiation culture medium suitable for differentiation of said human pluripotent stem cells to the endodermal cell comprises Activin.

26. The method of any of claims 23 to 25, wherein said endodermal cell expresses PDX1.

27. The method of any of claims 23 to 25, wherein said endodermal cell expresses SOX17.

28. A method of generating lineage-specific cells from human pluripotent stem cells, the method comprising:

(a) culturing the human pluripotent stem cells in a suspension culture, wherein said human pluripotent stem cells comprise at least 50% human pluripotent stem cells characterized by an endogenous $OCT4^{+}/TRA1\text{-}60^{-}/TRA1\text{-}81^{-}/SSEA1^{-}/SSEA4^{-}$ expression signature and being capable of differentiating into endoderm, ectoderm and mesoderm embryonic germ layers in a suspension culture, to thereby obtain expanded, undifferentiated pluripotent stem cells devoid of clumps; and

(b) subjecting said expanded, undifferentiated pluripotent stem cells devoid of clumps to culturing conditions suitable for differentiating and/or expanding lineage specific cells,

thereby generating lineage-specific cells from human pluripotent stem cells.