WHAT IS CLAIMED IS:

1. A method of producing mesendoderm cells, the method comprising the steps of:
obtaining a cell population comprising human pluripotent stem cells;
providing the human pluripotent stem cells with a medium comprising less than 2% serum and at least one TGFβ superfamily growth factor in an amount sufficient to promote differentiation of the human pluripotent stem cells to mesendoderm cells, said mesendoderm cells being multipotent cells that can differentiate into mesoderm or definitive endoderm cells; and
allowing sufficient time for the mesendoderm cells to form, wherein the sufficient time for the mesendoderm cells to form has been determined by detecting the presence of mesendoderm cells in the cell population.

2. The method of claim 1, wherein, the TGFβ superfamily growth factor is selected from the group consisting of Nodal, activin A and activin B.

3. The method of claim 2, wherein the TGFβ superfamily growth factor is activin A.

4. The method of claim 3, wherein at least 10 ng/ml activin A is provided.

5. The method of claim 3, wherein at least 100 ng/ml activin A is provided.

6. The method of claim 1, wherein the human pluripotent stem cells comprise human embryonic stem cells.

7. The method of claim 1, wherein the human embryonic stem cells are derived from a tissue selected from the group consisting of the morula or the ICM of an embryo.

8. The method of claim 1 or 2 further comprising the step of providing serum to the human pluripotent stem cells.

9. The method of claim 1 further comprising a medium that comprises less than 2% (v/v) serum.

10. The method of claim 1 or 2, wherein the expression of the marker selected from the group consisting of brachyury, FGF4 and SNAI1 is greater than the expression of the marker selected from the group consisting of OCT4, SOX17, CXCR4, FOXA2, SOX7 and SOX1 in the population of mesendoderm cells.

11. The method of claim 1, wherein at least 15% of the pluripotent human stem cells differentiate into mesendoderm cells.

12. The method of claim 1, wherein at least 50% of the pluripotent human stem cells differentiate into mesendoderm cells.

13. The method of claim 1, wherein at least 90% of the pluripotent human stem cells differentiate into mesendoderm cells.

14. The method of claim 1, wherein the said mesendoderm cells are further provided with one or more growth factors selected from the group consisting of FGF10, FGF4, FGF2 and Wnt3B.

15. An *in vitro* method of producing human mesendoderm cells, the method comprising: obtaining a cell population comprising human pluripotent stem cells; and differentiating said cell population in a medium comprising less than 2% serum and at least one growth factor of the TGFβ superfamily, wherein the growth factor is present in the medium in an amount sufficient to promote differentiation of at least a portion of said pluripotent cells to mesendoderm.

16. The method of claim 15, further comprising allowing sufficient time for the population of mesendoderm cells to form.

WHAT IS CLAIMED IS:

1. A method of producing mesendoderm cells, the method comprising the steps of:
obtaining a cell population comprising human pluripotent stem cells;
providing the human pluripotent stem cells with at least one TGFβ superfamily growth factor in an amount sufficient to promote differentiation of the human pluripotent stem cells to mesendoderm cells, said mesendoderm cells being multipotent cells that can differentiate into mesoderm or definitive endoderm
cells; and
allowing sufficient time for the mesendoderm cells to form, wherein the sufficient time for the mesendoderm cells to form has been determined by detecting the presence of mesendoderm cells in the cell population.

2. A method of producing mesendoderm cells, the method comprising the steps of:
obtaining a cell population comprising human pluripotent stem cells;
providing the human pluripotent stem cells with a medium comprising less than 2% serum and at least one TGFβ superfamily growth factor in an amount sufficient to promote differentiation of the human pluripotent stem cells to mesendoderm cells, said mesendoderm cells being multipotent cells that can differentiate into mesoderm or definitive endoderm
cells; and
allowing sufficient time for the mesendoderm cells to form, wherein the sufficient time for the mesendoderm cells to form has been determined by detecting the presence of mesendoderm cells in the cell population.

3. The method of claim 1 or 2, wherein, the TGFβ superfamily growth factor is selected from the group consisting of Nodal, activin A and activin B.

4. The method of claim 3, wherein the TGFβ superfamily growth factor is activin A.

5. The method of claim 4, wherein at least 10 ng/ml activin A is provided.

6. The method of claim 4, wherein at least 100 ng/ml activin A is provided.

7. The method of claim 1 or 2, wherein the human pluripotent stem cells comprise human embryonic stem cells.

8. The method of claim 1 or 2, wherein the human embryonic stem cells are derived from a tissue selected from the group consisting of the morula, the ICM of an embryo and the gonadal ridges of an embryo.

9. The method of claim 1 or 2 further comprising the step of providing serum to the human pluripotent stem cells.

10. The method of claim 1 further comprising a medium that comprises less than 2% (v/v) serum.

11. The method of claim 1 or 2, wherein the expression of the marker selected from the group consisting of brachyury, FGF4 and SNAI1 is greater than the expression of the marker selected from the group consisting of OCT4, SOX17, CXCR4, FOXA2, SOX7 and SOX1 in the population of mesendoderm cells.

12. The method of claim 1 or 2, wherein at least 15% of the pluripotent human stem cells differentiate into mesendoderm cells.

13. The method of claim 1 or 2, wherein at least 50% of the pluripotent human stem cells differentiate into mesendoderm cells.

14. The method of claim 1 or 2, wherein at least 90% of the pluripotent human stem cells differentiate into mesendoderm cells.

15. The method of claim 1 or 2, wherein the said mesendoderm cells are further provided with one or more growth factors selected from the group consisting of FGF10, FGF4, FGF2 and Wnt3B.

16. An *in vitro* method of producing human mesendoderm cells, the method comprising: obtaining a cell population comprising human pluripotent stem cells; and differentiating said cell population in a medium comprising less than 2% serum and at least one growth factor of the TGFβ superfamily, wherein the growth factor is present in the medium in an amount sufficient to promote differentiation of at least a portion of said pluripotent cells to mesendoderm.

17. The method of claim 16, further comprising allowing sufficient time for the population of mesendoderm cells to form.