CLAIMS

1. A population of cells expressing markers characteristic of the pancreatic endoderm lineage, wherein greater than 50% of cells in the population co-express PDX1 and NKX6.1.

2. The population of cells of claim 1 wherein greater than 60% of the cells in the population co-express PDX1 and NKX6.1.

3. The population of cells of claim 1 wherein greater than 70% of the cells in the population co-express PDX1 and NKX6.1.

4. The population of cells of claim 1 wherein greater than 80% of the cells in the population co-express PDX1 and NKX6.1.

5. The population of cells of claim 1 wherein greater than 90% of the cells in the population co-express PDX1 and NKX6.1.

6. A method to generate a population of cells expressing markers characteristic of the pancreatic endoderm lineage, wherein greater than 50% of the cells in the population co-express PDX1 and NKX6.1, comprising the steps of:

   a. Culturing a population of pluripotent stem cells,

   b. Differentiating the population of pluripotent stem cells into a population of cells expressing markers characteristic of the definitive endoderm lineage,

   c. Differentiating the population of cells expressing markers characteristic of the definitive endoderm lineage into a population of cells expressing markers characteristic of the pancreatic endoderm lineage, in a medium supplemented with a protein kinase C activator.

7. The method of claim 6 wherein the protein kinase C activator is selected from the group consisting of (2S, 5S)-(E, E)-8-(5-(4-(Trifluoromethyl)phenyl)-2,4-pentadiemoylamino) benzolactam, Indolactam V, phorbol-12-myristate-13-acetate, and phorbol-12,13-dibutyrate.

8. The method of claim 6 wherein the protein kinase C activator is (2S, 5S)-(E, E)-8-(5-(4-(Trifluoromethyl)phenyl)-2,4-pentadiemoylamino) benzolactam.

9. The method of claim 8 wherein the (2S, 5S)-(E, E)-8-(5-(4-(Trifluoromethyl)phenyl)-2,4-pentadiemoylamino) benzolactam is used at a concentration from about 20nM to about 500nM.

10. The method of claim 6, wherein the medium supplemented with a protein kinase C activator is further supplemented with at least one factor from the group consisting of a factor capable of inhibiting BMP, a TGFβ receptor signaling inhibitor, and a fibroblast growth factor.

11. The method of claim 10 wherein the factor capable of inhibiting BMP is noggin.

12. The method of claim 11 wherein noggin is used at a concentration from about 50ng/ml to about 500μg/ml.

13. The method of claim 11 wherein noggin is used at a concentration of about 100ng/ml.

14. The method of claim 10 wherein the TGFβ receptor signaling inhibitor is an inhibitor of ALK5.

15. The method of claim 14 where the inhibitor of ALK5 is ALK5 inhibitor II.

16. The method of claim 15 wherein ALK5 inhibitor II is used at a concentration from about 0.1 μM to about 10 μM.

17. The method of claim 16 wherein ALK5 inhibitor II is used at a concentration of about 1 μM.

18. The method of claim 10 wherein the fibroblast growth factor is FGF7.

19. The method of claim 10 wherein the fibroblast growth factor is FGF10.

20. The method of claim 10 wherein the fibroblast growth factor may be used at a concentration from about 50pg/ml to about 50μg/ml.

CLAIMS

1. A method to generate a population of cells expressing markers characteristic of the pancreatic endoderm lineage, wherein greater than 50% of the cells in the population co-express PDX1 and NKX6.1, comprising the steps of:

    a. Culturing a population of pluripotent stem cells,
    b. Differentiating the population of pluripotent stem cells into a population of cells expressing markers characteristic of the definitive endoderm lineage,
    c. Differentiating the population of cells expressing markers characteristic of the definitive endoderm lineage into a population of cells expressing markers characteristic of the pancreatic endoderm lineage, in a medium supplemented with a protein kinase C activator ,

    wherein the medium supplemented with a protein kinase C activator is further supplemented with at least one factor from the group consisting of noggin at a concentration from about 50ng/ml to about 500µg/ml, a TGFβ receptor signaling inhibitor, and a fibroblast growth factor.