What is claimed is:

1. A method for lowering blood glucose levels in an animal by transplanting a population of pancreatic endocrine precursor cells into the animal.

CLAIMS:

1. A population of pancreatic endocrine precursor cells expressing PDX1 and NKX6.1, for use in a method for lowering blood glucose levels in an animal by transplanting the population of cells into the animal, wherein the pancreatic endocrine precursor cells are obtained by culturing pancreatic endoderm cells in a medium comprising DMEM-high glucose, FGF7 and Cyclopamine-KAAD and wherein the medium is supplemented with a factor capable of inhibiting BMP and a TGF-β receptor I kinase inhibitor.

2. The population of cells for use according to claim 1, wherein the medium comprises DMEM (high glucose) containing 4500mg/l glucose, and 1% B27.

3. The population of cells for use according to claim 2, wherein the factor capable of inhibiting BMP is noggin.

4. The population of cells for use according to claim 3, wherein noggin is used at a concentration from about 100pg/ml to about 500μg/ml, or at a concentration of 100ng/ml.

5. The population of cells for use according to claim 2, wherein the TGF-β receptor I kinase inhibitor is ALK5 inhibitor II.

6. The population of cells for use according to claim 5, wherein the ALK5 inhibitor II is used at a concentration from about 0.1μM to about 10μM, or at a concentration of 1μM.

7. The population of cells for use according to any one of the preceding claims, wherein the cells are cultured in a culture medium for about four days.

8. The population of cells for use according to claim 1, wherein the culture medium comprises DMEM (high glucose), B27 (for example, 1% Invitrogen, CA), FGF7 (for example, 50 ng/ml), Cyclopamine-KAAD (for example, 0.25 μM), Noggin (for example, 100 ng/ml), and optionally an Alk5 inhibitor (for example, 1 μM) and/or Retinoic acid (RA) (for example, 0.1 μM).

9. The population of cells for use according to any one of the preceding claims, wherein the animal is a patient suffering from, or at risk of developing, Type 1 or Type 2 diabetes.

10. The population of cells for use according to any one of the preceding claims, wherein the cells are undifferentiated, or partially differentiated or fully differentiated into insulin-producing cells, prior to transplantation into the animal and optionally comprises further differentiation of the cells in the animal.

11. The population of cells for use according to any one of the preceding claims, wherein the cells are differentiated *in vitro* into a β-cell lineage or into pancreatic endocrine precursor cells, and the cells of a β-cell lineage or the pancreatic endocrine precursor cells are implanted into the animal.

12. The population of cells for use according to any one of the preceding claims, wherein the cells transplanted or implanted into the animal are provided in biocompatible degradable polymeric supports, porous non-degradable devices or encapsulated to protect from host immune response.

13. The population of cells for use according to any one of the preceding claims, wherein the method further comprises treating the animal with pharmaceutical agents or bioactives that facilitate the survival and function of the transplanted cells, for example selected from a list comprising: insulin, members of the TGF-β family, including TGF-β1, 2, and 3, bone morphogenic proteins (BMP-2, -3, -4, -5, -6, -7, -11, -12, and -13), fibroblast growth factors-1 and -2, platelet-derived growth factor-AA, and –BB, platelet rich plasma, insulin growth factor (IGF-I, II) growth differentiation factor (GDF-5, -6, -7, -8, -10, -15), vascular endothelial cell-derived growth factor (VEGF), pleiotrophin, endothelin, nicotinamide, glucagon like peptide-I (GLP-1) and II, GLP-1 and 2 mimetibody, Exendin-4, retinoic acid, parathyroid hormone, MAPK inhibitors.

14. The population of cells for use according to any one of the preceding claims, wherein additional factors, such as growth factors, antioxidants or anti-inflammatory agents are administered before, simultaneously with, or after the administration of the cells transplanted or implanted into the animal.

15. A method for differentiating pancreatic endoderm cells to pancreatic endocrine precursor cells expressing PDX1 and NKX6.1, wherein the method comprises culturing the pancreatic endoderm cells in a medium comprising DMEM-high glucose, FGF7 and Cyclopamine-KAAD and wherein the medium is supplemented with a factor capable of inhibiting BMP and a TGF-β receptor I kinase inhibitor.

16. The method according to claim 15, wherein the medium is as defined in any one of claim 2 to 6.

17. The method according to claim 15 or claim 16, wherein the cells are cultured as defined in claim 7.

18. The method according to any one of claims 15 to 17, wherein the medium is as defined in claim 8.

19. A population of cells substantially as described herein.

20. A method for differentiating cells substantially as described herein.