Placental derived MSCs exhibit many markers common to MSCs isolated from other tissues, e.g. CD105, CD73, CD90 and CD29, and the lack of expression of hematopoietic, endothelial and trophoblastic-specific cell markers. Adipogenic, osteogenic, and neurogenic differentiation have been achieved after culturing placental derived MSCs under appropriate conditions [Yen et al., Stem Cells (2005) 23(1): 3-9]. Furthermore, MSCs isolated from placenta and cultured *in vitro* have been demonstrated to be immune privileged in a similar fashion as MSCs [Li et al., Cell Res (2005) 15(7): 539-47]. Thus, the placenta provides an ethically non-controversial and easily accessible source of MSCs for experimental and clinical applications [Zhang et al., Exp Hematol (2004) 32(7): 657-64]. In addition, the present inventors have previously devised three dimensional (3D) culturing conditions suitable for expansion of placental derived MSCs (WO/2007/108003).

## SUMMARY OF THE INVENTION

In one aspect, there is provided a method of culturing adherent cells from a placenta tissue, the method comprising culturing the adherent cells from the placenta tissue under 3 dimensional (3D) culturing conditions which allow cell expansion, said conditions comprising

perfusion, wherein said perfusion is adjusted according to the glucose concentration of the culture medium,

and

wherein said 3D culturing conditions

(i) comprise a 3D bioreactor;

(ii) comprise an adherent material selected from the group consisting of glass, plastic, polyester, polypropylene, polystyrene, dextran and collagen; and

(iii) are effected for at least 3 days; and

wherein culturing of said cells is effected until at least 10% of said cells are proliferating.

According to ~~an aspect of~~ some ~~embodiments~~examples of the present ~~invention~~disclosure there is provided a method of culturing adherent cells from a placenta or adipose tissue, the method comprising culturing the adherent cells from the placenta or adipose tissue under 3 dimensional (3D) culturing conditions which allow cell expansion, the conditions comprising perfusion.

According to ~~an aspect of~~ some ~~embodiments~~examples of the present ~~invention~~disclosure there is provided a population of cells generated according to the above method.

According to ~~an aspect of~~ some ~~embodiments~~examples of the present ~~invention~~disclosure there is provided a population of cells comprising a gene expression profile essentially as described herein.

According to ~~an aspect of~~ some ~~embodiments~~examples of the present ~~invention~~disclosure there is provided a use of the population of cells, for the manufacture of a medicament identified for treating a condition which can benefit from cell or organ transplantation.

According to ~~an aspect of~~ some ~~embodiments~~examples of the present ~~invention~~disclosure there is provided a method of inducing tolerance and/or immunosuppression in a subject in need thereof, the method comprising administering to the subject a therapeutically effective amount of the adherent cells, thereby inducing tolerance and/or immunosuppression in the subject.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the perfusion is adjusted according to the glucose concentration of the culture medium.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the culture medium is maintained at a glucose concentration of about 550 mg/L.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the 3D culturing conditions comprise a 3D bioreactor.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the 3D culturing conditions comprise an adherent material selected from the group consisting of glass and plastic; polyester, polypropylene, polystyrene, dextran and collagen.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the 3D culturing conditions are effected for at least 3 days.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, culturing of the cells is effected until at least 10 % of the cells are proliferating.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, at least 10 % of the adherent cells are at a proliferative phase.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the adherent cells are capable of suppressing an immune reaction.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the adherent cells comprise a positive marker expression selected from the group consisting of CD73, CD90, CD29, CD105 and D7-fib.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the adherent cells comprise a negative marker expression selected from the group consisting of CD11b, CD34, HLA-DR, CD14, CD19, CD45, CD31, CD200 and KDR.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the adherent cells comprise a gene expression profile essentially as described herein.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the adherent cells are less committed to an osteogenic lineage as compared to adherent cells from bone marrow grown and allowed to differentiate under the same conditions.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the adherent cells are less committed to an adipogenic lineage as compared to adherent cells from bone marrow grown and allowed to differentiate under the same conditions.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the condition is selected from the group consisting of ischemia, peripheral arterial disease (PAD), critical limb ischemia (CLI), lower extremity ischemia, ischemic vascular disease, vascular disease of the kidney, ischemic heart disease, myocardial ischemia, coronary artery disease (CAD), atherosclerotic cardiovascular disease, left main coronary artery disease, arterial occlusive disease, peripheral ischemia, peripheral vascular disease, arteriosclerosis, ischemic brain disease, stroke, cerebral ischemia, cerebro vascular disease, retinopathy, retinal repair, remodeling disorder, von Hippel-Lindau syndrome, hereditary hemorrhagic telengiectasiaischemic vascular disease, Buerger's disease, ischemic renal disease, ischemic placenta, reproduction associated disorders, graft-versus-host disease, solid organ transplantation, hematopoietic stem cell transplantation, diabetes, connective tissue damage, cancer, pre-cancer, bone cancer, osteosarcoma, bone metastases, bone fracture, burn wound, articular cartilage defect, wound healing, deep wound, delayed wound-healing, delayed ulcer healing, subchondral-bone cyst, osteoporosis, osteoarthritis, degenerated bone, cartilage damage, articular cartilage defect, injured tendons, autoimmune disease, metabolic disorders, psoriasis, neuropathic pain, peripheral nerve injury, support of kidney transplantation and inflammatory disease.

According to some ~~embodiments~~examples of the ~~invention~~disclosure, the condition is selected from the group consisting of inflammatory bowel disease (IBD) and Crohn's disease.

Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of embodiments of the invention, exemplary methods and/or materials are described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

## BRIEF DESCRIPTION OF THE DRAWINGS

Some embodiments of the invention are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments of the invention. In this regard, the