CLAIMS

1. Use of stem cells or progenitor cells wherein the expression and/or activity of a member of the glypican family is reduced or abolished, for the manufacture of a medicament intended for the treatment by stem cell-based therapy of a pathological condition selected from the group consisting of a degenerative disease, a cardiac disorder, a metabolic disease and an injury.

2. The use according to claim 1, wherein the stem cells or progenitor cells are not directly derived from a human embryo.

3. The use according to claim 1 or 2, wherein the formation of teratomas is prevented.

4. The use according to any one of claims 1 to 3, wherein the member of the glypican family is Glypican 4.

5. An *in vitro* method for producing stem cells or progenitor cells displaying an early differentiation when exposed to environmental conditions triggering cell differentiation, comprising reducing or abolishing the expression and/or activity of a member of the glypican family in stem cells or progenitor cells;
thereby yielding stem cells or progenitor cells displaying an early differentiation when exposed to environmental conditions triggering cell differentiation.

6. The method according to claim 5, wherein the stem cells or progenitor cells are not directly derived from a human embryo.

7. An *in vitro* method for producing induced pluripotent stem cells (iPS cells) from somatic cells, comprising transiently increasing or inducing then transiently decreasing or reducing the expression and/or activity of a member of the glypican family in the somatic cells, thereby yielding induced pluripotent stem cells.

8. Stem cells, progenitor cells or iPS cells obtainable by an *in vitro* method as defined in any one of claims 5 to 7.

9. Use of stem cells or progenitor cells obtainable by an *in vitro* method as defined in any one of claims 5 to 6 for the manufacture of a medicament intended for the treatment by stem cell-based therapy of a pathological condition selected from the group consisting of a degenerative disease, a cardiac disorder, a metabolic disease and an injury.

10. An *in vitro* method for producing differentiated cells from stem cells or progenitor cells comprising the steps consisting in:

a) producing stem cells or progenitor cells displaying an early differentiation when exposed to environmental conditions triggering cell differentiation by the method defined in any one of claims 5 to 6; and

b) exposing the stem cells or progenitor cells produced in step a) to environmental conditions triggering cell differentiation;

whereby differentiated cells are produced.

11. Use of stem cells, progenitor cells or iPS cells produced by the *in vitro* method as defined in any one of claims 5 to 7 for toxicological screenings.

12. Use of a member of the glypican family for specifically purifying stem cells, progenitor cells, cancer stem cells or tissue specific stem cells from a sample.

13. An *in vitro* method for specifically purifying stem cells, progenitor cells, cancer stem cells or tissue specific stem cells from a sample, wherein the sample is contacted with a ligand of a member of the glypican family;

thereby purifying stem cells, progenitor cells, cancer stem cells or tissue specific stem cells which are present in the sample.

14. Use of a modulator of the activity of a member of the glypican family for the manufacture of a medicament intended for the treatment of cancer.

15. Use of an antagonist of the activity of a member of the glypican family for the manufacture of a medicament intended for inducing tissue regeneration after a degenerative disease, preferably for enhancing differentiation of tissue specific stem cells present in the tissue to be regenerated.

CLAIMS

1. Use of stem cells or progenitor cells wherein the expression and/or activity of Glypican 4 is reduced or abolished, for the manufacture of a medicament intended for the treatment by stem cell-based therapy of a pathological condition selected from the group consisting of a degenerative disease, a cardiac disorder, a metabolic disease and an injury.

2. The use according to claim 1, wherein the stem cells are not stem cells from a human embryo.

3. The use according to claim 1 or 2, wherein the formation of teratomas is prevented.

4. An *in vitro* method for producing stem cells or progenitor cells reaching their next step of differentiation, when exposed to environmental conditions triggering cell differentiation, 1 to 5 days earlier than non-pretreated cells when exposed to similar environmental conditions triggering cell differentiation,
said method comprising reducing or abolishing the expression and/or activity of Glypican 4 in stem cells or progenitor cells;
thereby yielding stem cells or progenitor cells reaching their next of differentiation, when exposed to environmental conditions triggering cell differentiation, 1 to 5 days earlier than non-pretreated cells when exposed to similar environmental conditions triggering cell differentiation.

5. The method according to claim 4, wherein the stem cells are not stem cells from a human embryo.

6. Stem cells or progenitor cells obtainable by an *in vitro* method as defined in any one of claims 4 to 5.

7. Use of stem cells or progenitor cells obtainable by an *in vitro* method as defined in any one of claims 4 to 5 for the manufacture of a medicament intended for the treatment by stem cell-based therapy of a pathological condition selected from the group consisting of a degenerative disease, a cardiac disorder, a metabolic disease and an injury.

8. An *in vitro* method for producing differentiated cells from stem cells or progenitor cells comprising the steps consisting in:

a) producing, by the method defined in any of claims 4 to 5, stem cells or progenitor cells reaching their next of differentiation, when exposed to environmental conditions triggering cell differentiation, 1 to 5 days earlier than non-pretreated cells when exposed to similar environment conditions triggering cell differentiation; and

b) exposing the stem cells or progenitor cells produced in step a) to environmental conditions triggering cell differentiation;

whereby differentiated cells are produced.

9. Use of stem cells or progenitor cells produced by the *in vitro* method as defined in any one of claims 4 to 5 for toxicological screenings.

10. Use of Glypican 4 for specifically purifying stem cells, progenitor cells, cancer stem cells or tissue specific stem cells from a sample.

11. An *in vitro* method for specifically purifying stem cells, progenitor cells, cancer stem cells or tissue specific stem cells from a sample, wherein the sample is contacted with a ligand of Glypican 4;

thereby purifying stem cells, progenitor cells, cancer stem cells or tissue specific stem cells which are present in the sample.

12. Use of a modulator of the activity of Glypican 4 for the manufacture of a medicament intended for the treatment of cancer.

13. Use of an antagonist of the activity of Glypican 4 for the manufacture of a medicament intended for inducing tissue regeneration after a degenerative disease.

14. The use according to claim 13, for enhancing differentiation of tissue specific stem cells present in the tissue to be regenerated.