Claims

1. A method of isolating a cardiomyocyte population from a heterogeneous population of differentiated stem cells, comprising contacting the heterogeneous cell population with at least one agent that specifically binds to CD166 (ALCAM) and isolating cells bound to the said agent as cardiomyocytes.

2. The method according to claim 1, further comprising a step of propagating the selected cardiomyocyte population in culture.

3. The method according to claim 1, further comprising contacting the heterogeneous cell population with at least one agent that binds specifically to at least one cardiomyocyte marker selected from a group consisting of VEGF receptor Flk1, N-cadherin, CD133 and CD117 (C-kit).

4. The method according to claim 1, wherein at least 50% of the isolated cells comprise cardiomyocytes.

5. The method according to claim 1, wherein the isolated cardiomyocytes have a fetal phenotype.

6. The method according to claim 1, wherein the isolated cardiomyocytes are capable of proliferating in culture.

7. The method according to claim 1, wherein the isolated cardiomyocytes are capable of rhythmic contractions and/or forming electrically coupled cell clusters.

8. The method according to claim 1, wherein the cardiomyocyte population is differentiated from stem cells selected from the group consisting of embryonic stem (ES) cells, pluripotent stem cells, hematopoietic stem cells, totipotent stem cells, mesenchymal stem cells, neural stem cells and adult stem cells.

9. The method according to claim 11, wherein the stem cells are human ES cells.

10. A model for study of human cardiomyocytes in culture, comprising cardiomyocytes isolated according to the method of claim 1.

11. A kit for cardiotoxic testing comprising cardiomyocytes isolated according to the method of claim 1.

12. Use of a cardiomyocyte population isolated according to the method of claim 1 in the preparation of a medicament for prevention, repair and/or treatment of at least one cardiac disorder in a subject.

13. A model for testing suitability of cardiomyocytes for cardiac transplantation, said model comprising:

A non-human animal having a measurable parameter of cardiac function wherein the said animal is capable of receiving a cardiomyocyte population isolated according to the method of claim 1 by transplantation; and

a means to determine cardiac function of the animal before and after transplantation of the isolated cardiomyocyte population.

14. A method of screening for cardiovascular compounds, the said method comprising subjecting a cardiomyocyte population isolated according to the method of claim 1 to test at least one compound, and observing and/or interpreting a cardiac specific response of the cardiomyocytes to the at least one test compound, wherein the cardiac response comprises alteration of the Q-T wave.

15. The use according to claim 12, wherein the prevention, repair, and/or treatment comprises transplanting the cardiomyocyte population in the subject.

Claims

1. A method of isolating a cardiomyocyte population from a heterogeneous population of differentiated human stem cells, comprising contacting the heterogeneous cell population with at least one agent that specifically binds to CD166 (ALCAM) and isolating cells bound to the said agent as cardiomyocytes.

2. The method according to claim 1, further comprising a step of propagating the selected cardiomyocyte population in culture.

3. The method according to claim 1, further comprising contacting the heterogeneous cell population with at least one agent that binds specifically to at least one cardiomyocyte marker selected from a group consisting of, VEGF receptor Flk1, N-cadherin, CD133 and CD117 (C-kit).

4. The method according to claim 1, wherein at least 50% of the isolated cells comprise cardiomyocytes.

5. The method according to claim 1, wherein the isolated cardiomyocytes have a fetal phenotype.

6. The method according to claim 1, wherein the isolated cardiomyocytes are capable of proliferating in culture.

7. The method according to claim 1, wherein the isolated cardiomyocytes are capable of rhythmic contractions and/or forming electrically coupled cell clusters.

8. The method according to claim 1, wherein the cardiomyocyte population is differentiated from human stem cells selected from the group consisting of embryonic stem (ES) cells, pluripotent stem cells, hematopoietic stem cells, totipotent stem cells, mesenchymal stem cells, neural stem cells and adult stem cells.

9. The method according to claim 8, wherein the stem cells are human ES cells.

10. A model for study of human cardiomyocytes in culture, comprising cardiomyocytes isolated according to the method of claim 1.

11. A kit for cardiotoxic testing comprising cardiomyocytes isolated according to the method of claim 1.

12. A model for testing suitability of cardiomyocytes for cardiac transplantation, said model comprising:

A non-human animal having a measurable parameter of cardiac function wherein the said animal is capable of receiving a cardiomyocyte population isolated according to the method of claim 1 by transplantation; and

a means to determine cardiac function of the animal before and after transplantation of the isolated cardiomyocyte population.

13. A method of screening for cardiovascular compounds, the said method comprising subjecting a cardiomyocyte population isolated according to the method of claim 1 to test at least one compound, and observing and/or interpreting a cardiac specific response of the cardiomyocytes to the at least one test compound, wherein the cardiac response comprises alteration of the Q-T wave.