WHAT IS CLAIMED IS:

1. An isolated hypoimmunogenic cardiac cell comprising one or more genetic modifications, wherein the isolated hypoimmunogenic cardiac cell:

(i) has reduced expression of β-2 microglobulin (B2M) and/or reduced expression of class II transactivator (CIITA) compared to a wild-type cell,

(ii) has increased expression of CD47 compared to the wild-type cell,

(iii) comprises a safety switch,

(iv) is differentiated from an induced pluripotent stem cell (iPSC),

(v) is suitable for therapeutic administration to a recipient once every 28 days or longer, and

(vi) is suitable for administration into cardiac muscle of the recipient.

2. The isolated hypoimmunogenic cardiac cell of claim 1, wherein the iPSC is a human iPSC, the B2M is a human B2M, the CIITA is a human CIITA, and the increased expression of CD47 results from introducing at least one copy of a CD47 transgene under the control of a promoter into the iPSC.

3. The isolated hypoimmunogenic cardiac cell of claim 1, wherein the iPSC is a mouse iPSC, the B2M is a mouse B2M, the CIITA is a mouse CIITA, and the increased expression of CD47 results from introducing at least one copy of a mouse CD47 transgene under the control of a promoter.

4. The isolated hypoimmunogenic cardiac cell of any one of claims 1 to 3, wherein the reduced expression of B2M results from a Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)/Cas9 mediated disruption of both alleles of the B2M gene.

5. The isolated hypoimmunogenic cardiac cell of any one of claims 1 to 4, wherein the reduced expression of CIITA results from a CRISPR/Cas9 mediated disruption of both alleles of the CIITA gene.

6. The isolated hypoimmunogenic cardiac cell of any one of claims 1 to 5, wherein the safety switch is a suicide gene.

7. The isolated hypoimmunogenic cardiac cell of claim 6, wherein the suicide gene is activated by a trigger agent that induces the isolated hypoimmunogenic cardiac cell to die.

8. The isolated hypoimmunogenic cardiac cell of claim 7, wherein the suicide gene is a herpes simplex virus thymidine kinase (HSV-tk) gene and the trigger agent is ganciclovir.

9. The isolated hypoimmunogenic cardiac cell of claim 8, wherein the HSV-tk gene encodes a protein comprising at least 90% sequence identity to SEQ ID NO:4.

10. The isolated hypoimmunogenic cardiac cell of claim 7, wherein the suicide gene is an *Escherichia coli* cytosine deaminase (CD) gene and the trigger agent is 5-fluorocytosine (5-FC).

11. The isolated hypoimmunogenic cardiac cell of claim 10, wherein the CD gene encodes a protein comprising at least 90% sequence identity to SEQ ID NO:5.

12. The isolated hypoimmunogenic cardiac cell of claim 7, wherein the suicide gene encodes an inducible caspase 9 protein and the trigger agent is a chemical inducer of dimerization (CID).

13. The isolated hypoimmunogenic cardiac cell of claim 12, wherein the inducible caspase 9 protein comprises at least 90% sequence identity to SEQ ID NO:6.

14. The isolated hypoimmunogenic cardiac cell of claim 12 or 13, wherein the CID is compound AP1903.

15. The isolated hypoimmunogenic cardiac cell of any one of claims 1 to 14, wherein the isolated hypoimmunogenic cardiac cell is selected from the group consisting of a cardiomyocyte, a nodal cardiomyocyte, a conducting cardiomyocyte, a working cardiomyocyte, a cardiomyocyte precursor, a cardiomyocyte progenitor cell, a cardiac stem cell, and a cardiac muscle cell.

16. A composition comprising a therapeutically effective amount of a population of the isolated hypoimmunogenic cardiac cells of any one of claims 1 to 15, for use in a method of treating a heart condition or heart disease in the recipient.

17. The composition of claim 16, wherein the composition further comprises a therapeutically effective carrier.

18. The composition of claim 16 or 17, wherein the composition is suitable for administration via intravenous injection, intraarterial injection, intracoronary injection, intramuscular injection, intraperitoneal injection, intramyocardial injection, trans-endocardial injection, trans-epicardial injection, or infusion.

19. The composition of any one of claims 16 to 18, wherein the heart condition or heart disease is selected from the group consisting of pediatric cardiomyopathy, age-related cardiomyopathy, dilated cardiomyopathy, hypertrophic cardiomyopathy, restrictive cardiomyopathy, chronic ischemic cardiomyopathy, peripartum cardiomyopathy, inflammatory cardiomyopathy, other cardiomyopathy, myocarditis, myocardial ischemic reperfusion injury, ventricular dysfunction, heart failure, congestive heart failure, coronary artery disease, end stage heart disease, atherosclerosis, ischemia, hypertension, restenosis, angina pectoris, rheumatic heart, arterial inflammation, and cardiovascular disease.

20. A method of producing a population of isolated hypoimmunogenic cardiac cells from a population of pluripotent cells by *in vitro* differentiation, the method comprising:

(a) culturing the population of pluripotent cells in a culture medium comprising a GSK inhibitor;

(b) after step (a), culturing the population of pluripotent cells in a culture medium comprising a WNT antagonist to produce a population of pre-cardiac cells; and

(c) culturing the population of pre-cardiac cells in a culture medium comprising insulin to produce the population of isolated hypoimmunogenic cardiac cells,

wherein the population of isolated hypoimmunogenic cardiac cells:

(i) have reduced expression of β-2 microglobulin (B2M) and/or reduced expression of class II transactivator (CIITA) compared to a wild-type cell,

(ii) have increased expression of CD47 compared to the wild-type cell,

(iii) comprise a safety switch,

(iv) are suitable for therapeutic administration to a recipient once every 28 days or longer, and

(v) are suitable for administration into cardiac muscle of the recipient.

21. The method of claim 20, wherein the GSK inhibitor is CHIR-99021.

22. The method of claim 20 or 21, wherein the GSK inhibitor is at a concentration ranging from 2 μM to 10 μM.

23. The method of any one of claims 20 to 22, wherein the WNT antagonist is IWRl.

24. The method of any one of claims 20 to 23, wherein the WNT antagonist is at a concentration ranging from 2 μM to 10 μM.

25. The method of any one of claims 20 to 24, further comprising culturing the population of pre-cardiac cells of step (c) in a culture medium absent of glucose.

26. The method of any one of claims 20 to 25, wherein the safety switch is a suicide gene and the method further comprises culturing the population of pre-cardiac cells of step (b) in a culture medium comprising a trigger agent that activates the suicide gene, and

wherein the trigger agent is ganciclovir if the suicide gene is a herpes simplex virus thymidine kinase (HSV-tk) gene, the trigger agent is 5-fluorocytosine (5-FC) if the suicide gene is an *Escherichia coli* cytosine deaminase (CD) gene, or the trigger agent is a chemical inducer of dimerization (CID) if the suicide gene encodes an inducible caspase 9 protein.

27. The method of any one of claims 20 to 26, wherein the safety switch is a suicide gene and the method further comprises culturing the population of isolated hypoimmunogenic cardiac

cells of step (c) in a culture medium comprising a trigger agent that activates the suicide gene, and

wherein the trigger agent is ganciclovir if the suicide gene is a herpes simplex virus thymidine kinase (HSV-tk) gene, the trigger agent is 5-fluorocytosine (5-FC) if the suicide gene is an *Escherichia coli* cytosine deaminase (CD) gene, or the trigger agent is a chemical inducer of dimerization (CID) if the suicide gene encodes an inducible caspase 9 protein.

28. The method of any one of claims 20 to 27, wherein step (c) further comprises isolating hypoimmunogenic cardiac cells from non-cardiac cells to obtain the population of isolated hypoimmunogenic cardiac cells.

29. The method of any one of claims 20-28, wherein the method further comprises cryopreserving the population of isolated hypoimmunogenic cardiac cells.