CLAIMS

1. A pharmaceutical composition for the treatment of heart disease comprising a nucleic acid that encodes a miRNA having a cardiomyocyte proliferation promoting action.

2. The pharmaceutical composition as recited in claim 1, wherein the miRNA is a substance selected from the group consisting of a mature miRNA, a precursor of said miRNA, as well as variants and analogs thereof.

3. The pharmaceutical composition as recited in claim 1 or 2, wherein the miRNA is a substance comprising a seed sequence depicted by SEQ ID NO: 1 or SEQ ID NO: 2.

4. The pharmaceutical composition as recited in claim 3, wherein the substance comprising the seed sequence depicted by SEQ ID NO: 1 is a substance selected from the group consisting of miR-148a (SEQ ID NO: 3), miR-148b (SEQ ID NO: 5), miR-152 (SEQ ID NO: 7), precursors thereof, as well as variants and analogs thereof.

5. The pharmaceutical composition as recited in claim 3, wherein the substance comprising the seed sequence depicted by SEQ ID NO: 2 is a substance selected from the group consisting of miR-373 (SEQ ID NO: 9), precursors thereof, as well as variants and analogs thereof.

6. The pharmaceutical composition as recited in any one of claims 1 to 5, wherein the nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action is contained as an expression vector for introduction and expression in cardiomyocytes.

7. The pharmaceutical composition as recited in claim 6, wherein the vector is a viral vector.

8. The pharmaceutical composition as recited in any one of claims 1 to 7, wherein the miRNA is a miRNA derivative comprising at least one modified internucleoside linkage, at least one modified sugar moiety, at least one modified base, or any combinations thereof.

9. The pharmaceutical composition as recited in any one of claims 1 to 8, wherein the heart disease is myocardial infarction, ischemic cardiac disease, congestive heart failure, hypertrophic cardiomyopathy, dilated cardiomyopathy, myocarditis, or chronic heart failure.

10. A method for the treatment of heart disease wherein a nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action is introduced into a damaged site in the heart of an individual to thereby proliferate cardiomyocytes at said site.

11. Use of a nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action for the manufacture of pharmaceutical compositions for the treatment of heart disease.

12. A nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action for use in the treatment of heart disease.

13. A method for proliferating cardiomyocytes wherein a nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action is introduced and expressed in cardiomyocytes.

14. The method as recited in claim 13, wherein the miRNA is a substance selected from the group consisting of a mature miRNA, a precursor of said miRNA, as well as variants and analogs thereof.

15. The method as recited in claim 13 or 14, wherein the miRNA is a substance comprising a seed sequence depicted by SEQ ID NO: 1 or SEQ ID NO: 2.

16. The method as recited in claim 15, wherein the substance comprising the seed sequence depicted by SEQ ID NO: 1 is a substance selected from the group consisting of miR-148a (SEQ ID NO: 3), miR-148b (SEQ ID NO: 5), miR-152 (SEQ ID NO: 7), precursors thereof, as well as variants and analogs thereof.

17. The method as recited in claim 15, wherein the substance comprising the seed sequence depicted by SEQ ID NO: 2 is a substance selected from the group consisting of miR-373 (SEQ ID NO: 9), precursors thereof, as well as variants and analogs thereof.

18. The method d as recited in any one of claim 13 to 17, wherein the nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action is introduced into cardiomyocytes using an expression vector.

19. The method as recited in claim 18, wherein the vector is a viral vector.

20. The method as recited in any one of claims 13 to 19, wherein the miRNA is a miRNA derivative comprising at least one modified internucleoside linkage, at least one modified sugar moiety, at least one modified base, or any combinations thereof.

CLAIMS

1. A pharmaceutical composition when used for the treatment of heart disease comprising a nucleic acid that encodes a miRNA, wherein the miRNA is a substance comprising a seed sequence depicted by SEQ ID NO: 2, wherein the miRNA has a cardiomyocyte proliferation promoting action.

2. The pharmaceutical composition when used in accordance with claim 1, wherein the substance comprising the seed sequence depicted by SEQ ID NO: 2 is a substance selected from the group consisting of miR-373 (SEQ ID NO: 9), precursors thereof, as well as variants and analogs thereof.

3. The pharmaceutical composition when used in accordance with claim 1 or claim 2, wherein the nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action is contained in an expression vector for introduction and expression in cardiomyocytes.

4. The pharmaceutical composition when used in accordance with claim 3, wherein the vector is a viral vector.

5. The pharmaceutical composition when used in accordance with any one of claims 1 to 4, wherein the miRNA is a miRNA derivative comprising at least one modified internucleoside linkage, at least one modified sugar moiety, at least one modified base, or any combinations thereof.

6. The pharmaceutical composition when used in accordance with any one of claims 1 to 5, wherein the heart disease is myocardial infarction, ischemic cardiac disease, congestive cardiac failure, hypertrophic cardiomyopathy, dilated cardiomyopathy, myocarditis, or chronic cardiac failure.

7. A method for proliferating cardiomyocytes wherein a nucleic acid that encodes a miRNA is introduced and expressed in cardiomyocytes, wherein the miRNA is a substance comprising a seed sequence depicted by SEQ ID NO: 2, wherein the miRNA has a cardiomyocyte proliferation promoting action.

8. The method according to claim 7, wherein the substance comprising the seed sequence depicted by SEQ ID NO: 2 is a substance selected from the group consisting of miR-373 (SEQ ID NO: 9), precursors thereof, as well as variants and analogs thereof.

9. The method according to claim 7 or claim 8, wherein the nucleic acid that encodes the miRNA having a cardiomyocyte proliferation promoting action is introduced into cardiomyocytes using an expression vector.

10. The method according to claim 9, wherein the vector is a viral vector.

11. The method according to any one of claims 7 to 10, wherein the miRNA is a miRNA derivative comprising at least one modified internucleoside linkage, at least one modified sugar moiety, at least one modified base, or any combinations thereof.