Claims

1. A method for evaluating induced pluripotent stem cells, comprising the following steps (1) to (3):
(1) a step of providing cultured induced pluripotent stem cells,
(2) a step of measuring a spontaneous frequency of an organelle having an abnormal nucleic acid structure in the provided induced pluripotent stem cells, and
(3) a step of identifying induced pluripotent stem cells having the spontaneous frequency of not more than a reference value, and induced pluripotent stem cells having the spontaneous frequency exceeding the reference value.

2. The evaluation method according to claim 1, wherein the organelle having the abnormal nucleic acid structure is micronucleus.

3. The evaluation method according to claim 1 or 2, wherein the reference value is a statistical value of the spontaneous frequency in embryonic stem cells.

4. The evaluation method according to claim 3, wherein the embryonic stem cells are human embryonic stem cells.

5. The evaluation method according to claim 1 or 2, wherein the reference value of the spontaneous frequency is a statistical value of the spontaneous frequency in induced pluripotent stem cells to be the reference.

6. The evaluation method according to claim 2, wherein the reference value of the spontaneous frequency is 2%.

7. The evaluation method according to any one of claims 1 to 6, wherein the induced pluripotent stem cells are human induced pluripotent stem cells.

8. A method for selecting induced pluripotent stem cells, comprising the following steps (1) to (4):
(1) a step of providing cultured induced pluripotent stem cells,
(2) a step of measuring a spontaneous frequency of an organelle having an abnormal nucleic acid structure in the provided induced pluripotent stem cells,
(3) a step of identifying induced pluripotent stem cells having the spontaneous frequency of not more than a reference value, and induced pluripotent stem cells having the spontaneous frequency exceeding the reference value, and
(4) a step of selecting induced pluripotent stem cells having the spontaneous frequency of not more than a reference value.

9. The selection method according to claim 8, wherein the organelle having the abnormal nucleic acid structure is micronucleus.

10. The selection method according to claim 8 or 9, wherein the reference value of the spontaneous frequency is a statistical value of the spontaneous frequency in embryonic stem cells.

11. The selection method according to claim 10, wherein the embryonic stem cells are human embryonic stem cells.

12. The selection method according to claim 8 or 9, wherein the reference value of the spontaneous frequency is a statistical value of the spontaneous frequency in induced pluripotent stem cells to be the reference.

13. The selection method according to claim 9, wherein the reference value of the spontaneous frequency is 2%.

14. The selection method according to any one of claims 8 to 13, wherein the induced pluripotent stem cells are human induced pluripotent stem cells.

15. A method for producing induced pluripotent stem cells, comprising the following steps (1) to (4):
(1) a step of providing established and cultured induced pluripotent stem cells,
(2) a step of measuring a spontaneous frequency of an organelle having an abnormal nucleic acid structure in the provided induced pluripotent stem cells,
(3) a step of identifying induced pluripotent stem cells having the spontaneous frequency of not more than a reference value, and induced pluripotent stem cells having the spontaneous frequency exceeding the reference value, and
(4) a step of selecting induced pluripotent stem cells having the spontaneous frequency of not more than a reference value.

16. The production method according to claim 15 further comprising the following steps before the step (1):
(A) a step of establishing an induced pluripotent stem cell comprising introducing a reprogramming factor into a somatic cell, and
(B) a step of culturing the established induced pluripotent stem cell.

17. A method for producing differentiated cells derived from induced pluripotent stem cells, comprising the following steps (1) to (5):
(1) a step of providing established and cultured induced pluripotent stem cells,
(2) a step of measuring a spontaneous frequency of an organelle having an abnormal nucleic acid structure in the provided induced pluripotent stem cells,
(3) a step of identifying induced pluripotent stem cells

having the spontaneous frequency of not more than a reference value, and induced pluripotent stem cells having the spontaneous frequency exceeding the reference value, and
(4) a step of selecting induced pluripotent stem cells having the spontaneous frequency of not more than a reference value, and
(5) a step of inducing differentiation of the induced pluripotent stem cells selected in (4) to give differentiated cells.

18. The production method according to claim 17 further comprising the following steps before the step (1):
(A) a step of establishing an induced pluripotent stem cell comprising introducing a reprogramming factor into a somatic cell, and
(B) a step of culturing the established induced pluripotent stem cell.

19. The production method according to any one of claims 15 to 18, wherein the organelle having the abnormal nucleic acid structure is micronucleus.

20. The production method according to any one of claims 15 to 19, wherein the reference value of the spontaneous frequency is a statistical value of the spontaneous frequency in embryonic stem cells.

21. The production method according to claim 20, wherein the embryonic stem cells are human embryonic stem cells.

22. The production method according to any one of claims 15 to 19, wherein the reference value of the spontaneous frequency is a statistical value of the spontaneous frequency in induced pluripotent stem cells.

23. The production method according to claim 19, wherein the

reference value of the spontaneous frequency is 2%.

24. The production method according to any one of claims 15 to 23, wherein the induced pluripotent stem cells are human induced pluripotent stem cells.

25. A differentiated cell derived from an induced pluripotent stem cell having a spontaneous frequency of micronucleus of not more than 2%.

26. A method for evaluating induced pluripotent stem cells, comprising the following steps (1) to (3):
(1) a step of providing cultured induced pluripotent stem cells,
(2) a step of measuring a spontaneous frequency of an organelle having an abnormal nucleic acid structure in the provided induced pluripotent stem cells, and
(3) a step of evaluating that induced pluripotent stem cells having the spontaneous frequency of not more than a reference value are induced pluripotent stem cells having a higher differentiation efficiency than induced pluripotent stem cells having the spontaneous frequency exceeding the reference value.