Claims

1. A method of producing an iPS cell, comprising a step of introducing the following (1) and (2) into a somatic cell:
(1) one or more episomal vectors containing a nucleic acid encoding one or more~~a~~ nuclear reprogramming factor selected from Oct family, Klf family, Sox family, Myc family, Lin28 family and Glis family; and
(2) an plasmid~~episomal~~ vector containing a nucleic acid encoding EBNA-1, wherein the plasmid vector is different from (1) and wherein the plasmid vector is devoid of a nucleic acid encoding a nuclear reprogramming factor from Oct family, a nucleic acid encoding a nuclear reprogramming factor from Klf family, a nucleic acid encoding a nuclear reprogramming factor from Sox family, a nucleic acid encoding a nuclear reprogramming factor from Myc family and a nucleic acid encoding a nuclear reprogramming factor from Lin28 family.~~which is different from (1) into a somatic cell.~~

2. The method according to claim 1, further comprising introducing a nucleic acid, encoding an inhibitor of p53 function, in the form of an episomal vector.

3. The method according to claim 2, wherein the inhibitor of p53 function is p53 shRNA or a dominant negative mutant of p53.

4. The method according to claim 3, wherein the dominant negative mutant of p53 is p53DD.

5. The method according to any one of claims 1 to 4, wherein the episomal vectors containing the nucleic acid encoding one or more nuclear reprogramming factor contain a nucleic acid encoding EBNA-1~~is one or more selected from the group consisting of the members of Oct family, Klf family, Sox family, Myc family, Lin family and Glis family~~.

6. The method according to any one of claims 1 to 5, wherein the nuclear

reprogramming factors are Oct3/4, Klf4, Sox2, L-Myc and Lin28.

7. The method according to any one of claims 1 to 56, wherein the nuclear reprogramming factors are Oct3/4, Klf4, Sox2, L-Myc, Lin28 and Glis1.

8. The method according to any one of claims 1 to 7, wherein the nucleic acid encoding a nuclear reprogramming factor is divided and contained in 2 or 3 episomal vectors.

17. The method according to claim 16, wherein the blood cell is a peripheral blood mononuclear cell (PMNC).

18. The method according to claim 17, wherein the peripheral blood mononuclear cell (PMNC) is a T cell.

~~19. A method of improving iPS cell establishment efficiency, comprising a step of introducing, into a somatic cell, one or more episomal vectors containing a nucleic acid encoding a nuclear reprogramming factor, wherein a different episomal vector containing a nucleic acid encoding EBNA-1 is introduced into the somatic cell together with the vector.~~

~~20. The method according to claim 19, further comprising introducing a nucleic acid, encoding an inhibitor of p53 function, in the form of an episomal vector.~~

~~21. The method according to claim 20, wherein the inhibitor of p53 function is p53 shRNA or a dominant-negative mutant of p53.~~

~~22. The method according to claim 21, wherein the dominant-negative mutant of p53 is p53DD.~~

19~~23~~. An agent for improving iPS cell establishment efficiency, comprising ~~an episomal~~ plasmid vector containing a nucleic acid encoding EBNA-1, wherein the plasmid vector is devoid of a nucleic acid encoding a nuclear reprogramming factor from Oct family, a nucleic acid encoding a nuclear reprogramming factor from Klf family, a nucleic acid encoding a nuclear reprogramming factor from Sox family, a nucleic acid encoding a nuclear reprogramming factor from Myc family and a nucleic acid encoding a nuclear reprogramming factor from Lin28 family, and wherein the plasmid vector improves iPS cell establishment efficiency when used in combination with one or more episomal vectors containing a nucleic acid encoding one or more nuclear reprogramming factor selected from Oct family, Klf family, Sox family, Myc family, Lin28 family and Glis

family, as compared to when the episomal vectors are used alone.

20~~24~~. A kit for producing an iPS cell, comprising the following (1) and (2):
(1) one or more~~an~~ episomal vectors containing a nucleic acid encoding one or more~~a~~ nuclear reprogramming factor selected from Oct family, Klf family, Sox family, Myc family, Lin28 family and Glis family; and
(2) a~~n episomal~~plasmid vector containing a nucleic acid encoding EBNA-1, ~~which is different from (1)~~wherein the plasmid vector is different from (1) and wherein the plasmid vector is devoid of a nucleic acid encoding a nuclear reprogramming factor from Oct family, a nucleic acid encoding a nuclear reprogramming factor from Klf family, a nucleic acid encoding a nuclear reprogramming factor from Sox family, a nucleic acid encoding a nuclear reprogramming factor from Myc family and a nucleic acid encoding a nuclear reprogramming factor from Lin28 family.

21~~25~~. The kit according to claim 20~~24~~, further comprising a nucleic acid encoding an inhibitor of p53 function ~~A~~, in the form of an episomal vector.

22~~26~~. The kit according to claim 21~~25~~, wherein the inhibitor of p53 function is p53 shRNA or a dominant-negative mutant of p53.

23~~27~~. The kit according to claim 22~~26~~, wherein the dominant-negative mutant of p53 is p53DD.

24~~28~~. The kit according to claim 20~~24~~, wherein the episomal vectors containing the nucleic acid encoding a nuclear reprogramming factor are pCEB-hSK-O and pCEB-hUL-G.

25~~29~~. The kit according to claim 20~~24~~, wherein the episomal vectors containing the nucleic acid encoding a nuclear reprogramming factor are pCXLE-hOCT3/4, pCXLE-hSK and pCXLE-hUL.

26~~30~~. The kit according to claim 21~~25~~, wherein the episomal vectors containing the nucleic acid encoding a nuclear reprogramming factor are pCXLE-hOCT3/4-shp53-F, pCXLE-hSK and pCXLE-hUL.

27~~31~~. The kit according to claim 21~~25~~, wherein the episomal vectors containing the nucleic acid encoding a nuclear reprogramming factor are pCE-hOCT3/4-shp53, pCE-hSK and pCE-hUL.

28~~32~~. The kit according to claim 21~~25~~, wherein the episomal plasmid vectors containing the nucleic acid encoding a nuclear reprogramming factor are pCE-hOCT3/4, pCE-hSK and pCE-hUL, and the episomal vector containing the nucleic acid encoding an inhibitor of p53 function is pCE-mp53DD.

29~~33~~. The kit according to any one of claims 24~~28~~ to 26~~30~~, wherein the plasmid vector containing the nucleic acid encoding EBNA-1 is pCXWB-EBNA1.

3034. The kit according to claim 2731 or 2832, wherein the plasmid vector containing the nucleic acid encoding EBNA-1 is pCXB-EBNA1.

3135. A method of producing a somatic cell, comprising producingsubjecting an iPS cell obtained by the method according to any one of claims 1 to 18, and subjecting the iPS cell to a differentiation treatment to allow for differentiation into a somatic cell.