Claims

1. Use of a closed linear DNA vector encoding one or more reprogramming factors for producing induced pluripotent stem cells.

2. A method of producing induced pluripotent stem cells (iPSCs) comprising introducing one or more closed linear vector(s) encoding one or more reprogramming factors into a population of somatic cells, and culturing said cells to effect expression of the one or more reprogramming factor(s).

3. The use of claim 1 or the method of claim 2 wherein two or more closed linear DNA vectors are provided, each encoding one or more different reprogramming factors.

4. The use or method of any preceding claim wherein said reprogramming factor is selected from any one or more of: Oct 3/4, Sox2, Sox1, Sox3, Sox15, Sox18, Klf1, Klf2, Klf4, Klf5, c-myc, L-myc, and N-myc, NANOG, and/or LIN28.

5. The use or method of any preceding claim wherein said closed linear DNA vector lacks EBNA1, or functional derivatives or variants of EBNA1 and/or OriP, or functional derivatives or variants of OriP.

6. The use or method of any preceding claim wherein said closed linear DNA vector lacks any sequence for the knockdown of p53.

7. The use or method of any preceding claim wherein said reprogramming factors are operably linked to one or more promoters, preferably operably linked to the same promoter on the closed linear DNA vector.

8. The use or method of any preceding claim wherein said closed linear DNA vector lacks one or more of:

(i) bacterial CpG motifs;

(ii) a bacterial origin of replication; and/or

(iii) antibiotic resistance genes.

9. The use or method of any preceding claim wherein the closed linear DNA vector is introduced into a somatic cell, optionally a mature somatic cell.

10. The use or method of any preceding claim wherein said closed linear DNA vector is introduced via transfection, optionally via nucleofection.

11. The use or method of claim 10 wherein the cell is cultured for around 30 days after transfection or nucleofection prior to reprogramming being complete, preferably 28 to 32 days.

12. A population of pluripotent stem cells induced with a closed linear DNA vector encoding at least one reprogramming factor.

13. A population of cells as claimed in claim 12 wherein said cell is induced with two or more closed linear DNA vectors are provided, each encoding one or more different reprogramming factors.

14. A population of cells as claimed in claim 13 wherein said closed DNA vector:

(i) encodes one or more reprogramming factors, selected from any one or more of: Oct 3/4, Sox2, Sox1, Sox3, Sox15, Sox18, Klf1, Klf2, Klf4, Klf5, c-myc, L-myc, and N-myc, NANOG, and/or LIN28;

(ii) lacks EBNA1, or functional derivatives or variants of EBNA1 and/or OriP, or functional derivatives or variants of OriP;

(iii) lacks any sequence for the knockdown of p53; and/or

(iv) lacks one or more of:

(a) bacterial CpG motifs;

(b) bacterial origin of replication; and/or

(c) antibiotic resistance genes.

15. A population of cells as claimed in claim 12 wherein said cells are prepared according to the use or method of any one of claims 1 to 10.

16. A population of cells as claimed in any one of claims 12 to 15 wherein said population of cells are therapeutic and/or GMP grade.

17. A population of cells as claimed in any one of claims 12 to 16 wherein said population of cells lack the closed linear DNA vector used to induce them.

18. A population of cells as claimed in any one of claims 12 to 17 which are closer in phenotype to embryonic stem cells than to pluripotent stem cells induced with OriP/EBNA1 vectors.

19. A population of cells as claimed in claim 18 wherein the phenotype may be selected from:

(i) markers for differentiation;

(ii) markers for pluripotency;

(iii) immune system gene expression;

(iv) cytokine signalling;

(v) interferon signalling; and/or

(vi) inflammatory response.

20. A population of cells as claimed in any one of claims 12 to 19, wherein said cells are stable and optionally resist or have delayed spontaneous differentiation during passaging.

21. The use, method or population of cells of any preceding claim wherein said cells are human.