Claims

1. A composition comprising IRF8, SPIB and TCF12, or IRF8, SPIB and TSC22D1, or IRF8, SPIB and IKZF2.

2. A construct or a vector encoding at least the two transcription factors SPIB and IRF8.

3. The construct or a vector according to claim 2, wherein the construct or vectors further code for one or more other transcription factors selected from the group consisting of: ARID5A, BCL11A, CBFA2T3, CREB3L2, ETS1, IKZF1, IKZF2, STAT1, TCF4, TCF12 and TSC22D1.

4. The construct or a vector according to any one of the previous claims 2 to 3, wherein the transcription factors individually are at least 90% identical to the sequences selected from the group consisting of: IRF8 (SEQ. ID. 1, SEQ. ID. 2), SPIB (SEQ. ID. 3, SEQ. ID. 4), ARID5A (SEQ. ID. 5, SEQ. ID. 6), BCL11A (SEQ. ID. 7, SEQ. ID. 8), CBFA2T3 (SEQ. ID. 9, SEQ. ID. 10), CREB3L2 (SEQ. ID. 11, SEQ. ID. 12), ETS1 (SEQ. ID. 13, SEQ. ID. 14), IKZF1 (SEQ. ID. 23, SEQ. ID. 24), IKZF2 (SEQ ID NO. 25, SEQ ID NO. 26), TCF4 (SEQ. ID. 41, SEQ. ID. 42), TCF12 (SEQ. ID. 43, SEQ. ID. 44), STAT1 (SEQ. ID. 45, SEQ. ID. 46) and TSC22D1 (SEQ. ID. 47, SEQ. ID. 48).

5. The construct or vector according to any one of the previous claims 2 to 4, wherein the construct or vector encodes a combination of transcription factors is selected from the following combinations:

    IRF8 and SPIB;
    IRF8, SPIB and ARID5A;
    IRF8, SPIB and BCL11A;
    IRF8, SPIB and CBFA2T3;
    IRF8, SPIB and CREB3L2;
    IRF8, SPIB and ETS1;
    IRF8, SPIB and IKZF1;
    IRF8. SPIB and IKZF2;
    IRF8, SPIB and STAT1;
    IRF8, SPIB and TCF4;
    IRF8, SPIB and TCF12;

IRF8, SPIB and TSC22D1, or mixtures thereof.

6. The construct or vector according to any one of claims 2-5, wherein the combination of transcription factors is the combination of IRF8, SPIB and TCF12.

7. The construct or vector according to any one of claims 2-5, wherein the combination of transcription factors is the combination of IRF8, SPIB and TSC22D1.

8. The construct or vector according to any one of claims 2-5, wherein the combination of transcription factors is the combination of IRF8, SPIB and IKZF2.

9. The construct or vector according to any one of claims 2-8, wherein the vector is a viral vector; in particular a retroviral, adenoviral, lentiviral, herpes viral, pox viral, paramyxoviral, rabdoviral, alphaviral, flaviral or adeno-associated viral vector.

10. The construct or vector according to any one of claims 2-9, wherein the vector or construct is synthetic mRNA, naked alphavirus RNA replicons or naked flavivirus RNA replicons.

11. Use of the construct or vector according to any one of claims 2-10, in the manufacture of a medicament for reprogramming a stem cell or a differentiated cell, or mixtures thereof, into a plasmacytoid dendritic cell in a subject, wherein the medicament is for treating cancer, autoimmune diseases, or infectious diseases.

12. The use according to claim 11, wherein the vector is a viral vector; in particular a retroviral, adenoviral, lentiviral, herpes viral, pox viral, paramyxoviral, rabdoviral, alphaviral, flaviviral or adeno-associated viral vector.

13. The use according to any one of claims 11-12, wherein the vectors is synthetic mRNA, naked alphaviral RNA replicons or naked flavivirus RNA replicons.

14. The use according to any one claims 11-13, wherein the stem cell or the differentiated cell, or mixtures thereof is selected from the group consisting of: pluripotent stem cell, multipotent stem cell, differentiated cell, tumor cell, cancer cell and mixtures thereof.

15. An *in vitro* method for reprogramming or inducing a cell into a plasmacytoid dendritic cell, comprising the following steps:

    transducing a cell selected from the group consisting of: a stem cell, a differentiated cell, and mixtures thereof,
    with one or more constructs or vectors according to any one of claims 1-10.

16. The method according to claim 15, wherein the one or more constructs or vectors further comprise one or more transcription factors selected from the group consisting of: ARID5A, BCL11A, CBFA2T3, CREB3L2, ETS1, IKZF1, IKZF2, STAT1, TCF4, TCF12 and TSC22D1.

17. The method according to any one of the claims 15-16, wherein the transcription factors individually are at least 90% identical to the sequences selected from the group consisting of: : IRF8 (SEQ. ID. 1, SEQ. ID. 2), SPIB (SEQ. ID. 3, SEQ. ID. 4), ARID5A (SEQ. ID. 5, SEQ. ID. 6), BCL11A (SEQ. ID. 7, SEQ. ID. 8), CBFA2T3 (SEQ. ID. 9, SEQ. ID. 10), CREB3L2 (SEQ. ID. 11, SEQ. ID. 12), ETS1 (SEQ. ID. 13, SEQ. ID. 14), IKZF1 (SEQ. ID. 23, SEQ. ID. 24), IKZF2 (SEQ ID. 25, SEQ ID. 26), TCF4 (SEQ. ID. 41, SEQ. ID. 42), TCF12 (SEQ. ID. 43, SEQ. ID. 44), STAT1 (SEQ. ID. 45, SEQ. ID. 46) and TSC22D1 (SEQ. ID. 47, SEQ. ID. 48).

18. The method according to any one of the claims 15-17, wherein the one or more constructs or vectors encode a combination of transcription factors selected from the following combinations:

    IRF8 and SPIB;
    IRF8, SPIB and ARID5A;
    IRF8, SPIB and BCL11A;
    IRF8, SPIB and CBFA2T3;
    IRF8, SPIB and CREB3L2;
    IRF8, SPIB and ETS1;
    IRF8, SPIB and IKZF1;
    IRF8, SPIB and IKZF2;
    IRF8, SPIB and STAT1;
    IRF8, SPIB and TCF4;
    IRF8, SPIB and TCF12;

IRF8, SPIB and TSC22D1, or mixtures thereof.

19. The method according to any one of the claims 15-18 culturing the transduced cells during at least 2 days, preferably at least 5 days, more preferably at least 8 days, even more preferably at least 9 days.

20. The method according to any one of the claims 15-19, wherein the transducing step further comprises at least one vector selected from the group consisting of: a nucleic acid sequence encoding IL-12; nucleic acid sequence encoding IL-4; a nucleic acid sequence encoding IFN-α; a nucleic acid sequence encoding IFN-β; a nucleic acid sequence encoding IFN-γ; a nucleic acid sequence encoding TNF; nucleic acid sequence encoding GM-CSF; nucleic acid sequence encoding siRNAs targeting IL-10 RNA , and mixtures thereof, preferably comprising nucleic acids encoding immunostimulatory cytokines.

21. The method according to any one of the claims 15-20, wherein the cell is a mammalian cell, a human cell, a non-human cell or a mouse cell selected from the group consisting of: of pluripotent stem cell, or multipotent stem cell, differentiated cell, wherein the pluripotent stem cell, multipotent stem cell, or differentiated cell, is selected from the group consisting of: an endoderm derived cell, a mesoderm derived cell, or an ectoderm derived cell, a multipotent stem cell including mesenchymal stem cell, a hematopoietic stem cell, an intestinal stem cell, a pluripotent stem cell and a cell line; in particular a mesoderm-derived cell preferably a monocyte and mixtures thereof.