Claims

1. A construct or a vector encoding a combination of at least three transcription factors, wherein the combination of encoded transcription factors is selected from the group consisting of :
PU.1, IRF4 and PRDM1;
PU.1, IRF4 and POU2F2;
PU.1, IRF4 and TGIF1; and
PU.1, IRF4 and RBPJ.
and wherein the transcription factors are at least 90% identical to a sequence of: (PU.1) SEQ. ID. 3 or SEQ. ID. 6, (IRF4) SEQ. ID. 9 or SEQ. ID. 12, (PRDM1) SEQ. ID. 15, SEQ. ID. 18, (POU2F2) SEQ. ID. 27, SEQ. ID. 30, (TGIF1) SEQ. ID. 33, SEQ. ID. 36 and (RBPJ) SEQ. ID. 45, SEQ. ID. 48.

2. The construct or vector according to claim 1, wherein the combination of encoded transcription factors is in the following sequential order from 5’ to 3’:
PU.1, IRF4 and PRDM1.

3. The construct or vector according to any one of claims 1 to 2, 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.

4. The construct or vector according to any one of claims 1 to 2, wherein the vector or construct is synthetic mRNA, naked alphavirus RNA replicons or naked flavivirus RNA replicons.

5. A composition comprising one or more vectors according to any one of the preceding claims.

6. The composition according to claim 5, wherein the transcription factors individually are encoded by polynucleotides being at least 90% identical to the following sequences: PU.1 (SEQ. ID. 1, SEQ. ID. 2, SEQ. ID. 4, SEQ. ID. 5), IRF4 (SEQ. ID. 7, SEQ. ID. 8, SEQ. ID. 10, SEQ. ID. 11), PRDM1 (SEQ. ID. 13, SEQ. ID. 14, SEQ. ID. 16, SEQ. ID. 17), POU2F2 (SEQ. ID. 25, SEQ. ID. 26, SEQ. ID. 28, SEQ. ID. 29), TGIF1 (SEQ. ID.

31, SEQ. ID.32, SEQ. ID. 34, SEQ. ID. 35) and RBPJ (SEQ. ID. 43, SEQ. ID. 44, SEQ. ID. 46, SEQ. ID. 47).

7. The composition according to any one of claims 5 to 6, wherein the combination of encoded transcription factors is selected from the following combinations:
PU.1, IRF4 and PRDM1;
PU.1, IRF4 and POU2F2;
PU.1, IRF4 and TGIF1; and
PU.1, IRF4 and RBPJ.

8. The composition according to any one of claims 5 to 6, wherein the combination of encoded transcription factors is PU.1, IRF4 and PRDM1.

9. The composition according to any one of claims 5 to 8, wherein the one or more vectors are viral vectors; in particular retroviral, adenoviral, lentiviral, herpes viral, pox viral, paramyxoviral, rabdoviral, alphaviral, flaviviral or adeno-associated viral vectors.

10. The composition according to any one of claims 5 to 9, wherein the one or more vectors or constructs are synthetic mRNA, naked alphavirus RNA replicons or naked flavivirus RNA replicons.

11. The composition according to any one of claims 5 to 10, wherein the cell is selected from the group consisting of: pluripotent stem cell, multipotent stem cell, differentiated cell, tumor cell, cancer cell and mixtures thereof.

12. Use of the composition according to any one of claims 5 to 11, in the manufacture of a medicament for veterinary or human medicine.

13. Use of the composition according to any one of claims 5 to 11, in the manufacture of a medicament for the treatment of cancer, infectious diseases or autoimmune diseases.

14. An *in vitro* or *ex vivo* method for reprogramming or inducing a stem cell or a differentiated cell into a conventional dendritic cell type 2, comprising the following steps: transducing a cell selected from the group consisting of: a stem cell or a differentiated cell, and mixtures thereof,

with one or more vectors encoding at least three transcription factors the first and second being PU.1 and IRF4 and the third being selected from the group consisting of PRDM1, POU2F2, TGIF1and RBPJ;
culturing the transduced cell in a cell media that supports growth of dendritic cells or antigen-presenting cells.

15. The method according to claim 14, comprising 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, more preferable at least 10 days.

16. The method according to any one of claims 14 to 15, wherein the cell is selected from the group consisting of: mammalian cell, a non-human cell or a human cell, a mouse cell, a human or mouse fibroblast, a mammalian umbilical cord blood stem cell, a pluripotent stem cell or multipotent stem cell, differentiated cell, and mixtures thereof, 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.

17. The method according to any one of claims 14 to 16, wherein the transduction 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.

18. An induced dendritic cell comprising the construct or vector according to any one of claims 1 to 4, or the composition according to claims 5 to 11.

19. A composition comprising the induced dendritic cell according to claim 18, or mixtures thereof, in a therapeutically effective amount and further comprising a pharmaceutically acceptable excipient, preferably an anti-viral, an analgesic, an anti-

inflammatory agent, a chemotherapy agent, a radiotherapy agent, an antibiotic, a diuretic, a filler, a binder, a disintegrant, or a lubricant or mixtures thereof.

20. Use of the composition according to claim 19, in the manufacture of a medicament for veterinary or human medicine.

21. Use of the composition according to claim 19, in the manufacture of a medicament for the treatment of cancer, infectious diseases or autoimmune diseases.

22. A vaccine or an injectable formulation, in particular an *in-situ* injection, for cancer, comprising the composition according to any one of claims 19 to 21, or the induced dendritic cell according to claim 18, or mixtures thereof.

23. A kit comprising at least one of the following components:

the induced dendritic cell according to claim 18;

the composition according to claim 19;

the vector or a construct according to any one of claims 1 to 0;

the composition according to any one of claims 5 to 11;

or mixtures thereof.