Claims

1. A composition comprising one or more constructs or vectors, which upon expression encodes the transcription factors:
    a) BATF3, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 10 (BATF3), such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 10 (BATF3);
    b) IRF8, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 11 (IRF8), such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 11 (IRF8); and
    c) PU.1, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 12 (PU.1), such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 12 (PU.1);

    wherein the one or more constructs or vectors comprise a promoter region capable of controlling the transcription of the transcription factors, wherein the promoter region comprises the spleen focus-forming virus (SFFV) promoter.

2. The composition according to claim 1, further comprising one or more constructs or vectors, which upon expression encode one or more transcription factors selected from:
    a) IRF7, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 21 (IRF7) such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 21 (IRF7);

b) BATF, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 19 (BATF), such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 19 (BATF);

c) SPIB, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 23 (SPIB), such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 23 (SPIB);

d) SPIC, or a biologically active variant thereof, wherein the biologically active variant is at least 70% identical to SEQ ID NO: 25 (SPIC), such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 25 (SPIC);

wherein the one or more constructs or vectors comprise a promoter region capable of controlling the transcription of the transcription factors, wherein the promoter region comprises spleen focus-forming virus (SFFV) promoter.

3. The composition according to any one of claims 1 or 2, wherein the SFFV promoter comprises or consists of a polynucleotide sequence at least 80% identical to SEQ ID NO: 1, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% identical to SEQ ID NO: 1;

4. The composition according to any one of the preceding claims, wherein the composition comprises:

a) one construct or vector which upon expression encodes the transcription factors BATF3, IRF8 and PU.1;

b) one construct or vector which upon expression encodes the transcription factors BATF3, IRF8 and SPIB;

c) a first construct or vector which upon expression encodes the transcription factors BATF3 and IRF8, and a second construct or vector which upon expression encodes the transcription factor PU.1;

d) a first construct or vector which upon expression encodes the transcription factors BATF3 and IRF8, and a second construct or vector which upon expression encodes the transcription factor SPIB;

e) a first construct or vector which upon expression encodes the transcription factor BATF3, and a second construct or vector which upon expression encodes the transcription factors IRF8 and PU.1;

f) a first construct or vector which upon expression encodes the transcription factor BATF3, and a second construct or vector which upon expression encodes the transcription factors IRF8 and SPIB;

g) a first construct or vector which upon expression encodes the transcription factor IRF8, and a second construct or vector which upon expression encodes the transcription factors BATF3 and PU.1;

h) a first construct or vector which upon expression encodes the transcription factor IRF8, and a second construct or vector, which upon expression encodes the transcription factors BATF3 and SPIB;

i) a first construct or vector which upon expression encodes the transcription factor BATF3; a second construct or vector which upon expression encodes the transcription factor IRF8; and a third construct or vector which upon expression encodes the transcription factor PU.1. and/or

j) a first construct or vector which upon expression encodes the transcription factor BATF3, a second construct or vector which upon expression encodes the transcription factor IRF8, and a third construct or vector which upon expression encodes the transcription factor SPIB.

5. The composition according to any one of the preceding claims, wherein the one or more constructs or vectors is a viral vector selected from the group consisting of: lentiviral vectors, retrovirus vectors, adenovirus vectors, herpes virus vectors, pox virus vectors, adeno-associated virus vectors,

paramyxoviridae vectors, rabdoviral vectors, alphaviral vectors and flaviral vectors.

6. The composition according to claim 5, wherein the adenovirus vector is selected from the group consisting of : wild-type Ad vectors, hybrid Ad vectors and mutant Ad vectors, preferably wherein the wild-type Ad vector is Ad5 and the hybrid Ad vector is Ad5/F35.

7. The composition according to any one of the preceding claims, further comprising one or more epigenetic modifiers, such as histone deacetylase inhibitors.

8. The composition according to claim 7, wherein the one or more histone deacetylase inhibitor is valproic acid.

9. A cell comprising one or more constructs or vectors according to any one of the preceding claims.

10. The cell according to claim 9, wherein the cell is a mammalian cell, such as a human or a murine cell.

11. The cell according to any one of claims 9 to 10, wherein the cell is selected from the group consisting of: a stem cell, a differentiated cell, and a cancer cell, wherein:
    a) the stem cell is selected from the group consisting of: a pluripotent stem cell and a multipotent stem cell, such as a mesenchymal stem cell or a hematopoietic stem cell;
    b) the differentiated cell is any somatic cell, such as a fibroblast or a hematopoietic cell, such as a monocyte.

12. A method of reprogramming or inducing a cell into a dendritic or antigen-presenting cell, the method comprising the following steps:
    a) transducing a cell with a composition comprising a construct or vector according to any one of claims 1 to 8.
    b) expressing the transcription factors;

    whereby a reprogrammed or induced cell is obtained.

13. The method according to claim 12, wherein the reprogramming or induction is in vivo, in vitro, or ex vivo.

14. The method according to any one of claims 12 to 13, wherein the method further comprises a step of culturing the transduced cell in a cell media, wherein the step is conducted before or after expressing the transcription factors.

15. The method according to any one of claims 12 to 14, wherein the method further comprises culturing the transduced cell in a cell media comprising one or more epigenetic modifiers, such as histone deacetylase inhibitors, preferably wherein the histone deacetylase inhibitor is valproic acid.

16. A reprogrammed or induced cell obtained according to the method defined in any one of claims 12 to 15, wherein the cell is a dendritic or antigen-presenting cell, such as a type 1 conventional dendritic cell.

17. The reprogrammed or induced cell according to claim 16 , wherein the resulting reprogrammed or induced cell is CD45, HLA-DR, CD141, CLEC9A, XCR1 and/or CD226 positive.

18. The composition according to any one of claims 1 to 8, the cell according to any one of claims 9 to 11, and/or the reprogrammed or induced cell according to claims 16 to 17, for use in medicine.

19. The composition according to any one of claims 1 to 8, the cell according to any one of claims 9 to 11, and/or the reprogrammed or induced cell according to any one of claims 16 to 17, for use in the treatment of cancer or infectious diseases.

20. The composition, the cell, and/or the reprogrammed cell according to claim 19, wherein the cancer is selected from the group consisting of: basal cell carcinoma, cervical dysplasia, sarcoma, germ cell tumor, retinoblastoma, glioblastoma, lymphoma, Hodgkin's lymphoma, non-Hodgkin's lymphoma, blood cancer, prostate cancer, ovarian cancer, cervix cancer, oesophageal cancer, uterus cancer, vaginal cancer, breast cancer, head and neck cancer, gastric cancer, oral cavity cancer, naso-pharynx cancer, trachea cancer, larynx cancer, bronchi cancer, bronchioles cancer, lung cancer, pleural cancer, urothelial cancer, hollow organs cancer, esophagus cancer, stomach cancer, bile duct cancer, intestine cancer, colon cancer, colorectum cancer, rectum cancer, bladder cancer, ureter cancer, kidney cancer, liver cancer, gall bladder cancer, spleen cancer, brain cancer, lymphatic system cancer, bone cancer, pancreatic cancer, leukemia, chronic myeloid leukemia, acute lymphoblastic leukemia, acute myeloid leukemia, skin cancer, melanoma and myeloma.