CLAIMS

1. A composition comprising a combination of at least two isolated transcription factors selected from the group consisting of BATF3, IRF8, PU.1 and TCF4.

2. The composition according to claim 1, wherein the at least two isolated transcription factors individually are at least 90% identical to sequence selected from the group consisting of BATF3 (SEQ ID NO:67, SEQ ID NO:68), IRF8 (SEQ ID NO:69, SEQ ID NO:70), PU.1 (SEQ ID NO: 71, SEQ ID NO:72) and TCF4 (SEQ ID NO:73, SEQ ID NO:74).

3. The composition according to any one of the preceding claims, wherein the at least two isolated transcription factors individually are at least 95% identical to a sequence selected from the group consisting of BATF3 (SEQ ID NO:67, SEQ ID NO:68), IRF8 (SEQ ID NO:69, SEQ ID NO:70), PU.1 (SEQ ID NO: 71, SEQ ID NO:72) and TCF4 (SEQ ID NO:73, SEQ ID NO:74).

4. The composition according to any of the preceding claims wherein the combination of isolated transcription factors is selected from the following encoded combinations:

   BATF3 (SEQ ID NO:67, SEQ ID NO:68), IRF8 (SEQ ID NO:69, SEQ ID NO:70) and PU.1 (SEQ ID NO: 71, SEQ ID NO:72);

   or TCF4 (SEQ ID NO:73, SEQ ID NO:74), BATF3 (SEQ ID NO:67, SEQ ID NO:68) and IRF8 (SEQ ID NO:69, SEQ ID NO:70);

   or TCF4 (SEQ ID NO:73, SEQ ID NO:74), IRF8 (SEQ ID NO:69, SEQ ID NO:70) and PU.1 (SEQ ID NO: 71, SEQ ID NO:72);

   or TCF4 (SEQ ID NO:73, SEQ ID NO:74), BATF3 (SEQ ID NO:67, SEQ ID NO:68), IRF8 (SEQ ID NO:69, SEQ ID NO:70) and PU.1 (SEQ ID NO: 71, SEQ ID NO:72).

5. The composition according to any one of the preceding claims wherein the combination of isolated transcription factors is the encoded combination of BATF3 (SEQ. ID. 1, SEQ. ID. 2), IRF8 (SEQ. ID. 5, SEQ. ID. 6) and PU.1 (SEQ. ID. 7, SEQ. ID. 8).

6. The composition according to any one of the preceding claims, for use as a reprogramming or inducing factor of a cell selected from a list consisting of: pluripotent stem cell, or multipotent stem cell, differentiated cell, and mixtures thereof into dendritic cell.

7. The composition according to any one of the preceding claims, for use as a

reprogramming or inducing factor of a cell selected from a group consisting of: tumour cell, cancer cell, and mixtures thereof, into antigen presenting cell.

8. The composition according to any one of the previous claims, for use as reprogramming or inducing factors of antigen presenting cells, wherein the antigen is: a cancer antigen, a self- antigen, an allergen, an antigen from a pathogenic and/or infectious organism.

9. The composition according to any one of the previous claims, for use in veterinary or human medicine, in particular in immunotherapy, or in neurodegenerative or ageing diseases, or cancer or infectious diseases, or immune-related diseases including transplant rejection, graft versus host disease, allergies, parasitic diseases, inflammatory diseases and autoimmune diseases or as a drug screening.

10. A construct or a vector encoding a combination of at least two transcription factors, wherein the at least two transcription factors individually comprises a sequence at least 90% identical to a sequence selected from the group consisting of BATF3 (SEQ ID NO:67, SEQ ID NO:68), IRF8 (SEQ ID NO:69, SEQ ID NO:70), PU.1 (SEQ ID NO: 71, SEQ ID NO:72) and TCF4 (SEQ ID NO:73, SEQ ID NO:74).

11. The construct or the vector according to claim 10, wherein the combination of three isolated transcription factors is in the following sequential order from 5' to 3':

PU.1, IRF8, BATF3; or
IRF8, PU.1, BATF3.

12. The construct or vector according to any one of claims 10-11, wherein the vector is a viral vector; in particular a retroviral, a adenoviral, a lentiviral, a herpes viral, a pox viral, or an adeno-associated viral vector.

13. A method for reprogramming or inducing a stem cell or a differentiated cell into a dendritic cell or antigen presenting 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 vectors encoding at least two transcription factors, wherein the at least two transcription factors individually comprises a sequence at least 90% identical to a sequence selected from the group consisting of BATF3 (SEQ ID NO:67, SEQ ID NO:68), IRF8 (SEQ ID NO:69, SEQ ID NO:70), PU.1 (SEQ ID NO: 71,

SEQ ID NO:72) and TCF4 (SEQ ID NO:73, SEQ ID NO:74);

culturing the transduced cell in a cell media that supports growth of dendritic cells or antigen presenting cells.

14. The method according to claim 11, wherein the at least two transcription factors individually comprises a sequence at least 90% identical to a sequence selected from the group consisting of:

BATF3 (SEQ. ID. 67, SEQ. ID. 68) and IRF8 (SEQ. ID. 69, SEQ. ID. 70);

or BATF3 (SEQ. ID. 67, SEQ. ID. 68) and PU.1 (SEQ. ID. 71, SEQ. ID. 72);

or IRF8 (SEQ. ID. 69, SEQ. ID. 70) and PU.1 (SEQ. ID. 71, SEQ. ID. 72);

or TCF4 (SEQ. ID. 73, SEQ. ID. 74) and BATF3 (SEQ. ID. 67, SEQ. ID. 68);

or TCF4 (SEQ. ID. 73, SEQ. ID. 74) and IRF8 (SEQ. ID. 69, SEQ. ID. 70);

or TCF4 (SEQ. ID. 73, SEQ. ID. 74) and PU.1 (SEQ. ID. 71, SEQ. ID. 72);

or BATF3 (SEQ. ID. 67, SEQ. ID. 68), IRF8 (SEQ. ID. 69, SEQ. ID. 70) and PU.1 (SEQ. ID.71, SEQ. ID. 72);

or TCF4 (SEQ. ID. 73, SEQ. ID. 74), BATF3 (SEQ. ID. 67, SEQ. ID.68) and IRF8 (SEQ. ID.69, SEQ. ID. 70);

or TCF4 (SEQ. ID. 73, SEQ. ID. 74), IRF8 (SEQ. ID. 69, SEQ. ID. 70) and PU.1 (SEQ. ID.71, SEQ. ID. 72);

or TCF4 (SEQ. ID. 73, SEQ. ID. 74), BATF3 (SEQ. ID. 67, SEQ. ID. 68), IRF8 (SEQ. ID. 69, SEQ. ID. 70) and PU.1 (SEQ. ID. 71, SEQ. ID. 72).

15. The method according to claim 14, wherein the at least two transcription factors is in the following sequential order from 5’ to 3’:

PU.1 (SEQ. ID.71, SEQ. ID. 72), IRF8 (SEQ. ID. 69, SEQ. ID. 70), BATF3 (SEQ. ID. 67, SEQ. ID. 68); or

IRF8 (SEQ. ID. 69, SEQ. ID. 70), PU.1 (SEQ. ID.71, SEQ. ID. 72), BATF3 (SEQ. ID. 67, SEQ.

16. The method according to claim 15, wherein the combination of three isolated transcription factors is in the following sequential order from 5’ to 3’:

PU.1 (SEQ. ID. 7, SEQ. ID. 8), IRF8 (SEQ. ID. 5, SEQ. ID. 6), BATF3 (SEQ. ID. 1, SEQ. ID. 2); or

IRF8 (SEQ. ID. 5, SEQ. ID. 6), PU.1 (SEQ. ID. 7, SEQ. ID. 8), BATF3 (SEQ. ID. 1, SEQ. ID. 2).

17. The method according to any one of claims 14-16, wherein transducing step further comprises at least one vector, wherein the vector comprises a nucleic acid

sequence selected from a group consisting of: a nucleic acid sequence encoding IL12; nucleic acid sequence encoding GM-CSF; nucleic acid sequence encoding IL-4; nucleic acid sequence encoding IFN-α; nucleic acid sequence encoding IFN-β; nucleic acid sequence encoding IFN-γ; nucleic acid sequence encoding TNF; nucleic acid sequence encoding siRNA targeting IL-10 RNA, and mixtures thereof.

18. The method according to any one of claims 13-17, wherein the transducing step further comprises at least one vector comprising polynucleotide sequences encoding immunostimulatory cytokines.

19. The method according to any one of claims 13-18, wherein the cell is a human or mouse fibroblast, or a human or mouse differentiated cell or a cancer cell or a mammalian hematopoietic lineage cell, including monocytes or hematopoietic stem and progenitor cells, or mesenchymal stem cells, or pluripotent stem cell.

20. An induced dendritic cell obtained by the method described in any of the claims 13-19.

21. An induced antigen presenting cell obtained by the method described in any of the claims 13-19.

22. A composition comprising an induced dendritic cell as described in claim 20, or an induce antigen presenting cell as described in claim 21, or mixtures thereof, in a therapeutically effective amount and a pharmaceutically acceptable excipient.

23. The composition according to any one of claims 1-9 and 22, for use in the treatment therapy or diagnostic of neoplasia in particular cancer, namely solid or hematological tumours.

24. The composition according to any one of claims 1-9 and 22-23 for use in the treatment, diagnostic or therapy of benign tumour, malignant tumour, early cancer, basal cell carcinoma, cervical dysplasia, soft tissue sarcoma, germ cell tumour, retinoblastoma, age-related macular degeneration, Hodgkin's lymphoma, blood cancer, prostate cancer, ovarian cancer, cervix cancer, uterus cancer, vaginal cancer, breast cancer, naso-pharynx cancer, trachea cancer, larynx cancer, bronchi cancer, bronchioles cancer, lung 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, leukaemia, skin cancer, or myeloma.

25. The composition according to any one of claims 1-10 and 22-24, for use in the treatment, therapy or diagnostic of a fungal, viral, chlamydial, bacterial, nanobacterial or parasitic infectious disease.