Claims:

1. A method of cellular reprogramming for the interconversion of a differentiated or somatic cell of a first cell phenotype to at least one desired second, multipotent, pluripotent, self-renewing or differentiating phenotype, the method comprising:

- transfecting a nucleated cell, wherein one or more transfection step is performed *in vitro*, and wherein said nucleated cell is transfected with: a) a nucleic acid, b) a vector, c) a vector comprising synthetic oligonucleotides, d) a vector for gene therapy, e) a virus, f) a polypeptide, g) a ribonucleic acid or, h) a deoxyribonucleic acid encoding a polypeptide, and wherein said polypeptide is;

i. one or more first polypeptide(s) selected from PRR+ Numb, Oct3/4, Sox2, Nanog and a polypeptide with LIF activity;

ii. one or more second polypeptide(s) selected from PRR+ Numb, Oct4, Sox2, Nanog, Notch, Fgf4, Hoxb4, Lin28, Lif, Lifr, Cntf, Cardiotrophin, Osm, Osm-r, Il6, Il6r, Hyper Il6, Il-11, Gp130, Stat3, C-myc, and a polypeptide with Lif Activity;

iii. one or more third polypeptide(s) selected from a short Numb isoform, Numblike, MyoD, myogenin, Myocardin, Ifrdl, Myf 5, Myf 6, Mef2, Gata 4, Gata 5, Gata 6, Sox9, CREB-binding polypeptide, Runx2, HNF- 1, HNF-3, HNF-4, HNF-6, Nurr1, REN, Neurogenin1, Neurogenin2, Neurogenin3, Mash1, Phox2a, Phox2b, dHand, Gata3, Shh, FGF8, Lmx1b, Nkx2.2, Pet1, Lbx1, Rnx, PITX2, D1x2, D1x5, Ngn2, Ptx3, Gata2, REST4, Foxa2, Sox17, HLXB9, Runx1/AML, Pdxl, OLIGI, OLIG2, NOV(CCN3), and Zfp488; and/or

iv. one or more fourth polypeptide(s) altering the amount, activity or antigenicity of a cellular protein.

2. The method of claim 1, further comprising

-growing the transfected cell in a first incubation step effective that the transfected cell grows at a first growth rate;

-differentiating the transfected cell in a second incubation step; and/or

-culturing the transfected cell in an environment selected from de-cellularized cadaveric tissue, a two-dimensional scaffold, a three-dimensional scaffold, and hanging drops.

3. The method of claim 1 further comprising

-assessing the transfected cell according to morphology, expression of cellular markers, transgenic markers, antibiotic markers, fluorescent markers, a marker gene encoded by a transgene expressing vector, an antibiotic resistance gene, a fluorescent protein gene, or a reporter gene under the control of a cell type specific promoter; and/or

-cryopreserving the transfected cell.

4. The method of claim1, wherein the vector comprises synthetic oligonucleotides directed against a HIV co-receptor, a decoy sequence, an HIV-2 RRE decoy sequence and/or an HIV-2 TAR decoy sequence, wherein the vector is capable of retarding HIV, SIV, or FIV infection.

5. The method of claim 1, wherein the synthetic oligonucleotides comprise miRNA, siRNA, or shRNA sequences directed against an HIV co-receptor, against CXCR4 and/or against CCR5.

6. The method of claim 1, wherein the nucleated cell is selected from the group of stem/progenitor cells and somatic cell types, said stem/progenitor cells comprising donor cells, autologous cells, HLA type compatible cells, reprogrammed cells, induced multipotent cells, induced pluripotent cells, cells derived from bone marrow, peripheral blood, placental blood, amniotic fluid, umbilical cord blood, banked sources, cryopreserved sources, skin, adipose tissue, non-human embryo cells, hematopoietic cells, spermatogonia, primordial germ cells, leukocytes, lymphocytes, epithelial cells, buccal cheek cells, and genetically-modified cells.

7. The method of claim 1, wherein the nucleated cell is transfected with a vector encoding a second polypeptide, wherein the vector encoding said second polypeptide does not integrate into the genome of said cell, wherein the second polypeptide is selected from PRR+ Numb, Oct4, Sox2, Nanog, Notch, FGF4, HOXB4, LIN28, LIF, LIFR, CNTF, cardiotrophin, OSM, OSM-R, L6, IL6R, hyper IL6, IL-11, gp130, stat3, c-myc, and a polypeptide with LIF activity.

8. The method of claim 1, wherein the nucleated cell is transfected with a third one or more polypeptide, and/or with ribonucleic acids or deoxyribonucleic acids encoding one or more third polypeptides, wherein the one or more third polypeptide is selected from a short Numb isoform, Numblike, MyoD, myogenin, Myocardin, Ifrdl, Myf 5, Myf 6, Mef2, Gata 4, Gata 5, and Gata 6, Sox9, CREB-binding polypeptide, Runx2, HNF-I, HNF-3, HNF-4, HNF-6, Nurrl, REN, Neurogenin1, Neurogenin2, Neurogenin3, Mash 1, Phox2a, Phox2b, dHand, Gata3, Shh, FGF8, Lmxlb, Nkx2.2, Pet1, Lbx1, Rnx, PITX2, Dlx2, Dlx5, Ngn2, Ptx-3, Gata2, REST4, Foxa2, Sox17, HLXB9, Runx1/AML, Pdxl, OLIG1, OLIG2, NOV(CCN3), and Zfp488, or said nucleic acid comprises antisense Hes1 RNA.

9. The method of claim 8, wherein the nucleated cell is transfected with a first polypeptide, or with one or more ribonucleic acids or deoxyribonucleic acids encoding a first polypeptide selected from PRR+ Numb, Oct3/4, Sox2, and Nanog; and wherein the nucleated cell is transfected with a second one or more polypeptide(s) and/or with one or more ribonucleic acids or deoxyribonucleic acids encoding the second one or more polypeptide(s) selected from PRR+ Numb, Oct4, Sox2, Nanog, Notch, LIN28, HoxB4, FGF4, LIF, LIFR, cardiotrophin, oncostatin, oncostatin receptor, IL6, hyper IL6, gp130, stat3, c-myc, CNTF, and a polypeptide with LIF activity.

10. The method of claim 2, wherein the transfected cell is grown in an environment selected from decellularized cadaveric tissue, a two-dimensional scaffold engineered to replicate tissue structure, a two-dimensional scaffold engineered to replicate an organ, a three-dimensional format, a three-dimensional scaffold engineered to replicate tissue structure, a three-dimensional scaffold engineered to replicate an organ, and an ink-jet style cartridge for subsequent placement of the transfected cell in a desired position utilizing ink-jet printer technology for tissue engineering.

11. The method of claim 2, further comprising isolating transfected cells, wherein transfected cells are isolated from the growth or differentiation medium after achieving a desired cell number and/or a desired state of differentiation.

12. The method of claim 1, wherein the vector encodes one or more polypeptide(s).

13. The method of claim 1, wherein the vector is capable of retarding HIV-I, HIV-2, and/or FIV infection and includes a decoy sequence, a synthetic oligonucleotide sequence(s) and a synthetic oligonucleotide sequences(s) directed against an HIV viral genomic sequence, a synthetic oligonucleotide directed against an HIV enzyme(s), and/or an a synthetic oligonucleotide directed against an HIV co-receptor(s).

14. The method of claim 2, wherein the a growth medium comprises one or more cytokines selected from EGF, IL-I, oncostatin, CNTF, soluble gp130, bFGF, steel factor, LIF, cardiotrophin, OSM, IL6, hyper IL6, and a cytokine having LIF activity; and/or a differentiation medium comprises an agent selected from the group consisting of retinoic acid, Neurotrophin 3 (NT 3), nerve growth factor (NGF), glial cell-line derived growth factor (GDNF), interferon (IFN-Y), hexamethylene bis acrylarnide, dimethylsulfoxide, fetal bovine serum (FBS), normal bovine serum (NBS), vascular endothelial growth factor (VEGF), thrombopoietin, a colony stimulating factor, M-CSF (CSF-I), GM-CSF, IL-7, and cardiomyocyte conditioned medium.

15. The method of claim 1, wherein the nucleated cell is transfected only with a first polypeptide; or with one or more nucleic acids encoding one first polypeptide, wherein the one first polypeptide is Oct3/4; and/or only with a second one or more polypeptide, or with one or more nucleic acids encoding one or more second polypeptide selected from PRR+ Numb, Sox2, Nanog, Notch, LIN28, HoxB4, FGF4, LIF, LIFR, cardiotrophin, oncostatin, oncostatin receptor, IL6, hyper IL6, gpl30, stat3, c-myc, CNTF, and a polypeptide with LIF activity.

16. The method of claim 1, wherein one or more transfecting steps comprises one or more of electroporation, a non-integrating vector, a nanocapsule, a nanovault, a cationic lipid, a liposome, or comprises avoiding retroviral/lentiviral integration or other random alteration of the genomes of the transfected cell.

17. The method of claim 1 wherein the transfected nucleic acid, vector, polypeptide, or nucleic acid encoding a polypeptide is one altering cellular differentiation, cellular protein antigenicity, neoplastic potential, the amount or activity of an enzyme, a cellular protein, a structural protein, a receptor protein, a signal transduction protein, a cellular transport protein, a membrane associated protein, an HLA type protein, a protein involved in DNA repair and chromosome maintenance; a protein involved in synapse formation and maintenance; a protein involved in neurite outgrowth or axon outgrowth and formation; a protein involved in cellular repair, a transcription factor protein, a cell fate determinant, a protein deficient in a patient or subject, telomerase, aspartoacyclase, hexosaminidase A (HEXA), hexosaminidase B (HEXB), HPRT, Huntingtin, galactosidase alpha (HLA), glucosidase beta acid (GBA), von Hippel Lindau tumor suppressor (VHL), Beta globin (HBB), NPC , and/or PARK.

18. The method of claim 1, wherein the nucleated cell is screened for HLA type and/or the transfected cell is screened for successful transfection, initiation of differentiation, or using standard PCR or nucleic acid hybridization-based methods.

19. The method of claim 1, wherein the transfected cell is genetically-modified.

20. The method of claim 1, wherein the nucleated cell is transfected simultaneously with two or more nucleic acids, two or more vectors, or two or more polypeptides.

21. The method of claim 1, wherein neoplastic potential is altered in the transfected cell.

22. The method of claim 1, wherein the transfected cell is capable of promoting growth in a target tissue, ameliorating a disease, ameliorating an injury or repairing a tissue.

23. The method of claim 1, wherein the method does not use oncogenes.

24. The method of claim 1, wherein the vector:

targets a sequence with at least 70% identity to a viral genomic nucleotide sequence or its complement; comprises synthetic oligonucleotide sequences that reduce the ability of target cells to sustain HIV replication by > 70;

comprises synthetic oligonucleotide sequences that reduce HIV viral activity by > 70%; and/or

comprises one or more synthetic nucleotide sequence comprising SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8, the nucleotides at positions 12-26 of SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, SEQ ID NO: 12, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 15, SEQ ID NO: 16, and/or SEQ ID NO: 17; or

wherein the vector comprises a polycistronic expression cassette, a transcriptional promoter element, and multiple nucleic acid coding sequences operably linked to a transcriptional promoter element.

25. The method of claim 1 further comprising screening an agent by incubating said cell in the presence of an agent and assessing the nucleated cell according to morphology, gene expression, cell sorting, expression of cellular markers, transgenic markers, antibiotic markers, fluorescent markers, a marker gene encoded by a transgene expressing vector, an antibiotic resistance gene, a fluorescent protein gene, and/or a reporter gene under the control of a cell type specific promoter.