

CLAIMS

1. A lentiviral vector, wherein the lentiviral vector comprises a polynucleotide, wherein the polynucleotide is characterized in that it comprises from 5' to 3' the following nucleotides:
 - a) a 5' long terminal repeat (5' LTR) which in turn comprises a cytomegalovirus chimeric promoter,
 - b) a primer binding site (PBS),
 - c) a psi packaging signal,
 - d) a Rev-responsive element (RRE),
 - e) a DNA flap central polypurine tract (cPPT),
 - f) a human phosphoglycerate kinase (PGK) promoter,
 - g) a nucleotide sequence encoding the RPS19 protein, wherein the nucleotide sequence encoding for the RPS19 protein is a codon-optimized nucleotide sequence with at least 95%, sequence identity over the full length with SEQ ID NO. 12,
 - h) a mutated optimized woodchuck hepatitis virus post-transcriptional regulatory element (Wpre), wherein the mutated optimized woodchuck hepatitis virus post-transcriptional regulatory element (Wpre) has at least 95%, sequence identity over the full length with SEQ ID NO: 13, and
 - i) a 3' long terminal repeat (3' LTR),
 wherein the 5' and 3' LTR regions have been rendered substantially transcriptionally inactive by virtue of total or partial deletion in the U3 region of the LTR, and wherein f), and h) are operably linked to and regulate the expression of g).
2. The lentiviral vector of claim 1, wherein the human PGK promoter has at least 95%, preferably 98%, sequence identity over the full length of SEQ ID NO: 10.
3. The lentiviral vector according to any of claims 1 and 2, wherein the nucleotide sequence encoding the RPS19 protein is a codon-optimized nucleotide sequence with at least 98%, sequence identity over the full length with SEQ ID NO: 12.
4. The lentiviral vector according to any of claims 1 to 3, wherein the mutated optimized woodchuck hepatitis virus post-transcriptional regulatory element (Wpre) has at least 98%, sequence identity over the full length with SEQ ID NO: 13.
5. The lentiviral vector according to any of claims 1 to 4, wherein the polynucleotide comprised in the lentiviral vector further comprises a polyadenylation signal sequence (PolyA) located after the 3' LTR.

6. The lentiviral vector according to any of claims 1 to 5, wherein the full-length polynucleotide of said lentiviral vector has at least 95%, preferably 98% sequence identity with SEQ ID NO: 17.
7. The lentiviral vector according to claim 6, wherein the sequence identity with SEQ ID NO: 17 is 100%.
8. A population of cells transduced with the lentiviral vector as defined in any of claims 1 to 7.
9. The population of cells according to claim 8, wherein the cells are enriched in CD34+ hematopoietic stem and progenitor cells.
10. The population of cells according to any of claims 8 and 9, wherein the cells are autologous to a subject.
11. A pharmaceutical composition comprising the lentiviral vector as defined by any of claims 1 to 7, or the population of cells as defined in any of claims 8 to 10, and a pharmaceutically acceptable diluent or carrier.
12. The lentiviral vector according to any of claims 1 to 7, the population of cells according to any of claims 8 to 10, or pharmaceutical composition according to claim 11, for use as a medicine.
13. Use of the lentiviral vector according to any of claims 1 to 7, the population of cells according to any of claims 8 to 10, or the pharmaceutical composition according to claim 11, in the manufacture of a medicament for the treatment of Diamond-Blackfan anemia in a subject in need thereof.
14. Use of the lentiviral vector according to any of claims 6 and 7 in the manufacture of a medicament for the treatment of Diamond-Blackfan anemia in a subject in need thereof.
15. The use according to any of claims 13 and 14, wherein the subject in need thereof is a human being.