CLAIMS

1. A pseudotyped retrovirus-like particle or retroviral vector comprising:

a) at least one cell targeting fusion protein comprising (i) a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one cell targeting domain,

b) at least one modulating fusion protein comprising (i) a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one functional domain chosen from a cytokine, growth factor, hormone, neurotransmitter, apoptosis ligand, or a combination thereof, and

c) at least one glycoprotein derived from an envelope glycoprotein F of a virus of the Paramyxoviridae family,

wherein said cell targeting fusion protein and/or said modulating fusion protein comprises a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family,

wherein said protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family lacks at least one part of the cytoplasmic region of said envelope glycoprotein G or H.

2. The pseudotyped retrovirus-like particle or retroviral vector according to claim 1, wherein said virus of the Paramyxoviridae family is a virus of the *Morbillivirus* genus or of the *Henipavirus* genus.

3. The pseudotyped retrovirus-like particle or retroviral vector according to claim 1 or 2, wherein said protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family is at least partially unable to bind at least one natural receptor of said envelope glycoprotein G or H.

4. The pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 3, wherein said glycoprotein derived from an envelope glycoprotein F of a virus of the Paramyxoviridae family lacks at least one part of the cytoplasmic region of said envelope glycoprotein F.

5. The pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 4, wherein said cell targeting domain is selected in the group consisting of a DARPin, ScFv, targeting peptide and their combinations.

6. The pseudotyped retrovirus-like particle or retroviral vector according to any of claims 1-5, wherein the protein comprising at least one modification by comparison to an envelope glycoprotein G or H of a virus of the Paramyxoviridae family comprises a protein having at least 80% sequence identity to SEQ ID NO: 9.

7. The pseudotyped retrovirus-like particle or retroviral vector according to any of claims 1-6, wherein the glycoprotein comprising at least one modification by comparison to an envelope glycoprotein F of a virus of the Paramyxoviridae family comprises a protein having at least 80% sequence identity to SEQ ID NO: 11.

8. An in vitro or ex vivo use of a pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 7 to selectively modulate the activity of target cells and optionally selectively transduce said target cells.

9. An in vitro or ex vivo method for selectively modulating the activity of target cells and/or selectively transducing target cells, wherein said method comprises contacting a pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 7 with cells comprising said target cells.

10. A pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 7 for use as a medicament.

11. Use of a pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 7 in the manufacture of a medicament, for use in immune therapy, gene therapy and/or vaccination.

12. Use of a pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 7 in the manufacture of a medicament, for the prevention and/or treatment of an immune disease, cancer, genetic disease, allergic disease, inflammatory disease, infectious disease, metabolic disease, neurological disease, muscular disease and their combinations.

13. A nucleic acid comprising a sequence encoding a cell targeting fusion protein and a sequence encoding a modulating fusion protein, wherein:

- said cell targeting fusion protein comprises a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one cell targeting domain, and
- said modulating fusion protein comprises (i) a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one functional domain.

14. The nucleic acid according to claim 13 or the pseudotyped retrovirus-like particle or retroviral vector of any of claims 1-7, wherein said virus of the Paramyxoviridae family is a henipavirus.

15. The nucleic acid according to claim 13 or 14 or the pseudotyped retrovirus-like particle or retroviral vector of any of claims 1-7, wherein said cell targeting fusion protein comprises the protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family.

16. The nucleic acid according to claim 13, wherein said nucleic acid comprises a sequence selected in the group consisting of SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7 and SEQ ID NO: 13 and/or comprises a sequence encoding a sequence selected in the group consisting of sequences SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 8 and SEQ ID NO: 14.

17. A vector comprising a nucleic acid according to any of claims 13-16.

18. A method for producing a pseudotyped retrovirus-like particle or retroviral vector according to any one of claims 1 to 7, wherein said method comprises co-transfecting a packaging cell line with:

(i) at least one nucleic acid encoding a cell targeting fusion protein, said cell targeting fusion protein comprising (i) a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one cell targeting domain,

(ii) at least one nucleic acid encoding a modulating fusion protein, said modulating fusion protein comprising (i) a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one functional domain chosen from a cytokine, growth factor, hormone, neurotransmitter, apoptosis ligand, or a combination thereof,

(iii) at least one nucleic acid encoding a glycoprotein derived from an envelope glycoprotein F of a virus of the Paramyxoviridae family, and

(iv) at least one vector comprising a nucleic acid encoding core proteins from said retrovirus,

wherein said cell targeting fusion protein and/or said modulating fusion protein comprises a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family, and

wherein said protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family lacks at least one part of the cytoplasmic region of said envelope glycoprotein G or H.

19. A fusion protein, which comprises (i) a protein derived from an envelope glycoprotein G of a virus of the Henipavirus genus and (ii) at least one cell targeting domain that binds a target cell selected from a hematopoietic cell, stromal cell, liver cell, muscle cell, or cell of the nervous system.

20. The fusion protein of claim 19, wherein the hematopoietic cell is selected from a T cell, a B cell, a monocyte, a Th1 cell, a Th2 cell, a Treg cell, a mast cell, a dendritic cell, a

natural killer cell, a natural killer T cell, a macrophage, a hematopoietic stem cell, a progenitor T cell, a progenitor B cell, an erythroblast, a platelet, or a neutrophil.

21. A fusion protein, which comprises (i) a protein derived from an envelope glycoprotein G of a virus of the Henipavirus genus and (ii) at least one cell targeting domain selected from a DARPin, a targeting peptide, or a combination thereof.

22. A pseudotyped retrovirus-like particle or retroviral vector comprising:

a) at least one cell targeting fusion protein comprising (i) a protein derived from an envelope glycoprotein G of a virus of the Henipavirus genus and (ii) at least one cell targeting domain,

b) at least one glycoprotein derived from an envelope glycoprotein F of a virus of the Paramyxoviridae family, and

c) a gene encoding a chimeric antigen receptor.

23. A pseudotyped retrovirus-like particle or retroviral vector comprising:

a) at least one cell targeting fusion protein comprising (i) a protein derived from an envelope glycoprotein G of a virus of the Henipavirus genus and (ii) at least one cell targeting domain,

b) at least one modulating fusion protein comprising (i) a protein derived from an envelope glycoprotein G or H of a virus of the Paramyxoviridae family or a transmembrane domain and (ii) at least one functional domain, and

c) at least one glycoprotein derived from an envelope glycoprotein F of a virus of the Paramyxoviridae family.

24. A pseudotyped retrovirus-like particle or retroviral vector comprising:

a) at least one cell targeting fusion protein comprising (i) a protein derived from an envelope glycoprotein G of a virus of the Henipavirus genus wherein the glycoprotein G has a truncation of 34 amino acids in the cytoplasmic region and (ii) at least one cell targeting domain, and

b) at least one glycoprotein derived from an envelope glycoprotein F of a virus of the Henipavirus genus wherein the glycoprotein F has a truncation of 22 amino acids in the cytoplasmic region.

25. The pseudotyped retrovirus-like particle or retroviral vector of claim 24, wherein the glycoprotein G that has a truncation of 34 amino acids in the cytoplasmic region lacks 34 amino acids at the N-terminus of SEQ ID NO: 9.

26. The pseudotyped retrovirus-like particle or retroviral vector of claim 24, wherein the glycoprotein F that has a truncation of 22 amino acids in the cytoplasmic region lacks 22 amino acids at the C-terminus of SEQ ID NO: 11.

27. A fusion protein, which comprises (i) a protein derived from an envelope glycoprotein G of a virus of the Henipavirus genus wherein the protein comprises E501A, W504A, Q530A and E533A point mutations by comparison to sequence SEQ ID NO: 9, and (ii) at least one cell targeting domain.

28. The fusion protein or pseudotyped retrovirus-like particle or retroviral vector of any of claims 14 or 19-27, wherein the virus of the Henipavirus genus is Nipah virus, Cedar virus, or Hendra virus.

29. The pseudotyped retrovirus-like particle or retroviral vector of any of claims 1-7 or 22-26, which comprises a gene encoding a chimeric antigen receptor

30. The pseudotyped retrovirus-like particle or retroviral vector of any of claims 1-7 or 22-26, wherein the modulating fusion protein comprises IL-7.

31. A pseudotyped retrovirus-like particle or retroviral vector or a fusion protein according to any one of claim 19-30 for use as a medicament.