Moreover, contrary to exogenous infectious retroviruses, HERVs are present in the DNA of all cells from each human individual and, therefore, therapeutic molecules classically used for treating human retroviruses cannot eliminate the corresponding provirus within a sub-population of reservoir cells. Many cellular and genetic constraints on these endogenous elements also make them controlled by non-retroviral molecular mechanisms, thus escaping from classical retroviral pathways. Among these various mechanisms, an involvement of gene silencing, of gene control by cellular promoter/enhancer or of genetic recombination between HERV sequences and cellular genes are known. Such features are not expected with classical exogenous retroviruses and therefore are not accessible to presently existing anti-retroviral therapy.

In such conditions, treatments of classical exogenous retroviruses cannot expect to fully control pathogenic HERV expression and, consequently, to have optimal therapeutic efficiency, if any, on HERV-associated diseases.

There is thus a long time felt unfulfilled need for a novel antiretroviral therapeutic strategy targeting the HERV viruses.

SUMMARY

In one aspect, the present disclosure relates to a use of an antibody, a fragment or a derivative thereof, in the manufacture of an antiretroviral drug targeting a virus belonging to human endogenous retroviruses (HERV), wherein said antibody, fragment or derivative is directed against HERV-W Envelope protein (HERV-W Env).

In another aspect, the present disclosure relates to a use of a composition comprising:

- an antibody, a fragment, or a derivative thereof as defined herein; and
- a retroviral reverse-transcriptase inhibitory drug;

in the manufacture of an antiretroviral drug targeting a virus belonging to human endogenous retroviruses type W (HERV-W).

In another aspect, the present disclosure relates to a use of a composition comprising:

- an antibody, a fragment or a derivative thereof as defined herein; and
- a retroviral reverse-transcriptase inhibitory drug;

in the manufacture of a medicament for preventing and/or treating a disease selected from the group consisting of multiple sclerosis (MS), schizophrenia (SZ), bipolar disorder (BP), unipolar or psychotic depression, clinically isolated syndrome (CIS, with neurological symptom), chronic inflammatory demyelinating polyneuropathy (CIDP), epilepsy, psoriasis, cancer, inflammatory pancreatitis and diabetes such as type 1 or type 2 diabetes.

In yet another aspect, the present disclosure relates to a use of a an antibody, a fragment or a derivative thereof directed against HERV-W Envelope protein (HERV-W Env) as defined herein and a retroviral reverse-transcriptase inhibitory drug in the manufacture of a combined preparation for treating a disease selected from the group consisting of multiple sclerosis (MS), schizophrenia (SZ), bipolar disorder (BP), unipolar or psychotic depression, clinically isolated syndrome (CIS, with neurological symptom), chronic inflammatory demyelinating polyneuropathy (CIDP), epilepsy, psoriasis, cancer, inflammatory pancreatitis and diabetes such as type 1 or type 2 diabetes, wherein said combined preparation is formulated for simultaneous, separate or sequential use.

In a further aspect, the present disclosure relates to a kit comprising at least two oligonucleotides selected from the group consisting of SEQ ID No: 11 to 28.

In another aspect, the present disclosure relates to a use of an antibody, a fragment or a derivative thereof directed against HERV-W Envelope protein (HERV-W Env) in the manufacture of an antiretroviral drug for targeting a virus belonging to human endogenous retroviruses (HERV) in a patient suffering from an HERV-W associated disease, wherein said patient is identified by a method comprising a step i) of detecting and/or quantifying HERV-W in a biological sample of said patient.

DETAILED DESCRIPTION OF THE INVENTION

The inventors have surprisingly found out that an unexpected anti-HERV effect targeting endogenous elements from the HERV-W family can reduce and inhibit HERV-W expression. Therefore, **in a first aspect**, the invention relates to an antibody, a fragment or a derivative thereof for use as an antiretroviral drug targeting a virus belonging to a human endogenous retrovirus (HERV), wherein said antibody is directed against HERV-W Envelope protein (HERV-W Env). Preferably, said antibody, fragment or derivative is for preventing

and/or treating an HERV-W associated disease. More preferably, said antibody is for preventing and/or treating Multiple Sclerosis (MS) or Chronic Inflammatory Demyelinating Polyneuropathy (CIDP). More preferably, said antibody is a monoclonal humanized antibody, wherein the heavy chain (HC) has the amino acid sequence as set forth in SEQ ID No: 9 and the light chain (LC) has the amino acid sequence set forth in SEQ ID No: 10.

In a second aspect, the invention relates to a composition comprising, preferably consisting of, an antibody directed against HERV-W Envelope protein (HERV-W Env), a fragment or a derivative thereof and a retroviral reverse-transcriptase inhibitory drug for use as an antiretroviral drug targeting a virus belonging to human endogenous retroviruses (HERV).

In a third aspect, the invention relates to an antibody directed against HERV-W Envelope protein (HERV-W Env), a fragment or a derivative thereof and a retroviral reverse-transcriptase inhibitory drug as a combined preparation for simultaneous, separate or sequential use in a method for treating an HERV-W associated disease, preferably a disease selected from the group consisting of multiple sclerosis (MS), schizophrenia (SZ), bipolar disorder (BP), unipolar or psychotic depression, clinically isolated syndrome (CIS, with neurological symptom), chronic inflammatory demyelinating polyneuropathy (CIDP), epilepsy, psoriasis, cancer, inflammatory pancreatitis and diabetes such as type 1 or type 2 diabetes.

In a fourth aspect, the invention relates to a kit comprising at least one oligonucleotide selected from the group consisting of SEQ ID No: 11 to 28.

In a fifth aspect, the invention relates to an antibody directed against HERV-W Envelope protein (HERV-W Env), a fragment or a derivative thereof for use as an antiretroviral drug targeting a virus belonging to human endogenous retroviruses (HERV), preferably to the HERV-W family, more preferably to MSRV, in a patient suffering from an HERV-W associated disease, wherein said patient is identified by a method comprising a step i) of detecting and/or quantifying HERV-W in a biological sample.

Definition

As used herein, the terms "**human endogenous retrovirus**" and "**HERV**", refer to the human endogenous retroviruses that comprise the virus belonging to the type-W endogenous retrovirus family, usually named "HERV-W".