presence of SDF-1 and no modulation of CXCR4 receptor activity will be observed in tissues and organs where SDF-1 ligand is not expressed, secreted or provided by the blood flow. Thus, hz515H7 Mab is likely to be less toxic as compared to other CXCR4 receptor ligands with positive or negative efficacy. In addition, silent antagonists are the minority species in the pharmacological space (Wurch et al., 1999, Kenakin, 2004).

In one aspect of the present disclosure, there is provided a humanized antibody capable of binding specifically to CXCR4, or a derived compound or functional fragment of same, characterized in that the said humanized antibody, or derived compound of functional fragment of same, comprises heavy and light chains, said heavy chain having CDRs consisting of CDR-H1, CDR-H2 and CDR-H3, and the said light chain having CDRs consisting of CDR-L1, CDR-L2 and CDR-L3, wherein said CDR-H1, CDR-H2 and CDR-H3 comprise respectively the sequences SEQ ID Nos. 4, 5 and 6, and said CDR-L1, CDR-L2 and CDR-L3 comprise respectively the sequences SEQ ID Nos. 7, 8 and 9.

In another aspect, there is provided an isolated nucleic acid molecule characterized in that it is selected among the following nucleic acids:

a) a nucleic acid, DNA or RNA, coding for a humanized antibody, or for a derived compound or functional fragment of same, as defined herein;

b) a nucleic acid complementary to a nucleic acid as defined in a);

c) a nucleic acid of at least 18 nucleotides capable of hybridizing under highly stringent conditions with at least one of the 3 CDRs of a heavy chain comprising the nucleic acid sequences SEQ ID Nos. 38 to 41, 49 to 52, 93 or 95; and

d) a nucleic acid of at least 18 nucleotides capable of hybridizing under highly stringent conditions with at least one of the 3 CDRs of a light chain comprising the nucleic acid sequences SEQ ID Nos. 42 to 48, 53 to 59, 94 or 96.

In another aspect, there is provided a vector composed of a nucleic acid as defined herein.

In another aspect, there is provided a host cell comprising a vector as defined herein.

In another aspect, there is provided a transgenic animal, except for man, comprising a cell transformed by a vector as defined herein.

In another aspect, there is provided a method for producing a humanized antibody, or a derived compound or functional fragment of same, characterized in that said method comprises the following steps: the culture in a medium of and the suitable culture conditions for a host cell as defined herein; and the recovery of said antibody, or one of its functional fragments, thus produced from the culture medium or from said cultured cells.

In another aspect, there is provided a humanized antibody, or a derived compound or functional fragment of same, as defined herein, for use as a drug.

In another aspect, there is provided a composition comprising as an active ingredient a compound consisting of a humanized antibody, or a derived compound or functional fragment of same, as defined herein.

In another aspect, there is provided a composition as defined herein, for use as a drug.

In another aspect, there is provided a humanized antibody, or a derived compound or functional fragment of same, as defined herein, and/or of a composition as defined herein, for the prevention or treatment of cancer.

In another aspect, there is provided a process of detecting in vitro the presence and/or the location of a CXCR4 expressing tumor in a subject, wherein said process comprises the steps of: (a) contacting a sample form the subject with a humanized antibody, or a derived compound or functional fragment of same, as defined herein; and (b) detecting the binding of said antibody with the sample.

In another aspect, there is provided a kit comprising at least a humanized antibody, or a derived compound or functional fragment of same, as defined herein, said antibody being preferably labeled.

Surprisingly, for the first time, inventors have managed to generate a humanized antibody capable of binding to CXCR4 but also capable of inducing conformational changes of the CXCR4 homodimers and/or heterodimers. More particularly, the humanized antibody of the invention is capable of inducing conformational changes of the CXCR4 homodimers but also of the CXCR4/CXCR2 heterodimers.

In the following specification, the plural expression "CXCR4 dimers" must be understood as encompassing the CXCR4 homodimers and also the CXCR4/CXCR2 heterodimers.

It must be mentioned at this stage that such humanized antibodies have never been described in the prior art. Moreover, it must be mentioned that the existence of CXCR4/CXCR2 heterodimers was never described.

A part of the invention is the discovery of the existence of a heterodimer formed by CXCR4 and CXCR2.

So, in a particular aspect, the present invention discloses an isolated complex comprising or consisting of the CXCR4/CXCR2 heterodimer.

CXCR4 compound part of said CXCR4/CXCR2 heterodimer complex is one of the two human CXCR4 isoforms selected from the group consisting of:

- the chemokine (C-X-C motif) receptor 4 isoform b [Homo sapiens] having the sequence as depicted under the Genbank accession number NP_003458 (SEQ ID No. 1);
- the chemokine (C-X-C motif) receptor 4 isoform a [Homo sapiens] having the sequence as depicted under the Genbank accession number NP_001008540 SEQ ID No. 2);
- an alternate transcriptional splice variant or a natural variant thereof having at least 95 % identity with one of these b or a isoforms having the SEQ ID No. 1 or 2; and