CLAIMS

1. A methodprocess offor designing a recombinant poxvirus, said recombinant poxvirus comprising one or more expression cassettes, each for expression of a fusion of one or a plurality of peptides, characterized in that it comprisinges performing by processing means (11) of a server (1) the steps of:
   (a) selecting a first subset of candidate peptides from a set of candidate peptides, wherein the candidatesaid peptides of the first subset of candidate peptides present transmembrane scores below a TMS transmembrane score threshold, wherein the transmembrane score of a candidate peptide is indicative of a probability that the candidate peptide bears at least one transmembrane segment;
   (b) determining an optimal distribution of the candidate peptides from saidof the first subset of candidate peptides to theone or more expression cassette(s) among a plurality of possible distributions, wherein said optimal distribution presentsdetermining comprises, ifwhen the one or more expression cassettes comprises there are at least two expression cassettes, calculating for each possible distribution athe lowest range between the hydropathy scores of the at least two expression cassettes and selecting as the optimal distribution the possible distribution having the lowest range;
   (c) for each of the one or more expression cassettes, determining an optimal slot assignment of the candidate peptides of the first subset of candidate peptides as function of a cassette slot occupancy rule so as to select athe peptide fusion with athe lowest TMtransmembrane score, wherein said cassette slot occupancy rule defines possible slot positions of candidate peptides of the first subset of candidate peptides within an expression cassette according to transmembrane scores of the candidate peptides, and, in case of equal transmembrane scores, according to hydropathy scores of the candidate peptides;
   (d) determining a DNA transfer sequence comprising athe nucleotide sequence of the one or more expression cassette(s) for generation of said recombinant poxvirus.

2. The methodprocess of claim 1, wherein thesaid candidate peptides of step (a) the first subset of candidate peptides present continuous regions below a homology threshold.

~~3. The process of claim 2, wherein step (a) comprises discarding peptides if they present transmembrane scores above a TMS threshold and/or an homologous region with a higher ranked candidate according to a predicted immunogenic potential above an homology threshold, and selecting a second subset of the identified set of candidate peptides as candidate peptides neither disclosed nor selected in the first subset.~~

~~4.~~3. The ~~process~~method of ~~any one of~~ claim~~s~~ 1 ~~to 3~~, wherein ~~step (b) comprises, if the number of~~ the plurality of possible distributions does not exceed~~s~~ a given maximum number of possible distributions~~function of resources of the processing means (11) of the server (1), attempting to determine said optimal distribution of the candidate peptides from said first subset to the expression cassette(s) among at least one iteration of said maximum number of possible distributions among the plurality of possible distributions~~.

4. The method of claim 3, wherein step (a) comprises discarding candidate peptides which transmembrane scores is above the transmembrane score threshold and/or which have a region of sequence identity above an identity threshold with another candidate peptide predicted to have a higher immunogenic potential, and selecting a second subset of candidate peptides wherein the candidate peptides of the second subset are neither discarded nor selected in the first subset.

5. The ~~process~~method of claim 4, ~~wherein~~ further comprising ~~step (b) comprises~~, ~~if~~when for each possible distribution ~~of an iteration of said maximum number of possible distributions~~, at least one expression cassette presents an hydropathy score above a given threshold, reiterating step (b) with another plurality of possible distributions~~either considering another iteration of said maximum number of possible distributions;~~ or replacing the candidate peptide from the first subset of candidate peptides presenting the highest hydropathy score by a candidate peptide from the second subset of candidate peptides, and ~~proceeding again with the peptide selection of~~ reiterating step (a).

6. The method~~process~~ of any one of claims 1 to 5, wherein step (c) further comprises discarding any peptide fusion that displays at least one transmembrane~~TM~~ patch with

a score above a transmembrane patch score threshold.

7. The method of claim 6, wherein step (a) comprises discarding candidate peptides which transmembrane scores is above the transmembrane score threshold and/or which have a region of sequence identity above an identity threshold with another candidate peptide predicted to have a higher immunogenic potential, and selecting a second subset of candidate peptides wherein the candidate peptides of the second subset are neither discarded nor selected in the first subset.

~~7.~~8. The process of claim 7~~6~~, wherein step (c) comprises, ~~if~~when at least one transmembrane domain is detected in any possible slot assignment of the candidate peptides in an expression cassette, replacing the candidate peptide from the first subset of candidate peptides presenting the highest transmembrane score, by a candidate peptide from the second subset, and repeating steps (b) then (c).

~~8. The process of any one of claims 1 to 7, wherein said cassette slot occupancy rule defines possible slot positions of candidate peptides within a cassette according to transmembrane scores of the peptides, and, in case of equal transmembrane scores, according to their hydropathy scores~~.

9. The method~~process~~ of claim 1~~8~~, wherein the candidates peptides distributed to an expression cassette are classified in one of~~according to~~ at least three classes ~~of risk of not generating or producing any recombinant poxvirus,~~ and wherein said cassette slot occupancy rule defin~~es~~ing, for each slot position~~s~~ of an expression cassette, in which~~what~~ class a candidate peptide shall ~~have to~~ be classified to be assigned to this slot position.

10. The method~~process~~ of ~~any one of~~ claim~~s~~ 1 ~~to 9~~, wherein there is/are a single expression cassette ~~if~~when the number of ~~selected~~ candidate peptides in the first subset of candidate peptides is below 10, two expression cassettes ~~if~~when the number of ~~selected~~ candidate peptides in the first subset of candidate peptides is between 10 and 14, and three expression cassettes ~~if~~when the number of ~~selected~~ candidate peptides in the first subset of candidate peptides is between 15 and 30.

11. A ~~process~~method for preparing a therapeutic vaccine comprising a recombinant poxvirus, comprising:
    - performing the ~~process~~method of ~~any one of~~ claim~~s~~ 1 to 9~~10~~ for designing said recombinant poxvirus;
    - generating said recombinant poxvirus.

12. The ~~process~~method according to claim 11, wherein said process further comprises a manufacturing step of said recombinant poxvirus, wherein said manufacturing step comprises amplifying the recombinant poxvirus ~~an amplification step~~ in a ~~suitable~~ producer cell ~~to a suitable scale, a step of~~ and recover~~ing~~ ~~of~~ the ~~produced~~ amplified recombinant poxvirus ~~from the cell culture and an optional step of purification of the recovered recombinant poxvirus~~.

13. The ~~process~~method according to any one of claims 11 and 12, wherein said recombinant poxvirus encodes neopeptides. ~~and is for use in a subject in need thereof for treating a cancer or preventing its relapse in a subject~~.