Claims

1. A method to generate a vaccine composition for use against a viral pathogen, comprising:

a. Identification of non-virion-integral proteins derived Human Leukocyte Antigen class I restricted epitopes (non-VIP-derived HLAI-HRE) from the viral pathogen against which the vaccine composition is desired.

b. Classification of immunogenicity of the identified non-VIP-derived HLAI-HRE in naïve CD8 T-cell populations isolated from donors without prior target virus infection, and/or in memory CD8 T-cell populations from donors with confirmed active, latent or resolved target virus infection.

c. Selection of non-VIP-derived HLAI-HRE with confirmed immunogenicity in naïve donors, or with observed CD8 T-cell responses in donors with confirmed active, latent or resolved target virus infection.

d. Inclusion of the selected non-VIP-derived HLAI-HRE in the vaccine composition.

2. The method according to claim 1, wherein multiple non-VIP-derived HLAI-HRE are selected for inclusion in the vaccine composition as to represent one or more HLAI-HRE in a selection of HLAI alleles that represents those alleles carried by at least 60 percent of individuals within the target population for which the vaccine composition is designed.

3. The method according to claim 1, wherein one or more non-VIP-derived HLAI-HRE is selected for inclusion in the vaccine composition as to represent one or more HLAI-HRE in a selection of one or more HLAI alleles that is carried by an individual for which the vaccine composition is designed.

4. The method according to any of claims 1-3, wherein the vaccine composition comprises one or more vaccination vectors selected from the following:

a. A recombinant non- replicating or replicating viral vector
b. A virus-like particle

c. A recombinant RNA construct, with or without modified nucleotides
d. A recombinant DNA construct, with or without modified nucleotides
e. A recombinant protein, with or without modified amino acids
f. A synthetic polypeptide, with or without modified amino acids

5. The method according to claim 4, wherein said one or more vaccination vectors are selected from a, b or c, and wherein the selected non-VIP-derived HLAI-HRE are incorporated into expression constructs that do not allow expression of functional non-VIP proteins in host cells upon vaccine delivery as to avoid immunoevasion activity of said viral non-VIP.

6. The method according to claim 5, wherein the provision of selected non-VIP-derived HLAI-HRE is provided by means of one or more of the following:

a. Introduction of point mutations and/or sequence insertions and/or sequence deletions, within full-length non-VIP ORFs that inactivate protein function
b. Construction of synthetic nucleic acid sequences comprising non-VIP ORF fragments that encode selected HLAI-HRE in a concatenated construct
c. Construction of synthetic nucleic acid sequences comprising non-VIP ORF fragments that encode selected HLAI-HRE within a carrier protein sequence

7. The method according to claim 4, wherein said one or more vaccination vectors are selected from d or e, and wherein the recombinant protein or synthetic polypeptides comprise one or more non-VIP-derived HLAI-HRE, and protein or polypeptide molecules comprise concatenated HLAI-HRE or encode said HLAI-HRE within a carrier protein or polypeptide.

8. The method according to any of claims 4-7, wherein the one or more vaccination vectors further encode one or more B-cell/Immunoglobulin epitopes as to prime neutralising Ig responses.

9. The method according to any of claims 4-8, wherein the one or more vaccination vectors further encode one or more selected HLAII-HRE epitopes as to prime CD4 T-cell responses to support B-cell maturation and neutralising antibody production, and/or

promote commitment of non-VIP-derived HLAI-HRE-specific CD8 T-cell responses to memory differentiation.

10. The method according to claim 8, wherein the one or more B-cell/Immunoglobulin epitopes have been modified as to remove HLAI-HRE from the VIP as to avoid priming CD8 T-cell responses against VIP proteins upon vaccine delivery.

11. A vaccine composition for use against a viral pathogen, which is prepared by a method as defined in any of claims 1-10.

12. A vaccine formulation comprising a vaccine composition as defined in claim 11 and at least one pharmaceutically acceptable excipient.

13. A method to vaccinate a human or veterinary subject to provide immunity against a virus, comprising the administration of a vaccine composition as defined in claim 11, a vaccine formulation as defined in claim 12 or a vaccine composition prepared by the method as defined in any of claims 1-10.

14. A method to treat a human or veterinary subject suffering from an acute, chronic or latent viral infection by immunizing said human or veterinary subject with a vaccine composition as defined in claim 11, a vaccine formulation as defined in claim 12 or a vaccine composition prepared by the method as defined in any of claims 1-10 to provoke an immune reaction.

15. A method to elicit a CD8 T-cell response against a viral infection in a human or veterinary subject, comprising the administration of a vaccine composition as defined in claim 11, a vaccine formulation as defined in claim 12 or a vaccine composition prepared by the method as defined in any of claims 1-10.