Claims

1. A vaccine comprising at least two distinct optimized viral HIV-1 polypeptides, wherein said optimized viral polypeptides correspond to the same viral gene product, wherein the viral gene product is selected from the group consisting of gag, pol and env, and

wherein the at least two distinct optimized gag polypeptides are selected from any one or more of the groups:

(a) SEQ ID NO:3 and 4 (b) SEQ ID NO:3 and 15 (c) SEQ ID NO:4 and 15;

wherein the at least two distinct optimized pol polypeptides are selected from any one or more of the groups:

(a) SEQ ID NO:12 and 13 (b) SEQ ID NO:12 and 14 (c) SEQ ID NO:13 and 14; and

wherein the at least two distinct optimized env polypeptides are selected from any one or more of the groups:

(a) SEQ ID NO:9 and 10 (b) SEQ ID NO:9 and 11 (c) SEQ ID NO:10 and 11.

2. The vaccine according to claim 1, wherein said at least two optimized gag viral polypeptides comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:3 and 4.

3. The vaccine according to claim 1, wherein said at least two optimized pol viral polypeptides comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:12 and 13.

4. The vaccine according to claim 2 further comprising at least two optimized pol viral polypeptides, wherein said polypeptide comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:12 and 13.

5. The vaccine according to claim 4 further comprising at least two optimized env viral polypeptides, wherein said polypeptides comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:9 and 10.

6. The vaccine of any one of claims 1 to 5, wherein said vaccine is formulated for delivery in a viral vector, wherein said vector is selected from the group consisting of adenovirus serotype 26 (Ad26), adenovirus serotype 34 (Ad34), adenovirus serotype 35 (Ad35), adenovirus serotype 48 (Ad48), or adenovirus serotype 5 HVR48 (Ad5HVR48), poxvirus, modified vaccinia virus Ankara (MVA).

7. The vaccine of claim 6, wherein said vector is an adenovirus serotype 26 (Ad26).

8. The vaccine of claim 6, wherein said vector is a modified vaccinia virus Ankara (MVA).

9. The vaccine of any one of claims 1 to 8, wherein said vaccine further comprises a pharmaceutically acceptable carrier, excipient, or diluent.

10. Use of the vaccine of any one of claims 1 to 8 in the manufacture of a medicament for treating or reducing the risk of a viral infection in a mammal, wherein said medicament comprises a pharmaceutically acceptable carrier, excipient, or diluent.

11. The use of claim 10, wherein said mammal is a human.

12. The use of claim 10 or 11, wherein said viral infection is a human immunodeficiency virus type 1 (HIV-1) infection.

13. A method of manufacturing a vaccine for treating or reducing the risk of an HIV-1 infection in a human, said method comprising synthesizing the vaccine of any one of claims 1 to 9.

14. A polypeptide comprising the amino acid sequence of SEQ ID NO: 9.

15. Use of the polypeptide of claim 14 in the manufacture of a medicament for treating or reducing the risk of HIV-1 infection in a human, wherein said medicament comprises a pharmaceutically acceptable carrier, excipient, or diluent.

Claims

1. A vaccine comprising at least two distinct optimized viral HIV-1 polypeptides, wherein said optimized viral polypeptides correspond to the same viral gene product, wherein the viral gene product is selected from the group consisting of gag, pol and env, and

wherein the at least two distinct optimized gag polypeptides are selected from any one or more of the groups:

(a) SEQ ID NO:3 and 4, (b) SEQ ID NO:3 and 15, and (c) SEQ ID NO:4 and 15;

wherein the at least two distinct optimized pol polypeptides are selected from any one or more of the groups:

(a) SEQ ID NO:12 and 13, (b) SEQ ID NO:12 and 14, and (c) SEQ ID NO:13 and 14; and

wherein the at least two distinct optimized env polypeptides are selected from any one or more of the groups:

(a) SEQ ID NO:9 and 10, (b) SEQ ID NO:9 and 11, and (c) SEQ ID NO:10 and 11.

2. The vaccine according to claim 1, wherein said at least two optimized gag viral polypeptides comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:3 and 4.

3. The vaccine according to claim 1, wherein said at least two optimized pol viral polypeptides comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:12 and 13.

4. The vaccine according to claim 2 further comprising at least two optimized pol viral polypeptides, wherein said polypeptide comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:12 and 13.

5. The vaccine according to claim 4 further comprising at least two optimized env viral polypeptides, wherein said polypeptides comprise an amino acid sequence having the sequences set forth in each of SEQ ID NO:9 and 10.

6. A vaccine formulated for delivery in a viral vector, wherein said vaccine comprises a nucleic acid molecule encoding the polypeptides of any one of claims 1 to 5, and said vector is selected from the group consisting of adenovirus serotype 26 (Ad26), adenovirus serotype 34 (Ad34), adenovirus serotype 35 (Ad35), adenovirus serotype 48 (Ad48), or adenovirus serotype 5 HVR48 (Ad5HVR48), poxvirus, modified vaccinia virus Ankara (MVA).

7. The vaccine of claim 6, wherein said vector is an adenovirus serotype 26 (Ad26).

8. The vaccine of claim 6, wherein said vector is a modified vaccinia virus Ankara (MVA).

9. The vaccine of any one of claims 1 to 8, wherein said vaccine further comprises a pharmaceutically acceptable carrier, excipient, or diluent.

10. Use of the vaccine of any one of claims 1 to 8 in the manufacture of a medicament for treating or reducing the risk of a viral infection in a mammal, wherein said medicament comprises a pharmaceutically acceptable carrier, excipient, or diluent.

11. The use of claim 10, wherein said mammal is a human.

12. The use of claim 10 or 11, wherein said viral infection is a human immunodeficiency virus type 1 (HIV-1) infection.

13. A method of manufacturing a vaccine for treating or reducing the risk of an HIV-1 infection in a human, said method comprising synthesizing the vaccine of any one of claims 1 to 9.

14. A polypeptide comprising the amino acid sequence of SEQ ID NO: 9.

15. Use of the polypeptide of claim 14 in the manufacture of a medicament for treating or reducing the risk of HIV-1 infection in a human, wherein said medicament comprises a pharmaceutically acceptable carrier, excipient, or diluent.