

were greater than or equal to 1:560. Guinea pigs vaccinated with saline produced low or negligible neutralizing antibody titers to MARV and EBOV (see FIGS. 25A and 25B).

[0168] MARV and EBOV challenge studies. Guinea pigs were infected the MARV or EBOV and monitored for 28 days to determine the effectiveness of each vaccine preparation. Both chimeric vaccines afforded significant protection from MARV challenge ($p < 0.05$). Of those animals infected with MARV, 8 out of 8 MARVGP1/EBOVGP2 VLP vaccinated animals survived infection with no appreciable weight loss (see FIGS. 26A and C). 7 out of 7 EBOVGP1/MARVGP2 VLP vaccinated animals also survived MARV challenge with little change in weight (see FIGS. 26A and C). All guinea pigs given saline in place of VLPs died from days 10 to 14; in parallel, 2 out of 8 guinea pigs, given EBOV GP1/2 VLPs, survived MARV challenge with extreme weight loss and visible signs of illness. Overall, there was no significant difference in survival between the EBOVGP1/2 and saline vaccinated groups ($p > 0.05$).

When a separate group of vaccinated guinea pigs were challenged with EBOV we observed survival in 8 out of 8 animals vaccinated with MARVGP1/EBOVGP2 VLPs with little change in weight. Two animals receiving EBOVGP1/MARVGP2 VLPs were not fully protected from infection and died on days 9 and 10. There was greater weight loss in this group compared to animals receiving MARVGP1/EBOVGP2 or EBOV GP1/2 VLP vaccines. The two animals that died had ruffled fur, malaise, and depression. Both chimeric GP VLP vaccinated groups were significantly protected when compared to the saline and MARV GP1/2 VLP vaccinated animals ($p < 0.05$). All guinea pigs receiving saline died between days 6 and 8 post infection, and animals vaccinated with MARV GP1/2 VLPs died between days 7-12 with one survivor (see FIGS. 26B and D).

CONCLUSION, NOVELTY AND IMPACT OF THE CURRENT INVENTION

[0169] The chimeric virus-like-particle (VLP) vaccine using a fusion of components from EBOV and MARV glycoprotein would provide immunity to two distinct filoviruses simultaneously, protect high risk workers, and cut production costs in half. This novel genetic approach builds on our previous finding using the VLP platform with a distinctively different approach to generate a broader protective immune response against the genetically diverse filoviruses, EBOV and MARV.

[0170] All documents cited herein are hereby incorporated in their entirety by reference thereto.

What is claimed is:

1. A chimeric filovirus virus like particle, VLP, comprising filovirus matrix protein VP40, and a chimeric envelope glycoprotein, GP, wherein said GP is comprised of GP1 from a first filovirus and GP2, from a second filovirus.
2. The chimeric filovirus VLP of claim 1 wherein said first filovirus is Ebola and said second filovirus is Marburg.
3. The chimeric filovirus VLP of claim 1 wherein said first filovirus is Marburg and said second filovirus is Ebola.
4. A vaccine against Ebola virus infection comprising the VLP according to claim 2.
5. A vaccine against Marburg virus infection comprising the VLP according to claim 3.
6. A vaccine against Marburg virus infection comprising VLP according to claim 2.
7. A vaccine against Marburg virus infection comprising VLP according to claim 3.
8. A panfilovirus vaccine comprising VLPs according to claim 2.
9. A panfilovirus vaccine comprising VLPs according to claim 3.
10. A filovirus vaccine according to claim 2 further comprising an adjuvant.
11. A filovirus vaccine according to claim 3 further comprising an adjuvant.
12. The vaccine of claim 9 wherein said adjuvant is chosen from the group consisting of: RIBI, QS21, and LT(R192G).
13. A chimeric VLP-producing cell comprising a mammalian cell expressing said VLP.
14. An immunogenic composition comprising, in a physiologically acceptable vehicle, chimeric VLPs according to claim 2.
15. An immunogenic composition comprising, in a physiologically acceptable vehicle, chimeric VLPs according to claim 3.
16. The immunogenic composition according to claim 14, further comprising an adjuvant.
17. The immunogenic composition according to claim 15, further comprising an adjuvant.
18. A chimeric VLP vaccine protective against infection with Marburg virus and Ebola virus comprising the VLP of claim 2.
19. The chimeric vaccine of claim 18 wherein said Marburg virus is MARV-Musoke, MARV-Ravn, and MARV-Ci67, and said Ebola is Ebola Zaire and Ebola Sudan.
20. A chimeric VLP-producing cell comprising an insect cell expressing said VLP.
21. A DNA vaccine comprising a nucleic acid capable of being expressed in a subject or a cell of a subject, said nucleic acid encoding a chimeric VLP according to claim 1.

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