

CLAIMS

1. A immunogenic composition comprising live attenuated chimeric respiratory syncytial virus (RSV) having a mutated gene encoding an RSV F protein having M at position 79, R at position 191, K at position 357, and Y at position 371, provided that the RSV F protein has less than 99% sequence identity to SEQ ID NO:4.
2. The immunogenic composition of Claim 1, wherein the RSV F protein has V at position 557 or F protein is mutated such that position 557 is V.
3. The immunogenic composition of Claim 1, wherein the RSV F protein has more than 85% sequence identity to SEQ ID NO: 1 or 13.
4. The immunogenic composition of Claim 1, wherein the genes encoding RSV NS1, NS2, and G proteins are codon-deoptimized such that the rate of expression of NS1, NS2, and G is reduced by more than half in Vero cells compared to the wild type A2 virus.
5. The immunogenic composition of Claim 4, wherein the rate of expression of G in mammalian cells is reduce by more than one tenth (1/10) in Vero cells compared to the wild type A2 virus.
6. The immunogenic composition of Claim 4, wherein the rate of expression of NS1 is reduce by more than one fourth (1/4) in Vero cells compared to the wild type A2 virus.
7. The immunogenic composition of Claim 4, wherein the rate of expression of NS2 is reduce by more than one fourth (1/4) in Vero cells compared to the wild type A2 virus.
8. The immunogenic composition of Claim 1, wherein the gene encoding the SH protein is deleted or truncated.
9. The immunogenic composition of Claim 1, wherein the gene encoding F protein is mutated such that position 557 is not V or that I is in position 557.

10. The immunogenic composition of Claim 1, further comprising an adjuvant and/or other pharmaceutically acceptable carrier.
11. The immunogenic composition of Claim 10, wherein the adjuvant is an aluminum gel, aluminum salt, or monophosphoryl lipid A.
12. The immunogenic composition of Claim 10, wherein the adjuvant is an oil-in-water emulsion optionally comprising α -tocopherol, squalene, and/or a surfactant.
13. The immunogenic composition of any one of Claims 1-12, for use in therapy.
14. The immunogenic composition of any one of claims 1-12, for use in the immunization of a subject against respiratory syncytial virus.
15. Use of the immunogenic composition of any one of claims 1-12 in the manufacture of a pharmaceutical composition for the immunization of a subject against respiratory syncytial virus.
16. A nucleic acid encoding an RSV F protein such that position 79 is I, position 191 is K, position 357 is T, and position 371 is N.
17. The nucleic acid of Claim 16 comprising SEQ ID NO: 14 or variants.
18. A vector comprising a nucleic acid of Claim 17.
19. The vector of Claim 18 selected from a plasmid or a bacterial artificial chromosome.
20. An isolated recombinant particle comprising an RSV F protein such that position 79 is M, position 191 is R, position 357 is K, and position 371 is Y, provided that the RSV F protein has less than 99% sequence identity to SEQ ID NO:4.
21. The isolated recombinant particle of Claim 20, comprising a live attenuated RSV genome or antigenome.