IMMUNOGENIC COMPOSITIONS

TECHNICAL FIELD

This invention is in the field of immunogenic compositions comprising conjugates of *Streptococcus agalactiae* capsular saccharides and carrier proteins. The compositions are useful for immunisation.

BACKGROUND ART

The capsular saccharides of bacteria have been used for many years in vaccines against capsulated bacteria. As saccharides are T-independent antigens, however, they are poorly immunogenic. Conjugation to a carrier can convert T-independent antigens into T-dependent antigens, thereby enhancing memory responses and allowing protective immunity to develop. The most effective saccharide vaccines are therefore based on glycoconjugates, and the prototype conjugate vaccine was against *Haemophilus influenzae* type b ('Hib') [*e.g.* see chapter 14 of Vaccines (2004) eds. Plotkin & Orenstein. ISBN 0-7216-9688-0].

Another bacterium for which conjugate vaccines have been described is *Streptococcus agalactiae*, also known as 'group B streptococcus', or simply as 'GBS'. Much of this work has been performed by Dennis Kasper and colleagues, and is described in documents such as references 1 to 9. Conjugate vaccines for each of GBS serotypes Ia, Ib, II, III, and V have been shown to be safe and immunogenic in humans [10&11]. However, there remains a need for further and improved GBS conjugate vaccines.

DISCLOSURE OF THE INVENTION

The invention provides an immunogenic composition comprising: i) a capsular saccharide from GBS serotype Ia conjugated to a carrier protein; ii) a capsular saccharide from GBS serotype Ib conjugated to a carrier protein; iii) a capsular saccharide from GBS serotype III conjugated to a carrier protein; iv) a capsular saccharide from GBS serotype V conjugated to a carrier protein; and v) a capsular saccharide from GBS serotype II conjugated to a carrier protein.

Typically, the immunogenic composition will not comprise any conjugates other than those specifically mentioned, particularly conjugates comprising capsular saccharides from GBS serotypes other than those specifically mentioned. However, in some embodiments, the compositions may comprise other conjugates, including conjugates comprising capsular saccharides from other GBS serotypes. For example, the compositions may comprise a conjugate that is a capsular saccharide from GBS serotype VI conjugated to a carrier protein. In another possibility, the compositions may comprise a conjugate that is a capsular saccharide from GBS serotype VIII conjugated to a carrier protein.

The immunogenic compositions described above may comprise any suitable amount of the capsular saccharide(s) per unit dose. Suitable amounts of the capsular saccharide(s) may be from 0.1 to 50 μg per unit dose. Typically, each GBS capsular saccharide is present at an amount from 1 to 30μg, for example

CLAIMS

1. An immunogenic composition comprising: a) a conjugate that is a capsular saccharide from GBS serotype Ia conjugated to a carrier protein; b) a conjugate that is a capsular saccharide from GBS serotype Ib conjugated to a carrier protein; c) a conjugate that is a capsular saccharide from GBS serotype III conjugated to a carrier protein; d) a conjugate that is a capsular saccharide from GBS serotype II conjugated to a carrier protein; and e) a conjugate that is a capsular saccharide from GBS serotype V conjugated to a carrier protein.

2. The immunogenic composition according to claim 1, wherein the total quantity of GBS capsular saccharides is ≤ 70 μg.

3. The immunogenic composition according to claim 1 or claim 2, wherein each GBS capsular saccharide is present at an amount from 1 to 30 μg per unit dose.

4. The immunogenic composition according to claim 3, wherein each GBS capsular saccharide is present at an amount of 5 μg, 10 μg or 20 μg per unit dose.

5. The immunogenic composition according to any one of the preceding claims, wherein the amounts of the GBS serotype Ia, Ib, II, V and III capsular saccharides per unit dose are selected from the group consisting of 20 μg, 20μg, 20 μg, 20 μg and 20μg; 10μg, 10μg, 10μg, 10μg and 10μg; and 5μg, 5μg, 5μg, 5μg and 5μg.

6. The immunogenic composition according to claim 5, wherein the amounts of the GBS serotype Ia, Ib, II, V and III capsular saccharides per unit dose are 5μg, 5μg, 5μg, 5μg and 5μg.

7. The immunogenic composition according to claim 1 or claim 2, wherein each GBS capsular saccharide is present at an amount from 0.1 to 5 μg per unit dose.

8. The immunogenic composition according to claim 7, wherein each GBS capsular saccharide is present at an amount of 0.5, 2.5 or 5 μg per unit dose.

9. The immunogenic composition according to any one of the preceding claims, wherein the ratio of the masses of the GBS serotype Ia, Ib, II, V and III capsular saccharides is 1:1:1:1:1.

10. The immunogenic composition according to any one of claims 1 to 9, wherein the composition is for administration in one unit dose followed by a second unit dose administered 3 months after the first unit dose.

11. The immunogenic composition according to any one of the preceding claims, wherein the composition is for administration in one unit dose followed by a second unit dose administered 1 month after the first unit dose.

12. The immunogenic composition according to any one of claims 1-9 and 11, wherein the composition is for administration in a single dose.

13. The immunogenic composition according to any one of the preceding claims, wherein the immunogenic composition does not contain an aluminium salt adjuvant.

14. The immunogenic composition according to any one of the preceding claims, wherein the immunogenic composition does not contain any adjuvant.

15. The immunogenic composition according to any one of the preceding claims, wherein the carrier proteins in a), b), c), d) and e) are diphtheria toxoid, tetanus toxoid or CRM197.

16. The immunogenic composition according to claim 15, wherein the carrier proteins in a), b), c), d) and e) are CRM197.

17. The immunogenic composition according to any one of the preceding claims, wherein the capsular saccharide from GBS serotype Ia has a MW in the range of 150-300kDa; the capsular saccharide from GBS serotype Ib has a MW in the range of 150-300kDa; the capsular saccharide from GBS serotype III has a MW in the range of 50-200kDa; the capsular saccharide from GBS serotype II has a MW in the range of 150-300kDa; and the capsular saccharide from GBS serotype V has a MW in the range of 150-300kDa.

18. The immunogenic composition according to any one of the preceding claims, wherein the conjugate that is a capsular saccharide from GBS serotype Ia conjugated to a carrier protein has a saccharide:protein ratio (w/w) between about 1:1 to 1:2; the conjugate that is a capsular saccharide from GBS serotype Ib conjugated to a carrier protein has a saccharide:protein ratio (w/w) between about 1:1 to 1:2; the conjugate that is a capsular saccharide from GBS serotype II conjugated to a carrier protein has a saccharide:protein ratio (w/w) between about 1:1 to 1:2; the conjugate that is a capsular saccharide from GBS serotype V conjugated to a carrier protein has a saccharide:protein ratio (w/w) between about 1:1 to 1:2; and the conjugate that is a capsular saccharide from GBS serotype III conjugated to a carrier protein has a saccharide:protein ratio (w/w) between about 3:1 to 1:1.

19. The immunogenic composition according to any one of the preceding claims, wherein the composition is for administration intramuscularly.

20. The immunogenic composition according to any one of the preceding claims, wherein the composition is an injectable liquid solution or suspension.

21. The immunogenic composition according to any one of claims 1-19, wherein the composition is lyophilised.

22. The immunogenic composition according to claim 21, wherein the composition comprises mannitol to stabilise the conjugate(s).

23. The immunogenic compositions according to any one of the preceding claims, wherein the composition comprises a potassium dihydrogen phosphate buffer.

24. The immunogenic compositions according to any one of the preceding claims, wherein the composition comprises sodium chloride.

25. The immunogenic composition according to any one of the preceding claims, wherein the composition is a vaccine.

26. The immunogenic composition according to any one of the preceding claims, wherein the composition is for administration to a human.

27. The immunogenic composition according to any one of the preceding claims, wherein the composition is for administration to humans selected from females of child-bearing age, pregnant females and elderly patients.

28. The immunogenic composition according to claim 27, wherein the composition is for administration to a pregnant female.

29. The immunogenic composition according to any one of claims 26-28, wherein prior to administration the human has undetectable levels of antibodies against capsular saccharide from GBS serotype Ia, capsular saccharide from GBS serotype Ib, capsular saccharide from GBS serotype II, capsular saccharide from GBS serotype V, and/or capsular saccharide from GBS serotype III.

30. The immunogenic composition according to any one of the preceding claims, wherein the composition is for use as a medicament.

31. The immunogenic composition according to claim 30, wherein the composition is for the prevention and/or treatment of a disease caused by *S.agalactiae*.

32. The immunogenic composition according to claim 31, wherein the disease is neonatal sepsis, bacteremia, neonatal pneumonia, neonatal meningitis, endometritis, osteomyelitis or septic arthritis.

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CLAIMS

1. An invention not claimed in any divisional application.