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MeNZB™ - what it targets, its efficacy and the duration of protection.
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This information is provided as further background on the effectiveness of the MeNZB vaccine and the estimated duration of protection.

Key Message

The MeNZB vaccine targets the epidemic strain of meningococcal disease in New Zealand and offers a high level of protection against the epidemic strain that is expected to last for several years.

Background to Key Message

1. The purpose of this immunisation programme is to control the epidemic of group B meningococcal disease that has occurred in New Zealand since the early 90s; it is not to get rid of all meningococcal disease or even this organism from our community, though that would be a bonus. The vaccine is targeting 100% of the epidemic strain – see graph.

2. The efficacy of the vaccine and the duration of protection following vaccination are, at present, unknown. However quite a bit about the immune response and its duration following vaccination is known. In infants aged 6-8 months, toddlers aged 16-24 months and children aged 8-12 years the percentage sero-converting, as defined as a fourfold rise in serum bactericidal antibody titre, was 75% in the clinical trials conducted in Auckland[1]. In the 6-10 week age group 55% sero-converted.

   If the less conservative measure used in other international studies[2] had been used in New Zealand, then over 90% of the clinical trial participants aged 6 months or older would have sero-converted. While the percentage sero-converting in the 6-10 week age group would be 75%.

3. From international data we know that high levels of protection can be expected for communities in which a majority of vacinees mount a fourfold rise in Serum Bactericidal Activity following vaccination[3-6]. Therefore, given the percentage of sero-responders seen in the clinical trials, high levels of efficacy are expected i.e**. at least** 75% for children over 6 months of age: the real figure will only be known when sufficient vaccinees have been monitored for sufficiently long – probably not till 2007.

4. Information on duration of protection comes from Norway where an efficacy trial was conducted in teenagers in which the protection afforded by two doses was assessed. At 10 months the efficacy estimate was 87%[7] and this had fallen to 57% at 29 months[8]. It is known that a 3rd

dose, which is being offered in New Zealand, heightens the immune response and extends its duration[6,7] and so would be expected to extend the duration of protection.

5. Further information on duration of protection, as opposed to duration of measurable immune response, comes from the only other country which has mounted an epidemic control campaign using a similar vaccine – Cuba. In that country in the late 1980s all aged less than 20 years received 2 doses of an outer membrane vesicle vaccine against the circulating strain. Although the vaccination programme began after the epidemic had apparently begun to decline, the decline continued and the vaccine has since remained in the infant immunisation schedule in Cuba with low rates of disease being sustained over the last 15 years. Judging from the course of the epidemic in Norway, the rate of decline in Cuba was greater than would be expected with natural waning. This experience was important in the formulation of the NZ strategy.

6. The assumption that sero-converting as defined by a four fold rise in serum bactericidal antibody titre following vaccination equates with protection at an individual level, and failing to do so does not, is simply not correct.

   In addition, it is known that the percentage of individuals sustaining a fourfold rise in serum bactericidal antibody declines over the year following receipt of the vaccine in all age groups in which it has been measured. If an individual who previously sero-converted suffers a decline in serum bactericidal antibody it does not necessarily mean that they have become susceptible to disease.

   It is not known whether circulating antibody or immune memory or both are necessary for long-term protection.

7. In summary - ***The MeNZB vaccine targets the epidemic strain of meningococcal disease in New Zealand and offers a high level of protection against the epidemic strain that is expected to last for several years.***

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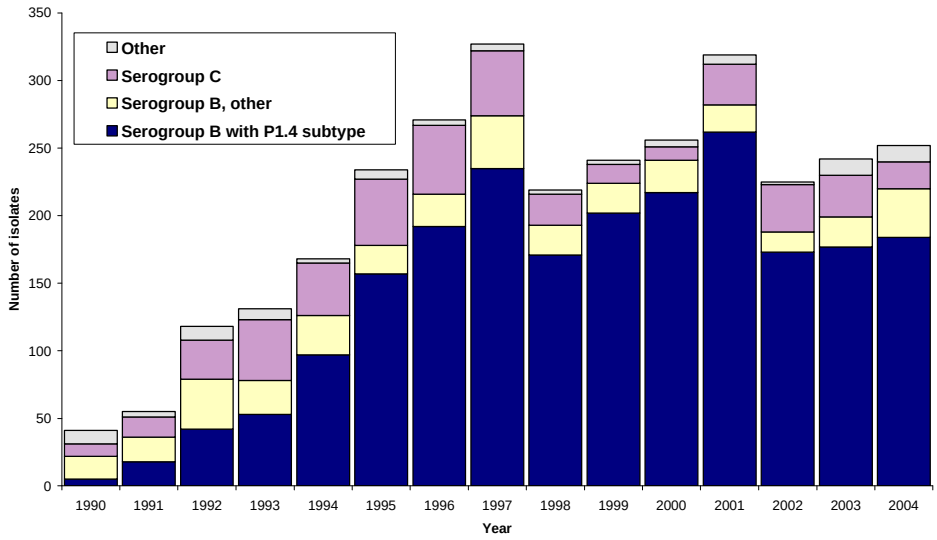
3. Boslego J, Garcia J, Cruz C, et al. Efficacy, safety, and immunogenicity of a meningococcal group B (15:P1.3) outer membrane protein vaccine in Iquique, Chile. Chilean National Committee for Meningococcal Disease. Vaccine. 1995; 13: 821-9.
4. Milagres LC, Ramos SR, Saachi CT, et al. Immune response of Brazilian children to a *Neisseria meningitidis* to a serogroup B outer membrane protein vaccine: comparison with efficacy. Infect Immun. 1994; 62: 4419-24.
5. Thomas M. Prevention of group B meningococcal disease by vaccination: a difficult task. NZMJ 2004 vol 117 No 1200 !SSN 1175 8716
6. Holst J, Feiring B, Fuglesang JE, Høiby EA, Nøkleby H, Aaberge IS, et al. Serum bactericidal activity correlates with the vaccine efficacy of outer membrane vesicle vaccine against *Neisseria meningitidis* serogroup B disease. Vaccine 2003;21:734-737.
7. Perkins BA, Jonsdottir K, Briem H et al. Immunogenicity of two efficacious outer membrane protein-based serogroup B meningococcal vaccines among young adults in Iceland. J Infect Dis. 1998; 17: 683-91.
8. Bjune et al Results of an efficacy trial with an outer membrane vesicle vaccine against systemic serogroupB meningococcal disease in Norway. NIPH Annals 1991:14(2):125-132.

Meningococcal disease isolate serogroup and dominant subtype, 1990-2004



ESR data - Vaccine is targeting the dark blue part of this histogram

NB. The proportion of cases caused by the vaccine strain, ~75%, is derived from cases where the causative organism has been confirmed. It is reasonable to expect that the proportion of cases caused by the vaccine strain in those where the organism has not been confirmed, i.e. probable cases, is also 75%.