

Vaccines for Preventing Meningococcal Disease
Prof. Tony Walls, University of Otago, New Zealand
A Webber Training Teleclass

Vaccines for preventing meningococcal disease

Dr Tony Walls
Paediatric Infectious Diseases
University of Otago, Christchurch, New Zealand



Hosted by Jane Barnett
jane@webbertraining.com

www.webbertraining.com

October 18, 2012

Outline

- Meningococcal disease
 - Clinical features
 - Epidemiology
- New Zealand meningococcal epidemic
- Meningococcal vaccines
 - MeNZB™ in New Zealand
 - MenAfrivac™
 - Conjugate meningococcal vaccines
 - The future of meningococcal vaccines

Invasive meningococcal disease



Invasive meningococcal disease



Invasive meningococcal disease



Carriage and transmission

- Asymptomatic carriage provides reservoir for transmission
- Increasing carriage with age
 - Up to 25% in 15-19 year olds
- Risk factors:
 - Overcrowding, Hajj pilgrimage, students at university, exposure to *N. meningitidis*, specific immune deficiencies

Hosted by Jane Barnett jane@webbertraining.com
www.webbertraining.com

Vaccines for Preventing Meningococcal Disease

Prof. Tony Walls, University of Otago, New Zealand
A Webber Training Teleclass

Epidemiology

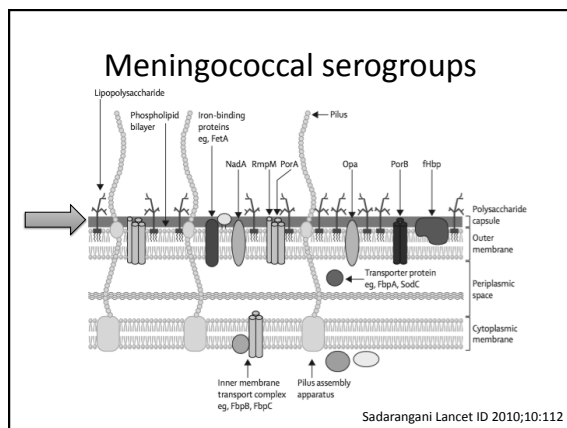
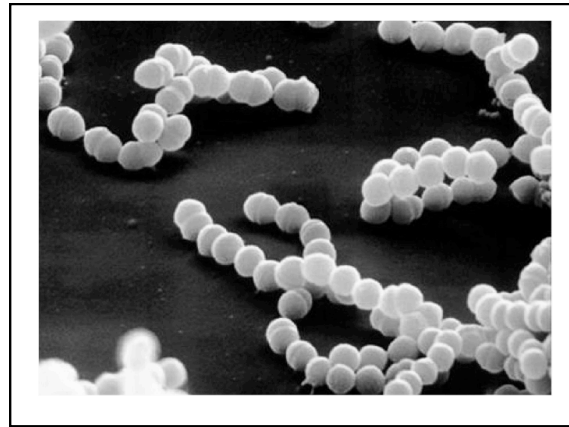
Table 1

Invasive meningococcal incidence by country or region.

Country/region	Incidence/100,000	Year
African meningitis belt	10–1000 (during epidemics) ^a	Not applicable
New Zealand	2.4	2010
Australia	1.2	2009
Europe	0.92	2009
Chile	0.5	2010
Argentina	0.6	2008
Canada	0.47	2008
United States	0.28	2009

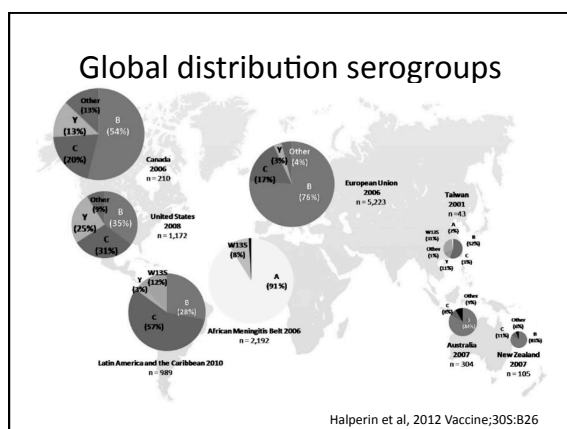
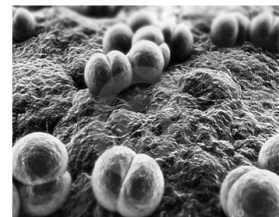
^a The annual incidence during serogroup A epidemics in the meningitis belt can exceed 1000 cases per 100,000 population.

Halperin et al, 2012 Vaccine;30S:826



Meningococcal serogroups

- 12 meningococcal serogroups
- Vast majority of infections are caused by six serogroups:
 - A, B, C, W135, X and Y



Meningococcal vaccines

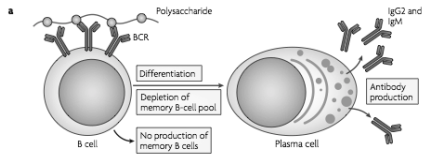
- Serogroup specific
- Polysaccharide vaccines
- Protein-polysaccharide conjugate vaccines



Vaccines for Preventing Meningococcal Disease

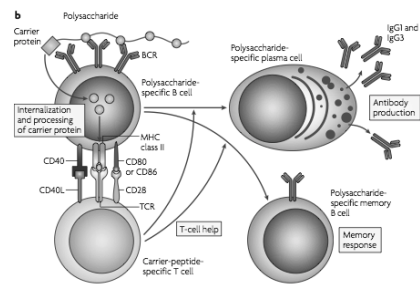
Prof. Tony Walls, University of Otago, New Zealand
A Webber Training Teleclass

Pure polysaccharide vaccine



- Polysaccharide vaccine poorly immunogenic in children < 2 years of age

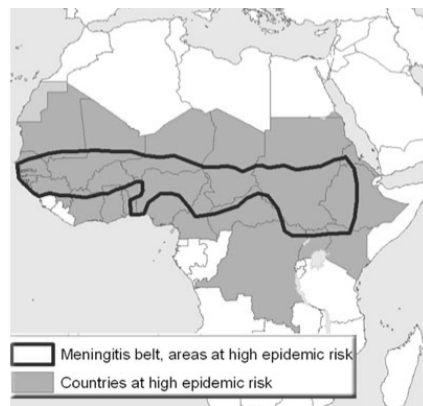
Conjugate protein-polysaccharide vaccines



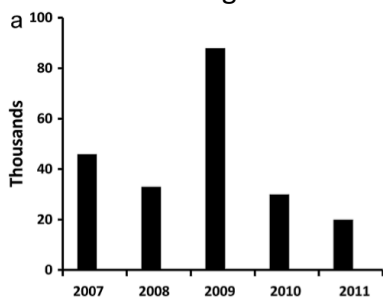
Serogroup A Meningococcal disease



www.meningvax.org



Number of meningitis deaths in African meningitis belt



Halperin et al, 2012 Vaccine;30S:B26

Serogroup distribution African meningitis belt

Year	Number of samples tested ^a	Meningococcal serogroup ^b		
		Serogroup A	Serogroup W135	Other serogroups
2007	2533	609	63	9
2008	3413	1062	7	65 ^c
2009	5688	1966	167	47
2010	4132	439	726	75
2011 ^d	4278	197	495	144

^a The proportion of cases investigated varied between countries and from year to year but was usually about 10%.

Halperin et al, 2012 Vaccine;30S:B26

Hosted by Jane Barnett jane@webbertraining.com
www.webbertraining.com

Vaccines for Preventing Meningococcal Disease

Prof. Tony Walls, University of Otago, New Zealand
A Webber Training Teleclass



- Collaboration between:
 - Bill & Melinda Gates Foundation
 - Path (Seattle based NGO)
 - World Health Organisation
- Meningococcal A vaccine developed by Serum Institute of India Ltd
 - MenAfriVac™

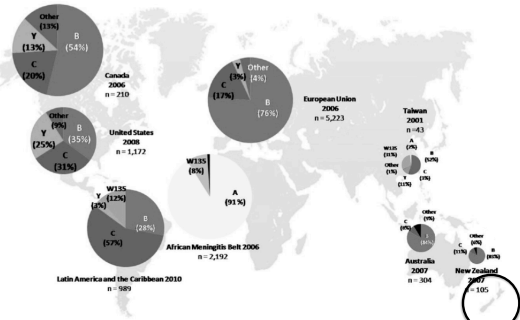


- Single dose conjugate vaccine administered to 1-29 year olds
- Cost US\$0.40 per dose
- Burkino Faso 10-day national campaign and over 11.4 million people vaccinated
- www.meningvax.org

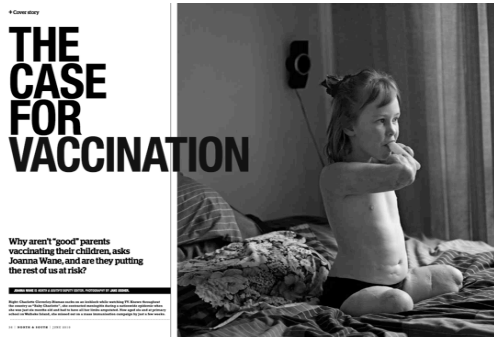


- MVP News Digest 2012
 - “to date, not a single case of group A Meningitis has been notified in more than 54 million individuals who received the MenAfriVac™ in 2010-11.”

Global distribution serotypes



Halperin et al, 2012 Vaccine;30S:B26



New Zealand experience

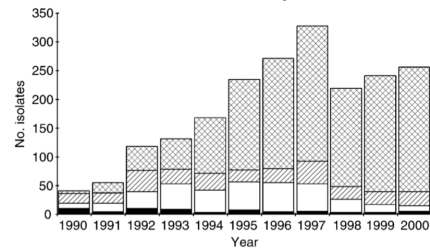


Fig. 5 Meningococcal disease isolate serogroup and dominant subtype, by year, 1990–2000. (▨) Serogroup B with P1.7b,4 subtype; (□) serogroup C; (▧) other serogroup B; (■) other serogroup.

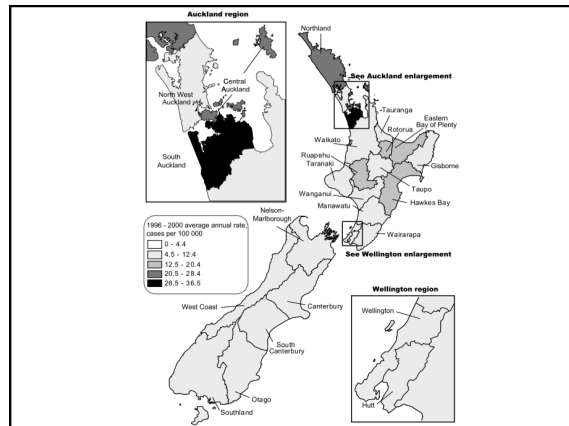
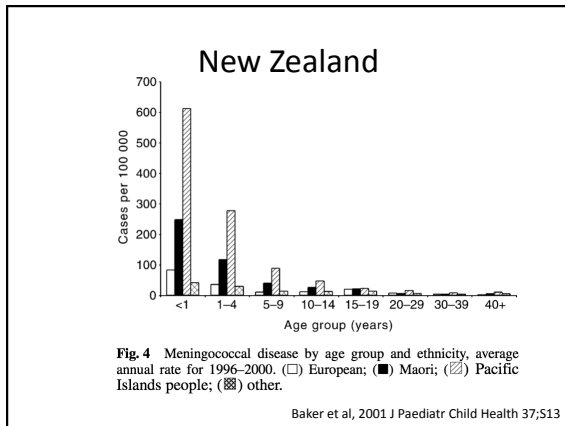
Baker et al, 2001 J Paediatr Child Health 37;S13

Hosted by Jane Barnett jane@webbertraining.com
www.webbertraining.com

Vaccines for Preventing Meningococcal Disease

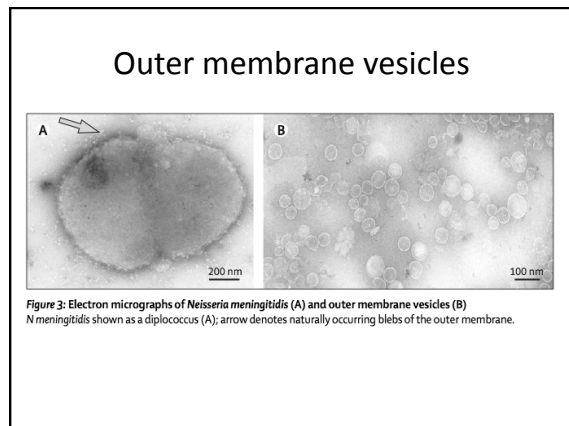
Prof. Tony Walls, University of Otago, New Zealand

A Webber Training Teleclass



Group B meningococcal vaccines

- No licensed serogroup B polysaccharide vaccine
 - Poor immunogenicity
 - Possible induction of autoantibodies
- Outer membrane vesicle (OMV) vaccines developed for clonal outbreaks
 - Chile, Brazil, Cuba, Norway



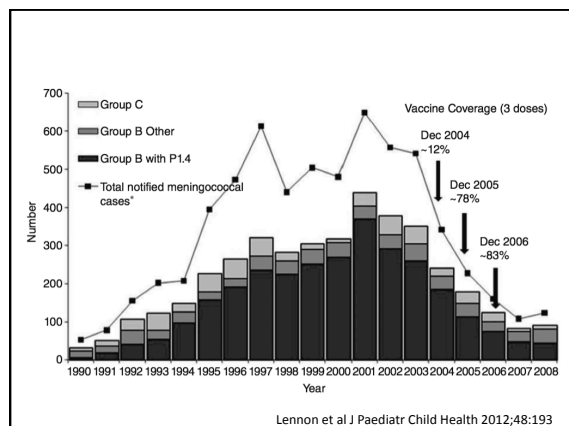
THE NEW ZEALAND MEDICAL JOURNAL
Vol 117 No 1200 ISSN 1175 8716

The New Zealand Meningococcal Vaccine Strategy: A tailor-made vaccine to combat a devastating epidemic

Kerry Sexton, Diana Lennon, Philipp Oster, Sue Crengle, Diana Martin, Kim Mulholland, Teuila Percival, Stewart Reid, Joanna Stewart, Jane O'Hallahan

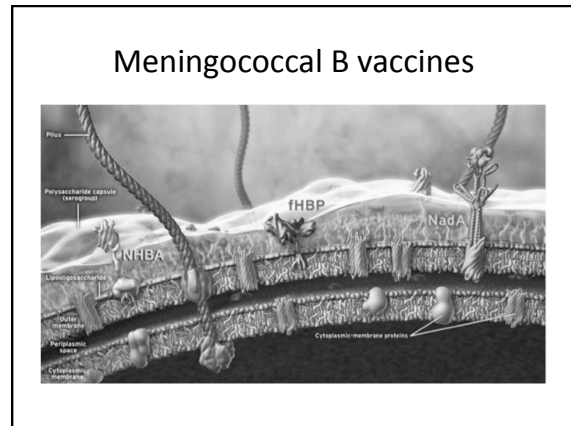
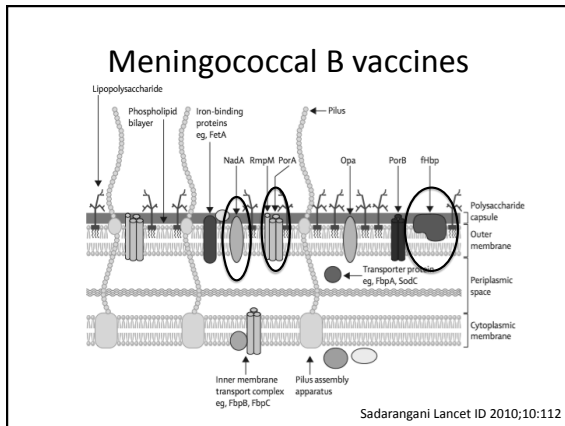
Abstract

The New Zealand Meningococcal Vaccine Strategy aims to end the devastating 14-year epidemic of B:4:P1.7b,4 group B meningococcal disease in New Zealand through a mass immunisation programme to all under 20 year olds using a tailor-made vaccine (McNZB™). This paper describes the scientific rationale, development, and key components of the New Zealand Meningococcal Vaccine Strategy. A summary of the efficacy and safety data of existing outer membrane vesicle group B meningococcal vaccines is included as these data critically support the Strategy.



Hosted by Jane Barnett jane@webbertraining.com
www.webbertraining.com

Vaccines for Preventing Meningococcal Disease
Prof. Tony Walls, University of Otago, New Zealand
A Webber Training Teleclass



- ### 4CMenB vaccine
- A new vaccine with recombinant proteins and outer membrane vesicles
 - Developed by reverse vaccinology
 - Each dose contains:
 - 50ug NadA
 - 50ug fHbp
 - 50ug NHBA
 - OMV from NZ98/254

- ### 4CMenB vaccine
- Not yet licensed
 - Phase II studies show immunogenicity in infants and adolescents
 - Can be given safely with other infant vaccines
 - Potential to cover 78% of serogroup B isolates

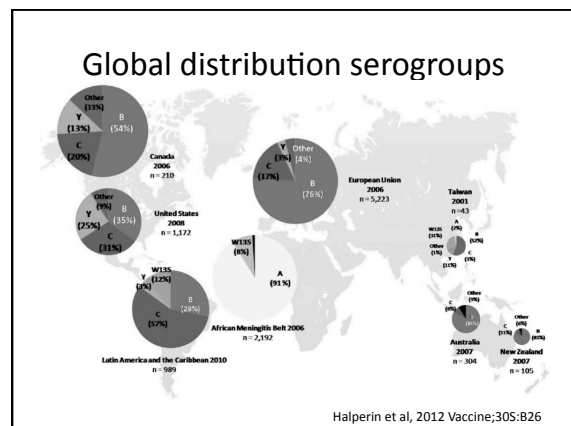
EDITORIAL

Editorials represent the opinions of the authors and JAMA and not those of the American Medical Association.

Inching Toward a Serogroup B Meningococcal Vaccine for Infants

Amanda C. Cohn, MD
 Nancy E. Messonnier, MD

JAMA 2012;307:614-5



Vaccines for Preventing Meningococcal Disease

Prof. Tony Walls, University of Otago, New Zealand

A Webber Training Teleclass

Other meningococcal vaccines

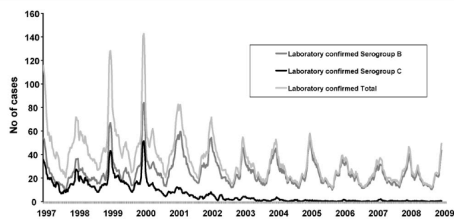
- Polysaccharide vaccines
 - Mencevax ACWY
 - Menommune ACYW
- Conjugate vaccines
 - Meningitec (Group C)
 - NeisVac-C (Group C)
 - Menactra (Quadravalent A,C,Y and W135)
 - Menveo (Quadravalent A,C,Y and W135)

Men C vaccine in the UK

- Men C vaccination introduced into UK 1999
- 3-dose schedule at 2, 3 and 4 months



Men C vaccine in the UK



Men C disease in Canada

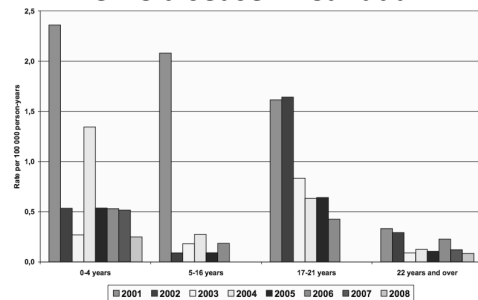
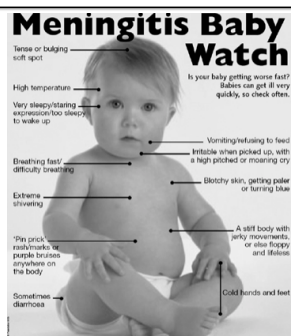


FIGURE 2. Incidence of serogroup C meningococcal disease by age group and year in the province of Quebec, Canada.

De Wals et al PIDJ 2011;30:566-569

Quadravalent Meningococcal vaccine

- Ideal for countries where meningococcal disease caused by several serogroups
- Cost implications



Morbidity and Mortality Weekly Report (MMWR)

Updated Recommendations for Use of Meningococcal Conjugate Vaccines --- Advisory Committee on Immunization Practices (ACIP), 2010

- January 2011 Advisory Committee on Immunization Practice (ACIP) recommended:
 - Vaccinate persons aged 2-55years at increased risk of meningococcal disease
 - Vaccinate all adolescents 11 to years
 - All adolescents receive a booster at age 16 years

Vaccines for Preventing Meningococcal Disease
Prof. Tony Walls, University of Otago, New Zealand
A Webber Training Teleclass

Summary

- Meningococcal disease is preventable
- New vaccines in development
 - e.g. Meningococcal B vaccines
- Global initiatives for resource poor countries
- Introduction of Meningococcal vaccines into routine schedules will depend on many different factors:
 - Rates of disease, cost, acceptability



SOUTH PACIFIC
Teleclass Series
2012

February 12
Outbreaks of Vaccine Preventable Diseases - Communicating the Science and Closing the Gaps
Dr Nikki Turner, University of Auckland, New Zealand

April 18
Central Line Associated Infection in ICU
Professor M.L. McLaws, University of New South Wales, Australia

June 13
Hand Hygiene Initiatives in Australia
Phil Russo, Hand Hygiene Australia

October 18
Meningococcal Disease and the New Zealand Experience - Where to From Here
Dr Tony Walls, University of Otago, New Zealand

December 5
(WHO Teleclass) New Developments in Infection Control for Renal Dialysis
Prof. W.H. Seto, Queen Mary Hospital, Hong Kong

NOTICE
Look for additional teleclass lectures broadcast live from South Pacific conferences.
www.webbertraining.com

Hosted by Jane Barnett jane@webbertraining.com
www.webbertraining.com