Meningococcal

Updated: April 15, 2010

Understanding the Disease | Top

Neisseria meningitidis, or the meningococcus, is a bacterium that can cause a life-threatening infection of the bloodstream, meningitis (infection of the brain and spinal cord coverings), or both. Symptoms may include fever, stiff neck, sore throat, headache, muscle aches, joint pain and swelling, shock, and seizures. Complications—in 11-19% of survivors—may include deafness and other neurologic impairment, and impaired circulation leading to gangrene and amputation of limbs. Death occurs in 10% to 14% of people with meningococcal disease, and is highest in infants and adolescents.

The epidemiology of *N. meningitidis* is highly variable, with differences in serogroups and disease incidence between geographic regions causing unpredictable outbreaks and epidemics. Vaccine against serogroup C in the United Kingdom has proven highly efficacious and to serogroup B in New Zealand. Prior to recommending universal MCV4 immunization for 11-12 year old children in the United States, the incidence of meningococcal disease was at its nadir of 0.35/100,000 although it has varied from 0.5 to 1.5 cases per 100,000 population over the preceding decades.

There are approximately 2,600 cases of meningococcal meningitis in the U.S. each year, mostly in children less than five years old. Children younger than two years old have the highest incidence, with a second peak incidence between 15 to 24 years of age. Close contacts of a person with meningococcal disease have a higher rate of infection and are at greatest risk in the first week of contact. Depending on the type of exposure some of these persons may be given antibiotics to prevent infection. Studies report that first-year college students living in dormitories have a somewhat elevated risk for meningococcal disease when compared with other undergraduate students (See Related Issues).

Large outbreaks of the disease are rare in the United States, but not in some countries. It is recommended that travelers to certain areas, particularly sub-Saharan Africa during the dry season (December through June) and travelers to Mecca during Hajj receive the vaccine.

Table of Contents

Available Vaccines | Top

Product: Menomune A/C/Y/W-135 (MPS4)
(Meningococcal polysaccharide vaccine, Groups A, C, Y and W-135 combination)
Manufacturer: Aventis Pasteur
Year licensed: 1981

Product: Menactra (MCV4)
(Meningococcal polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid Conjugate Vaccine)
Manufacturer: Aventis Pasteur
Year licensed: 2005

Product: Menveo (MCV4)
(Meningococcal polysaccharide (Serogroups A, C, Y and W-135) Diphtheria CRM197 Conjugate Vaccine)
Manufacturer: Novartis
Year licensed: 2010

MPSV4 is both available as single dose which is thimerosal preservative-free and is also available in 10 dose vials that contain 25 mcg of thimerosal/0.5 ml. MCV4 is available as a single dose that is thimerosal preservative free.

History of the Vaccine | Top

In the U.S., meningococcal disease is usually caused by groups A, B, C, Y, and W-135 of the meningococcus bacteria. In 1978, the first meningococcal vaccines were licensed in the United States and were effective against only two of the major groups of meningoccocus. Currently, licensed vaccines provide some protection against all groups except B; there is no licensed vaccine for group B in the U.S.

Originally, the vaccines were developed to control meningococcal disease in the armed forces. All U.S. military recruits are given meningococcal polysaccharide vaccine prior to induction.

Menactra MCV4 was licensed in 2005 and may be used to immunize people 2-55 years of age and Menveo MCV4 was licensed in 2010 for use in people 11-55 years of age.

Who Should and Should Not Receive the Vaccine | Top

Who should receive MCV4 vaccine?

- All persons 11-18 years of age.
- Persons at increased risk for meningococcal disease aged 2-55 years.
- Persons vaccinated at 2-6 years of age should be revaccinated after 3 years.
- Persons vaccinated at >7 years and who are at prolonged risk should be revaccinated after 5 years.

Persons at prolonged increased risk for meningococcal disease include:

- People with immune system disorders including removed or damaged spleen and complement component deficiencies. Persons who have prolonged exposure such as laboratory personnel who are routinely exposed to the meningococcus.
- Travelers to or residents of regions where meningococcal disease is at increased risk such as certain parts of Africa and Mecca during the Hajj, and other locations where meningococcal disease is common.
- If at risk, MPSV4 can likely be safely given to **pregnant women**; there is no data for MCV4 given during pregnancy.

Who should not receive the meningococcal vaccines?

- People who had a serious reaction to a previous dose of the MCV4 vaccines or any of the components of the vaccines, including those who are known to be hypersensitive to diphtheria toxoid.
- Menactra is contraindicated in individuals who have previously had Guillain-Barré Syndrome and is contraindicated for people who are known to be hypersensitive to latex.
- Meningococcal immunization is not routinely recommended for children younger than 11 years of age unless they are known to be at increased risk for meningococcal infection.
- People who are moderately or severely ill should consult with their physician before receiving any vaccine.

Dose Schedule | Top

For children and adults 2-55 years of age, MCV4 is administered as a single 0.5 ml dose intramuscularly. MPSV4 is administered 0.5 ml subcutaneously.

Persons at prolonged increased risk for meningococcal disease who were previously immunized at >7 years should be re-immunized after 5 years and persons who were vaccinated at 2-6 years of age should be revaccinated 3 years after their previous meningococcal vaccine. MCV4 and MPSV4 may be administered concomitantly with other vaccines but at a different site of the body.

Effectiveness of the Vaccine | Top

In older children and adults, the MPSV4 vaccine is 85% to 100% effective at preventing infection from the strains of the meningococcus used in the vaccine, and protection lasts for at least three years. Children under two years of age respond poorly to the vaccine.

Compared to MPSV4, MCV4 induces higher production of antibodies and protection is expected to last longer.

Neither MPSV4 or MCV4 would be expected to prevent serogroups B disease.

A comprehensive program to prevent meningococcal disease will require immunization of infants with a vaccine that also includes a component providing immunity to endemic serogroup B strains.

Known Side Effects | Top

More than half of those immunized with MPSV4 experience no adverse reactions. Mild reactions are experienced by up to 40% of those immunized and include pain and redness at the site of injection. Also, recipients may develop a fever after immunization.

Local adverse reactions are more common among MCV4 recipients than among persons vaccinated with MPSV4.

In very rare cases (far less than 1 person out of 10,000 shots given), a more serious reaction to MPSV4, such as

paresthesia (a burning, prickling, or sensation of numbness), or an allergic response that can cause difficulty breathing, can occur.

Adverse events, whether felt to be due to the vaccine or not, should be reported to the Vaccine Adverse Events Reporting System.

Related Issues Top

MPSV4 is to be administered subcutaneously whereas MCV4 is to be administered intramuscularly. More than 100 persons have inadvertently received the MCV4 vaccine by the subcutaneous route, however. For a subset of these individuals, CDC determined that—although the serologic responses were lower after MCV4 was administered SC compared to IM—the proportions of individuals who achieved antibody levels felt to be protective were similar. Therefore CDC did not recommend that those who had received MCV4 needed to be re-immunized (see **MMWR report**).

Five cases of Guillain-Barré Syndrome have been reported in recipients of MCV4 (See report on**MMWR**) but it is uncertain if they were causally related or coincidental.

Meningococcal outbreak control is discussed in detail in **CDC** publications.

Key References and Sources of Additional Information Top

- Harrison, LH. 2010. Epidemiologic profile of meningococcal disease in the United States. Clin Infec Dis 50(Suppl 2): S37-44.
- CDC. 2005. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 54 (RR-7).
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- Lieu TA, Kulldorff M, Davis Rl, et al. 2007. Real-time vaccine safety surveillance for the early detection of adverse events. Medical Care 45(10) Suppl 2: S89-95.
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