



MENINGOCOCCAL MENINGITIS : A RARE BUT POTENTIALLY DEVASTATING DISEASE

KEY FACTS

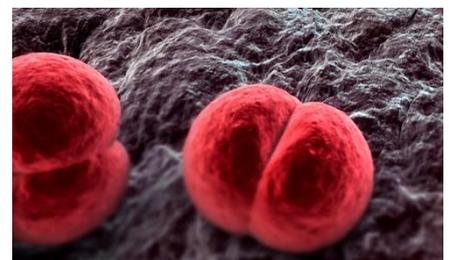
- Invasive Meningococcal Disease (IMD) is a rare but potentially devastating bacterial infection.^{1,2}
- It commonly presents as an infection of the brain (meningitis) and/or infection of the blood (septicemia or blood poisoning).^{1,3}
- Despite advances in medical care, the disease can kill in as little as 24 hours or cause severe long-term sequelae such as disability, hearing loss or brain damage¹ with devastating effects on the individuals, their families, and significant lifelong economic impact on society.^{3,4}
- While it mainly affects children below the age of five and adolescents, it can affect any individual at any age.^{1,3}
- There is no universal vaccine offering protection against meningococcal meningitis, however, to date, five (ABCWY) of the most common bacterial serogroups are vaccine preventable. Vaccines that help to prevent meningococcal meningitis include quadrivalent vaccines against 4 serogroups (ACWY) with one single vaccine, and monovalent vaccines against A, B or C serogroups.¹
- There are considerable variations between national vaccination recommendations around the world, leaving room for outbreaks in unprotected and vulnerable populations.⁵
- At Sanofi Pasteur, we believe in a world where no one suffers or dies from vaccine preventable diseases and that everyone should have access to the broadest protection. For over 45 years, Sanofi Pasteur has been at the forefront in combating meningococcal epidemics and in driving meningococcal vaccines evolution overtime from monovalent to quadrivalent vaccines and from polysaccharide to conjugate vaccines.⁶

A HIGHLY UNPREDICTABLE DISEASE

Meningococcal meningitis and septicemia is a bacterial infection caused by *Neisseria meningitidis*. It commonly presents as an infection of the brain (meningitis) and/or infection of the blood (septicemia or blood poisoning).^{1,3}

It is a rare but potentially devastating disease that can claim a life in as little as 24 hours.¹ One in 10 people who develop the disease will die from it and up to 10-20% of survivors suffer from severe long-term complications such as amputation, deafness or brain damage.⁷

In addition to the devastating effect on the individuals and their family, severe meningococcal meningitis results in significant lifetime costs for society.⁴



Magnification of *Neisseria meningitidis*, a gram-negative bacterium that can cause meningococcal meningitis

SPREAD THROUGH DROPLETS

About 1 in 10 people have meningococcal bacteria in the back of their nose or throat with no signs or symptoms of the disease; this is known as being 'a carrier'.⁸

But the bacteria may invade the body and cause infections. Meningococcal disease is spread through respiratory droplets (e.g. coughing, sneezing) and direct contact with someone who is infected (e.g. kissing).^{1,8} Fortunately, meningococcal disease is not as easily transmitted as other infections such as influenza, but the infection is far deadlier.^{1,8}

ANYONE CAN BE AFFECTED

While meningococcal disease mainly affects children below the age of five, there is a second peak in adolescents and young adults, and it can affect any individuals at any age without identifiable risk factors.¹ Notably, a relatively large number of cases are also observed among older adults.^{9,10}

Increased risk factors include:^{11,12,13}

- Living in community settings (e.g. military, children at summer camp and college students in dormitories) or participating in mass gathering events such as Olympic Gamers and Hajj, an annual Islamic pilgrimage to Mecca
- Certain medical conditions, including HIV infection / asplenia / a compromised immune system / deficiencies of either immunoglobulins or complement
- Travelling to endemic areas such as the meningitis belt in sub-Saharan Africa

FAST DIAGNOSIS AND TREATMENT IS IMPERATIVE

The early symptoms can be misleading as they are flu-like in nature, making diagnosis difficult. Classic signs of meningococcal meningitis and septicemia include fever, headache and stiff neck. Other symptoms include nausea, vomiting, photophobia (being sensitive to light) and confusion.¹⁴

To diagnose the disease, samples of blood or cerebrospinal fluid are tested for the *Neisseria meningitis* bacteria.⁷

Fast diagnosis and treatment, with appropriate antibiotics, is imperative. As a precaution, people who have been in prolonged close contact with anyone infected with meningococcal disease should also receive antibiotics to help protect against an infection.¹⁵

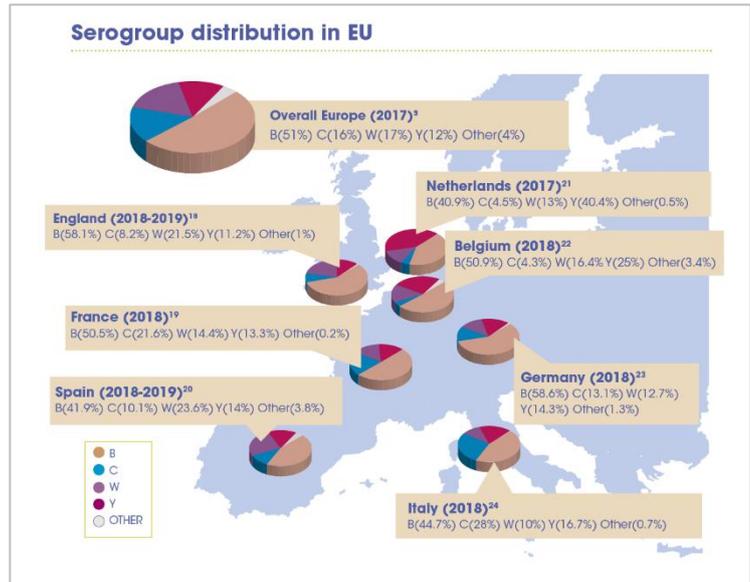
Depending on how serious the infection is, people with meningococcal disease may need other treatments including breathing support, medications to treat low blood pressure, and wound care for areas with damaged skin.⁷

TYPES OF MENINGOCOCCAL MENINGITIS ACROSS THE WORLD

There are many different serogroups (or types) of bacteria that can cause meningococcal meningitis, the most common being A, B, C, W, Y and more recently, X in Africa.² Their circulation worldwide is highly unpredictable and varies overtime across age groups and geographies.²

An example of the unpredictable nature of meningococcal meningitis is the recent spread of a virulent W serogroup which caused outbreaks across the UK and several other European countries, South Africa, Brazil, Argentina, Chile and Australia.^{2,5,16,17}

(Figure: 9,18,19,20,21,22,23,24)



MOST MENINGOCOCCAL MENINGITIS CAN BE PREVENTED THROUGH VACCINATION

There is no universal vaccine that helps to protect against meningococcal meningitis, however, to date, five (ABCWY) of the most common bacterial serogroups are vaccine preventable. Vaccines against meningococcal meningitis include quadrivalent vaccines to offer protection against 4 serogroups (ACWY) with one single vaccine, and monovalent vaccines to protect against A, B or C serogroups.¹

CURRENT NATIONAL IMMUNIZATION

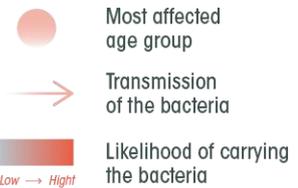
There are considerable variations between national vaccination recommendations around the world¹⁷, with some providing general recommendations for maximum population coverage and others focusing on populations at higher risks. These groups may include toddlers, young children, adolescents, immunocompromised individuals, and people in mass gathering or community setting situations such as university, pilgrims and the military.^{11,12,13} For older adults, where the fatality rate of meningococcal disease is the highest, there is no routine immunisation programme available to date.¹⁷

VACCINATION STRATEGIES:^{5,17,25}

THREE MAIN OPTIONS:

- Offer direct protection to population of higher risk of meningococcal disease
- Offer indirect protection by vaccinating the age group (adolescents) with the highest carrier rate of the bacteria to reduce transmission to other age groups over time
- Implement both strategies.

Adolescents play a key role in the carriage and **transmission** of **meningococcal bacteria**

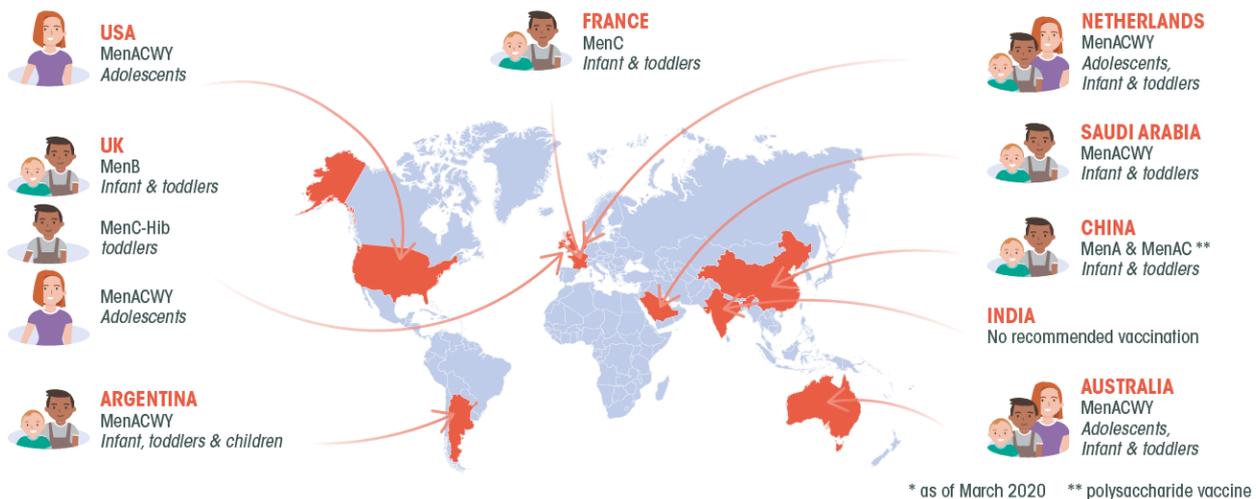


Vetter, V., et al. Routinely vaccinating adolescents against meningococcus: targeting transmission & disease. Expert Review of Vaccines. Volume 15, Issue 5, May 2016. Pages 641-658.

IMMUNIZATION PROGRAMS VARY GREATLY FROM COUNTRY TO COUNTRY:^{26,27,28,29,30,31}

While the ACWY serogroups remain the cause of a significant proportion of the disease, there is still a long way to go to ensure routine, broad immunization across age groups and countries.

Routine **vaccination programs** against Meningococcal Meningitis **vary widely** from country to country*



* as of March 2020 ** polysaccharide vaccine

SANOFI PASTEUR'S LEGACY: 45 YEARS FIGHTING MENINGOCOCCAL MENINGITIS

At Sanofi Pasteur, we believe in a world where no one suffers or dies from vaccine preventable diseases. For over 45 years, Sanofi Pasteur has worked passionately to innovate and develop preventative strategies and therapies helping society to fight meningococcal meningitis, as well as outbreak control.⁶

Sanofi Pasteur shares the view with partners and experts around the globe that meningococcal meningitis is a significant personal and public health challenge. We support key patient groups and scientific organizations to enhance global scientific and academic research to prevent potential epidemics through new innovative vaccine solutions. We are actively involved with public health partners, patient associations, scientific and medical experts to achieve our united goal of broader protection and are committed to playing our part in achieving the WHO and MRF stated vision of a world free from meningitis by 2030.

For decades, Sanofi Pasteur has been at the forefront in combating meningococcal epidemics

In 1974, we created the first approved monovalent A vaccine used in Africa, followed by the first approved bivalent AC vaccine in 1975, the first approved ACWY quadrivalent polysaccharide vaccine in 1981 and the first FDA approved ACWY quadrivalent conjugate vaccine in 2005. Today, we continue to work towards defeating this disease.

ADVANCING MENINGOCOCCAL DISEASE PROTECTION

Sanofi Pasteur believes that the most effective vaccination strategies should be available to everyone and we are committed to developing cutting-edge vaccination technology and expanding meningococcal vaccine availability worldwide. We want to ensure that no individuals are impacted by devastating vaccine preventable diseases such as meningococcal meningitis and call for routine immunization programs that provide optimal protection across all age groups, to help keep our loved ones safe.

Sanofi Pasteur is continuously developing and enhancing manufacturing capacities to support increased vaccination programs as well as supporting fast, efficient and reliable epidemic responses. We contribute to the WHO stockpile of meningococcal meningitis vaccinations³², and are working to develop new vaccines to fight the global burden of meningococcal meningitis. We aim to play a critical role in controlling meningococcal meningitis and helping reduce its impact and incidence globally.

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