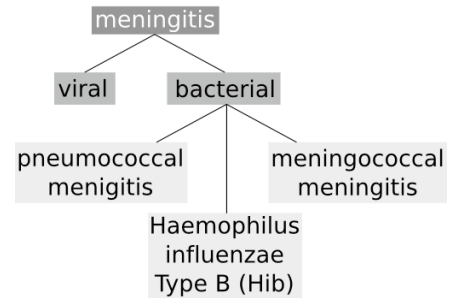


# Meningococcal Disease

## Description

Meningitis is an infection of the meninges, the thin clingfilm-like lining that surrounds the brain and the spinal cord. It can be caused many agents, including bacteria or viruses. Bacterial meningitis is less common than viral meningitis, but it is always serious and severe. Viral meningitis is generally less severe, although it can be very debilitating. Before the 1990s, *Haemophilus influenzae* type b (Hib) was the leading cause of bacterial meningitis, but vaccines given to all children as part of routine immunisation have reduced the occurrence of the disease. Today, *Streptococcus pneumoniae* (pneumococcal meningitis) and *Neisseria meningitidis* (meningococcal meningitis) are the leading causes of bacterial meningitis.



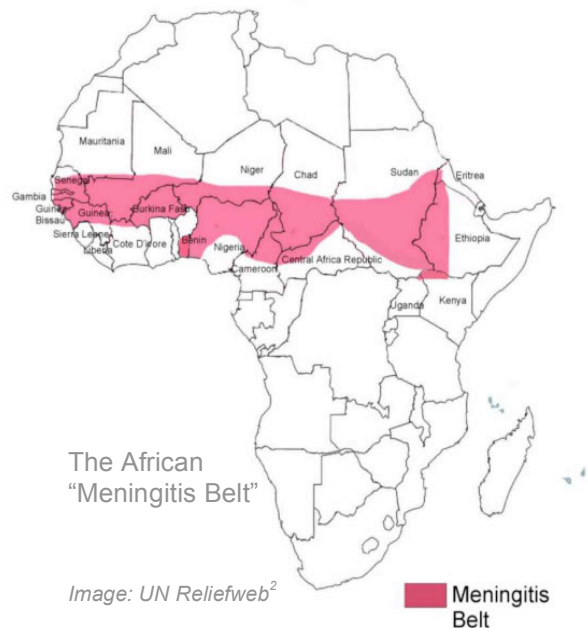
*Meningococcal Disease* refers to an acute infection by *Neisseria meningitidis* that can cause death within hours if not promptly recognised and treated, and has the potential to cause epidemics. Although the majority of patients recover fully, 5-10% of patients die and 10-20% of survivors are left with brain damage, hearing loss or learning difficulty.<sup>1</sup>

## Causative Agent

There are 13 serotypes of *N.meningitidis*, although only five serotypes, A, B, C, Y and W135, are clinically important. Serotypes A, B and C are the most common causes of illness worldwide, with serotypes B and C predominant in Europe, the Americas and Australia and New Zealand, and A and C predominant throughout Africa and Asia. In recent years increasing emergence of serotype W135 in Africa and the Middle East has caused concern.

## Distribution

Meningococcal disease occurs sporadically in small clusters worldwide, with seasonal variations. The “Meningitis Belt” of Africa experiences **cyclical epidemics** of the disease, usually every 2 to 3 years during the dry season. In West Africa high transmission usually occurs between November and May. The season is more variable in East Africa.



In addition, **major epidemics** occur every 8-12 years. In 2000, a serogroup W-135 epidemic occurred in Saudi Arabia in association with the Hajj pilgrimage. In 2002, a major meningococcal disease epidemic occurred in Burkina Faso caused by serogroup W-135. In 2003 and 2004, serogroup W-135 has been detected in several African countries, but it has not caused major epidemics.<sup>3</sup> An outbreak has been reported in 2007 in Burkina Faso where from 1 January to 8 April 2007, the Ministry of Health of Burkina Faso reported 22255 suspected cases including 1490 deaths.<sup>4</sup>

## Transmission

The reservoir for *N. meningitidis* is exclusively human, with an estimated 10 to 25% of people carrying the bacteria at any one time. The disease lives naturally at the back of the nose and throat<sup>5</sup> and for reasons not fully known the bacteria sometimes overwhelm the body’s defences, allowing infection to spread through the bloodstream and to the brain. The carriage rate may be much higher in epidemic situations.

Transmission occurs via the respiratory route from coughing and sneezing, and is acquired from a carrier during close contact such as kissing or sharing of eating or drinking utensils. Transmission is often associated with overcrowded and poor conditions. The bacteria cannot live long outside the body so cannot be picked up from water

<sup>1</sup> World Health Organisation Fact Sheet No 141; Meningococcal Meningitis <http://www.who.int/mediacentre/factsheets/fs141/en/>

<sup>2</sup> United Nations Reliefweb <http://www.reliefweb.int/rw/RWB.NSF/db900LargeMaps/SKAR-64GESW?OpenDocument>

<sup>3</sup> US Center for Disease Control [http://www.cdc.gov/ncidod/dbmrd/diseaseinfo/meningococcal\\_g.htm](http://www.cdc.gov/ncidod/dbmrd/diseaseinfo/meningococcal_g.htm)

<sup>4</sup> World Health Organisation Epidemic and Pandemic Alert and Response [http://www.who.int/csr/don/2007\\_04\\_17/en/index.html](http://www.who.int/csr/don/2007_04_17/en/index.html)

<sup>5</sup> National Travel Health Network and Centre <http://www.nathnac.org/travel/factsheets/meningococcal.htm>

supplies, swimming pools, buildings or factories. Certain serotypes (e.g. type C) spread more rapidly in crowded areas. Incubation for meningococcal meningitis is between 2 and 10 days.<sup>6</sup>

## Pathogenesis

In most cases, meningococcal colonisation of mucosal surfaces of the nose and throat leads to subclinical infection or mild symptoms. In approximately 10-20% of cases, *N. meningitidis* enters the bloodstream. In the vascular compartment they may be killed by immune defences or they may multiply rapidly, initiating the bacteraemic phase.

Systemic disease appears with the multiplication of the bacteria in the blood, and usually precedes meningitis by 24-48 hours. The systemic disease involves bacteraemia, metastatic infection (commonly meningitis), or severe systemic infection with circulatory collapse and disseminated intravascular coagulation (DIC). The presence of Meningococci in the blood leads to diffuse vascular injury.

The invasion of the disease depends on host factors. Infants are protected from meningococcal disease for the first few months of life by transferred maternal antibodies and low rate of meningococcal acquisition. Subsequently, susceptibility peaks at age 6-12 months and decreases again after colonisation of closely related nonpathogenic bacteria such as *Neisseria lactamica* that have surface antigens in common with virulent strains. Colonisation with *N. meningitidis* gradually replaces the nonpathogenic bacteria and induces antibodies to the infecting strain, thus reinforcing natural immunity. Invasive disease occurs if no protective antibodies are mounted against the infecting strain. In addition to these host factors, the meningococci can create a capsule to protect them from drying out and also from host immune mechanisms, which increases their virulence.

Individuals acquire the infection if they are exposed to virulent bacteria and have no protective antibodies. Smoking and concurrent viral infection of the upper respiratory tract increase the likelihood of invasive disease. Crowded living conditions also facilitate disease spread, since individuals from different areas have different strains of meningococci. The risk of invasive disease is higher in the first few days after exposure to a new strain.

## Symptoms

Symptoms can develop within minutes or hours and can include:

- |   |  |
|---|--|
| • Sudden onset of a high fever                              | <i>Symptoms of both meningitis &amp; septicaemia</i> |
| • Loss of appetite, vomiting                                |  |
| • Muscle pain   |  |
| • Drowsiness and difficulty waking                          | <i>Symptoms of septicaemia</i>                       |
| • Breathing difficulties                                    |  |
| • Diarrhoea and abdominal pain                              |  |
| • Rash that doesn't disappear when pressed (the glass test) | <i>Symptoms of meningitis</i>                        |
| • Severe headache and stiff neck                            |  |
| • Photophobia (intolerance of light)                        |  |



## Treatment

A range of antibiotics may be used for treatment including penicillin, ampicillin, chloramphenicol, and ceftriaxone. Under epidemic conditions in Africa, oily chloramphenicol is the drug of choice in areas with limited health facilities as a single dose of this long-acting formulation has been shown to be effective.

The earlier the treatment, the better the prospect of recovery. In the UK, GPs will often give treatment even before the person is admitted to hospital. If you suspect someone may have meningococcal disease, contact the doctor immediately. If the doctor is unavailable the patient should be taken to the nearest casualty department.<sup>8</sup>

## Prevention

There is no known way to prevent meningitis, it is therefore important to be aware of the danger signs. If someone becomes unwell he/she may deteriorate quickly, so medical advice must be sought if you suspect meningitis or septicaemia. Effective vaccines are available against meningococci groups A and C and HiB.

Travellers should be advised on the mode of transmission and to avoid overcrowded situations. A quadrivalent vaccine (ACWY) that lasts 3 years is available for those travelling to the Meningitis Belt or areas considered a risk for transmission.<sup>9</sup>

<sup>6</sup> NHS Direct <http://www.nhsdirect.nhs.uk/articles/article.aspx?articleId=245&sectionId=11531>

<sup>7</sup> The Meningitis Trust Disease Information [http://www.meningitis-trust.org/disease\\_info/index.php?section=2](http://www.meningitis-trust.org/disease_info/index.php?section=2)

<sup>8</sup> UK Health Protection Agency [http://www.hpa.org.uk/infections/topics\\_az/wfhfactsheets/WFHmeningococcal.htm](http://www.hpa.org.uk/infections/topics_az/wfhfactsheets/WFHmeningococcal.htm)

<sup>9</sup> National Travel Health Network and Centre <http://www.nathnac.org/travel/factsheets/meningococcal.htm>