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Meningococcal meningitis

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Introduction

Meningococcal meningitis is caused by a Gram-negative bacterium, *Neisseria meningitidis*. There are 13 serotypes of *N. meningitidis*, although only five serotypes; A, B, C, W135 and Y, are clinically important. Serotypes A, B and C are the most common causes of illness worldwide. W135 has emerged in recent years in Africa and the Middle East.

Epidemiology

Global epidemiology

Meningococcal disease occurs sporadically all over the world, with seasonal variations [1]. *N. meningitidis* serogroups B and C are the most common cause of disease in Europe, the Americas, Australia, and New Zealand. Cases tend to occur more frequently in winter and spring. Serogroup A is the main cause of disease in Africa and Asia.

Worldwide, the highest rates of disease occur in the '[meningitis belt](#)' of sub-Saharan Africa [1, 2]. This extends across the dry, savannah regions from Senegal in the west, across to Ethiopia in the east. During epidemics, this region can have an annual incidence rate of 1,000 cases per 100,000 population [2]. The largest recorded outbreak of meningococcal disease in history occurred in Africa in 1996 when over 20,000 deaths were reported to the World Health Organization (WHO) [3].

In the 2009 epidemic season 14 African countries reported 78,416 suspected cases and 4,053 deaths. This is the largest reported number since the 1996 epidemic [1]. More than 85% of these cases were reported in one epidemic foci, encompassing northern Nigeria and Niger, and were characterised by the predominance of *N. meningitidis* serogroup A [4].

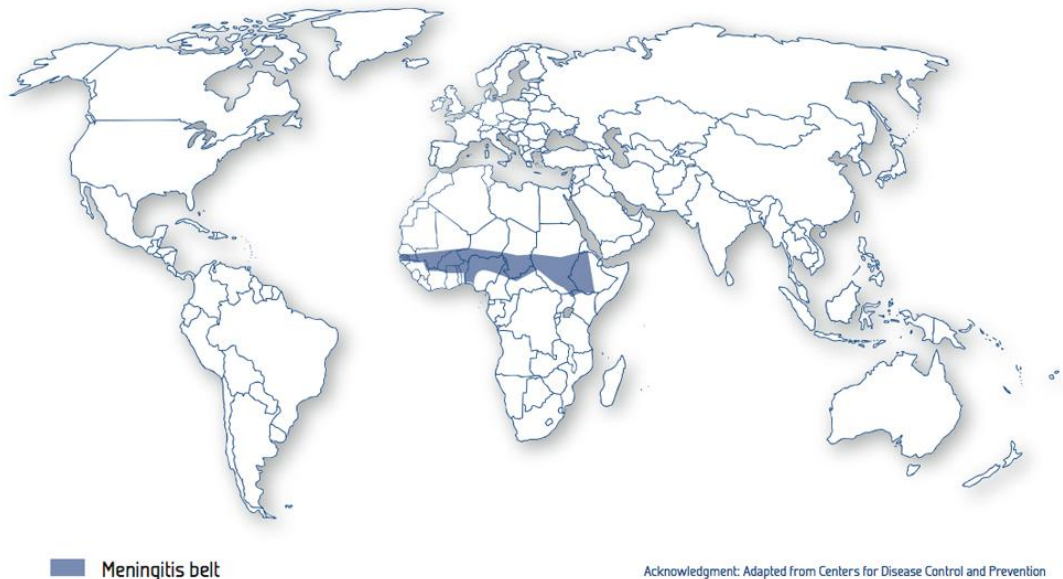
Epidemics in meningitis belt countries occur in cycles, usually in the dry season. In the dry season (December to June) a combination of factors; cold nights, dust winds, increased incidence of upper respiratory tract infections, overcrowding and seasonal population displacement, facilitate outbreaks [1]. In west Africa, the dry season is usually between December and June. In east Africa, the seasons vary.

The serogroups most commonly associated with the African meningitis belt are A and C. However, serogroup W135 has been isolated from other west African countries including Cameroon [5], Chad [6], the Gambia [7] and Burkina Faso [8, 9]. Serogroup A was identified in a subsequent outbreak in Burkina Faso in 2007, in which 22,255 suspected cases and 1,490 deaths were reported [10].

In 2002, countries south of the meningitis belt in the Great Lakes region, including Tanzania, Rwanda, Burundi and the Democratic Republic of Congo, reported over 2,200 cases of meningococcal disease, including 200 deaths [11,12]. Small villages and refugee camps were most affected.

Meningococcal Meningitis Belt in Africa

Meningococcal Meningitis Belt in Africa



Map reproduced from Health Information from Overseas Travel (NaTHNaC 2010).

Serogroup A was responsible for two pandemics in Asia throughout the 1960s, 70s and 80s. It spread from China in the early 1980s to Nepal and India. In 1987 serogroup A was responsible for an outbreak involving 2,000 pilgrims to the Hajj in Mecca, Saudi Arabia [13]. In situations of overcrowding, such as during the Hajj, carriage rates can be as high as 80% [14]. Subsequent outbreaks occurred among pilgrims returning to their home countries. This led to the introduction of a bivalent polysaccharide vaccine (against A and C serogroups) in 1988 as an entry requirement for Hajj and Umrah.

In 2000, an international outbreak of meningococcal infection due to serogroup W135 was associated with the Hajj pilgrimage. More than 330 cases in pilgrims or contacts of pilgrims in 12 countries were reported to the WHO between 28 February 2000 and 26 May 2000 [16]. The quadrivalent (A, C, W135, Y) vaccine was recommended for Hajj pilgrims in 2001, but uptake was not 100%. Cases of W135 associated with the Hajj occurred again in 2001 [17]. Quadrivalent vaccine was therefore made an entry requirement for all pilgrims to the Hajj and Umrah from



2002. There are two quadrivalent vaccines currently available in the UK: ACWY Vax® and Menveo®.

Current outbreaks of meningococcal disease are recorded in the [NaTHNaC Outbreak Surveillance Database](#).

Meningococcal disease in travellers from England, Wales and Northern Ireland

In England, Wales and Northern Ireland, there is currently no routine reporting of travel-related meningococcal infections. Between 1998 and 2003, the most recent period for which data is available, there were 29 laboratory confirmed cases of meningitis associated with overseas travel. Of these, fifteen were serogrouped; serogroup C was the most frequent. The majority of cases (24/28) were associated with travel to Spain [17].

Classifying a case of meningococcal disease as travel-related is difficult. A traveller can have nasopharyngeal colonisation with meningococcal bacteria before travel and develop symptoms while away, rather than acquiring infection in another country. A link with travel can be inferred when a strain of *N. meningitidis* is isolated that is rarely seen in the UK, such as strains of serogroup A or W135 [18]. More information on which strains occur in the UK can be found on the [Health Protection Agency website](#).

Risk for travellers

Meningococcal disease occurs worldwide. Most travellers will be at a similar risk of infection during travel as they would be in the UK. A retrospective questionnaire study in 1994 identified 13 cases of meningococcal disease among travellers from industrialised countries [19]. The overall incidence was estimated to be 0.4 per 100,000 travellers per month.

Transmission of meningococcal disease is via droplet infection, with risk increasing in overcrowded conditions. Travellers at higher risk include healthcare workers, those living or working with local people, especially for prolonged periods, in endemic areas or where outbreaks are occurring (e.g. the African meningitis belt). A statement on risk in individual countries can be found on the [NaTHNaC Country Information Pages](#).

Transmission

The reservoir for *N. meningitidis* is exclusively human, with the bacteria carried in the nasopharynx. Transmission occurs via the respiratory route, from coughing and sneezing, during close contact with a carrier. Most epidemics occur during the winter-spring period in temperate areas and during the dry season in tropical areas. In the meningitis belt of sub-Saharan Africa, the highest transmission period in west Africa is from December to June. Seasons vary in east Africa.

Signs and symptoms

Meningococcal meningitis usually presents with sudden onset of fever, intense headache, nausea and vomiting. These symptoms can develop within minutes or hours. The patient is often irritable and prefers to lie still. Neck stiffness from meningeal irritation is characteristic.

A non-blanching petechial or purpuric rash usually occurs with septicaemia. Delirium, coma and shock can ensue. With early diagnosis and treatment, the case fatality rate varies from 9% to 12% [20].



Treatment

Suspected meningococcal infection is a medical emergency. On admission to hospital, treatment with parenteral antibiotics should be commenced immediately. Intensive care, monitoring and supportive treatment are necessary.

Prevention

A conjugated meningococcal type C vaccine is a routine UK vaccination and is offered to all children. The schedule consists of a single dose given at three and four months of age, with a third dose combined with *Haemophilus influenzae* type b (Hib) at 12 months of age.

Travellers should be advised on the mode of transmission and to avoid overcrowded situations. A quadrivalent vaccine should be offered to travellers going to areas considered a risk for transmission.

Vaccine information

Conjugate meningitis C vaccine forms part of the UK immunisation schedule. Further information can be found in the [Department of Health Immunisation against infectious disease \(the 'Green Book'\)](#)

The following section refers to quadrivalent ACW135Y vaccines: ACWY Vax® (polysaccharide) and Menveo® (conjugate).

Indications for use of vaccine

- Travellers visiting risk areas for meningococcal disease, whose planned activities put them at higher risk. All pilgrims travelling to Saudi Arabia for the Hajj or Umrah are required to show proof of vaccination.

Vaccine recommendations for specific countries can be found on the [NaTHNaC Country Information Pages](#).

The Summary of Product Characteristics (SmPC) for individual vaccines should be consulted for specific information relating to the product [21, 22].

Vaccine schedule

Vaccine	Manufacturer/distributor	Age range	Schedule	Reinforcing dose
ACWY Vax®	GlaxoSmithKline	Infants and children aged under five years.	Not recommended.	Not applicable.
		Children from five years old.	• Single dose.	5 years.

		and adults.		
Menveo®	Novartis Vaccines	Infants aged 2 months to under one year.	'Off label use': • Day 0, 1 st dose • 1 month: 2 nd dose • Reinforcing dose: 12 months if at continued risk.	Not known.
		Children aged one year to 10 years	'Off label use' • Single dose.	
		Children from 11 years and adults.	(Preferred) • Single dose.	

*Conjugated vaccine is expected to be more immunogenic in young children. Menveo® is therefore the preferred vaccine for infants aged over 2 months of age to 5 years. Use of the conjugated vaccine under the age of 11 years is unlicensed [23].

Contraindications

- Confirmed anaphylactic reaction to a previous dose of vaccine, or to any constituent of the vaccine.

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Reading list

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Links

Meningococcal meningitis belt in Africa

[NaTHNaC Advice for Hajj pilgrims](#)

[NHS Choices: Meningitis](#)

[Department of Health: Immunisation against infectious disease: Chapter 22 Meningococcal](#)