

## Module 1: Invasive meningococcal disease (IMD)

This eModule is designed to give you a broad overview of IMD so that you can confidently discuss the primary biological and clinical aspects of the disease with your customers.

This eModule is provided to you by Pfizer Ltd. It is not intended to replace your guidelines, protocols and SOPs.

For UK registered healthcare professionals and other relevant decision makers\*

References can be found via the buttons on every screen throughout the course, prescribing information and adverse event reporting can be found via buttons on the summary screen.

For full information on Nimenrix, please refer to the Summary of Product Characteristics.

\*The ABPI Code of Practice definition of "other relevant decision makers" particularly includes those with an NHS role who could influence in any way the administration, consumption, prescription, purchase, recommendation, sale, supply or use of any medicine but who are not healthcare professionals

## Module introduction and learning objectives

## Introduction:

Invasive meningococcal disease (IMD) is a serious bacterial infection caused by the bacterium *Neisseria meningitidis*. The bacteria can invade the body causing serious illnesses, such as meningitis and septicaemia.<sup>1-3</sup> This first module will give you an overview of IMD, including how it is caused and transmitted, typical presentations, and the risk factors for developing IMD.

## Learning objectives:

By the end of this Module, you should be able to:



Explain what IMD is and how it is caused



Feel confident describing how IMD manifests



Identify potential risk factors of IMD and communicate them effectively.

## Meet the Young family

Tom and Deborah live in North London and have one teenage daughter, Ellie. Tom is an engineer and often travels, on business, to different parts of the world. His work may take him to areas within central Africa in the coming year, so he decides to ask a healthcare professional whether he'll need to have any vaccinations before travelling.



"Hello, can I help you?"



“There are a few diseases that you should be mindful of. These include diphtheria, hepatitis A, poliomyelitis, tetanus, typhoid, yellow fever, cholera, hepatitis B, meningococcal meningitis and rabies.”<sup>1,2</sup>



“Yes! I might be working in central Africa, including Nigeria and Cameroon, sometime this year and I wondered if there are any vaccinations I would need to take before I travel?”



“Meningococcal meningitis?  
I’m not sure what that is –  
could you tell me more?”



Vaccination against meningococcal infection may be recommended for those travelling to areas prone to outbreaks of invasive meningococcal disease such as sub-Saharan Africa or to an area where a known outbreak is occurring.<sup>3</sup>

The Kingdom of Saudi Arabia requires that everyone visiting for Hajj or Umrah should be vaccinated against common types of meningococcal bacteria.<sup>3</sup>

## What is IMD?

Invasive meningococcal disease (IMD) is a life-threatening infection and is a leading cause of bacterial meningitis and septicaemia in many parts of the world.<sup>1,2</sup>

IMD can progress quickly and be fatal within 24 to 48 hours after the onset of symptoms.<sup>2</sup> Recent UK data reports mortality rates of almost 7% for IMD.<sup>3</sup>





## What is invasive meningococcal disease?

The *Neisseria meningitidis* bacteria – often referred to as meningococcus – can overcome host defenses and penetrate the mucosa in the nasopharynx and then spread to the bloodstream, causing invasive meningococcal disease. Only a small number of people exposed to the *Neisseria meningitidis* bacteria develop invasive meningococcal disease.<sup>1,2</sup>



## Disease manifestation

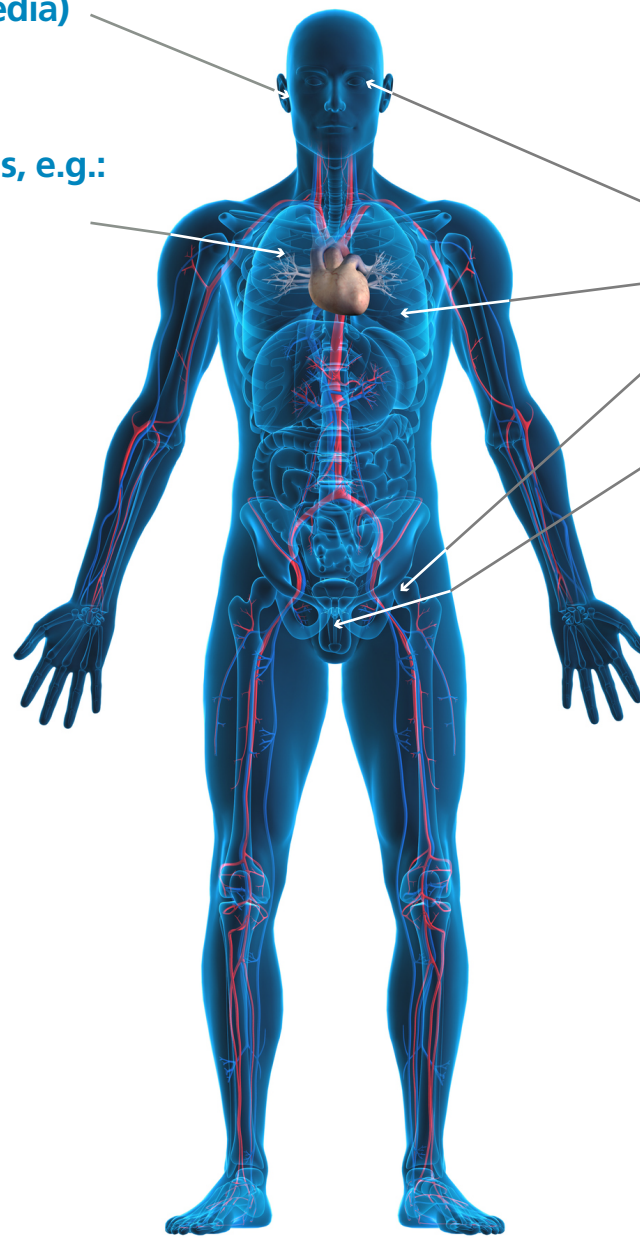
Clinical presentation of invasive meningococcal disease in England:<sup>1</sup>

- Meningitis – in 26.1% of cases
- Septicaemia – in 45.6% of cases
- Meningitis and Septicaemia – in 21.2% of cases

**Meningitis** is an inflammation of the meninges, i.e., the soft membranes enclosing the brain and spinal cord.<sup>2,3</sup>

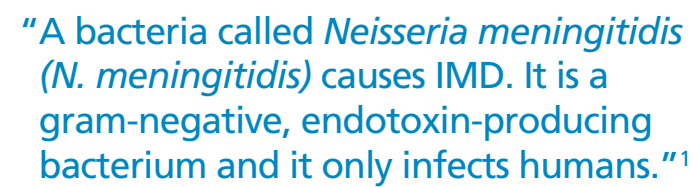
Meningococcal **septicaemia** (meningococcaemia) is a form of sepsis, or blood poisoning.<sup>2,3</sup>

- Of the conjunctiva of the eye – **conjunctivitis**
- Of the pericardium of the heart – **pericarditis**
- Of the joints – **arthritis**
- Of the urethra – **urethritis**





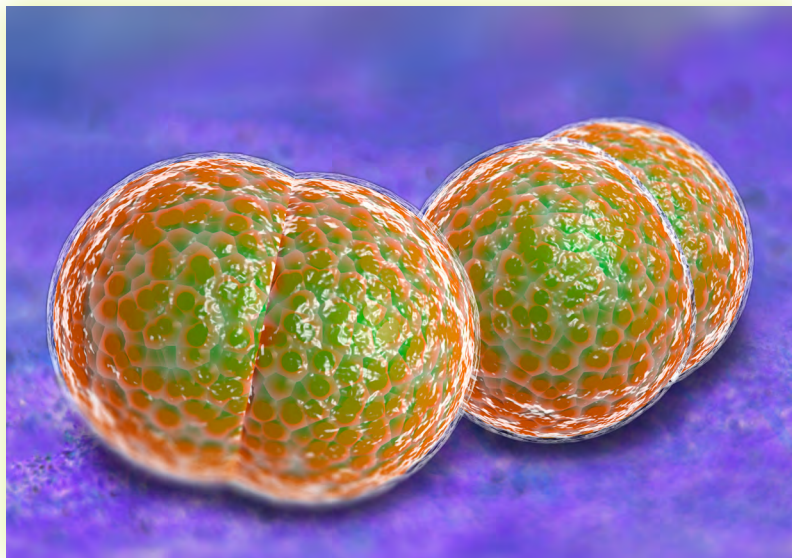
"So, what causes invasive meningococcal disease?"



## What causes IMD?

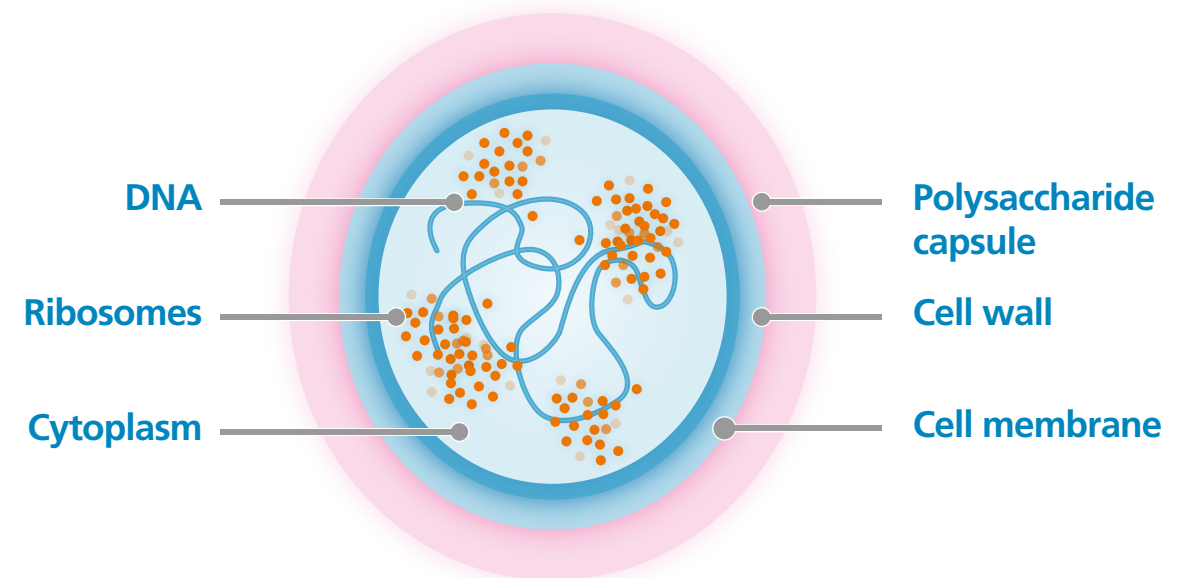
Here's a little more information about this bacteria:

### Diplococcus structure of *N. meningitidis*



*N. meningitidis* has a diplococcus structure,<sup>1</sup> which means it is a round bacterium that typically occurs as two cells joined together.<sup>1,2</sup>

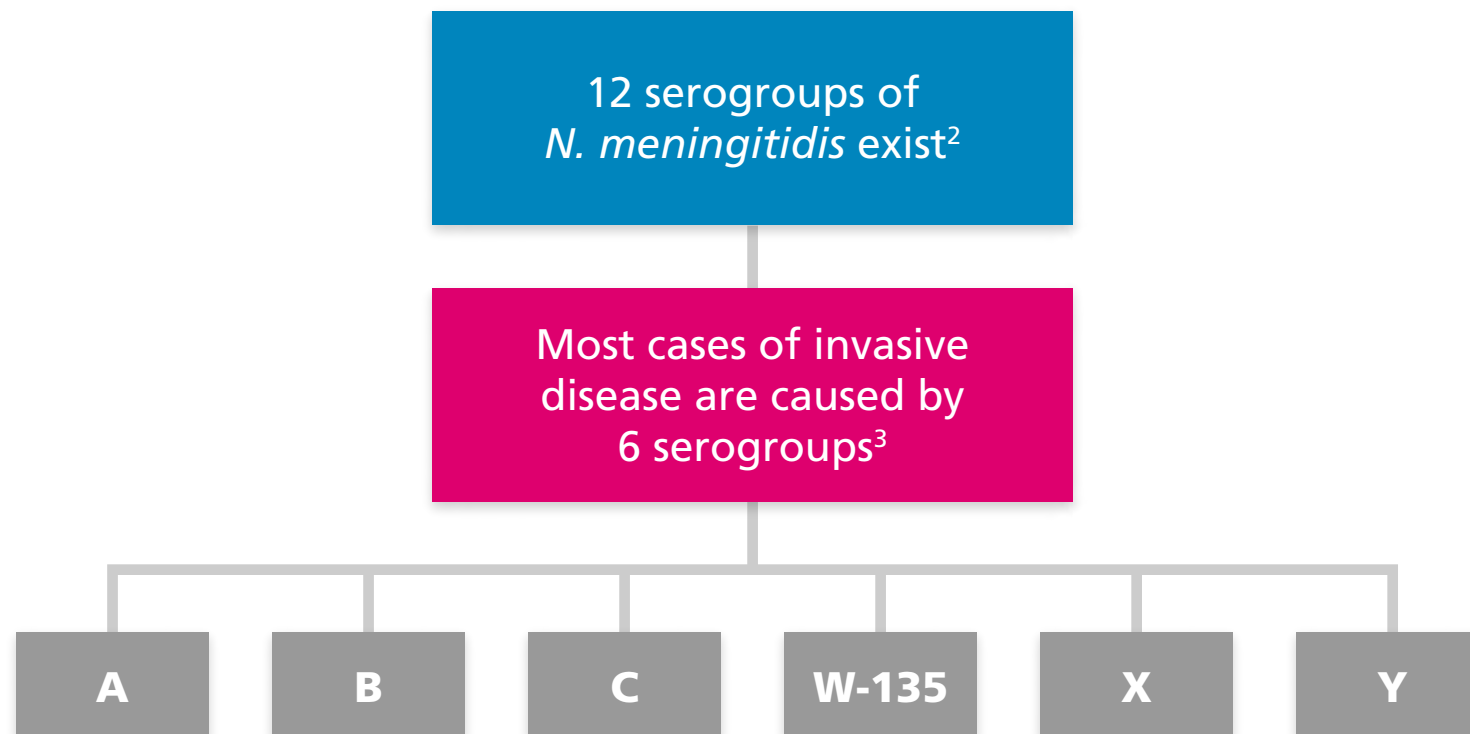
### Structure of *N. meningitidis*<sup>3</sup>



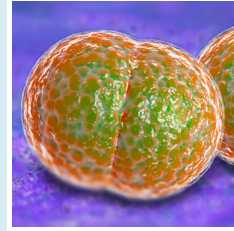
The *N. meningitidis* bacteria can have an outer polysaccharide capsule that protects it from being attacked by the human immune system.<sup>1</sup>

## *N. meningitidis* serogroups

*N. meningitidis* bacteria are classified into serogroups according to differences in their protective polysaccharide capsule.<sup>1</sup>



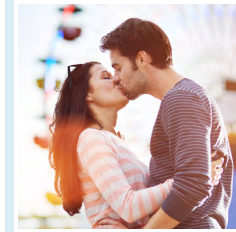
## Disease transmission



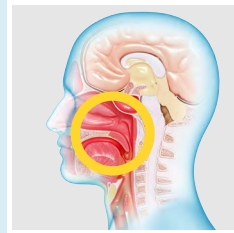
## How is *N. meningitidis* spread?<sup>1,2</sup>



## Airborne droplets

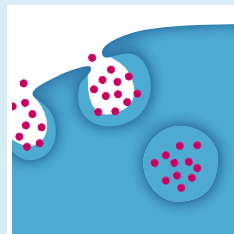


Direct contact with respiratory secretions or saliva e.g., through intimate kissing



*N. meningitidis* binds to mucosal cells on the surface of the nasopharynx via special structures, called pili

*N. meningitidis* replicates and  
a carrier state is established



*N. meningitidis* enters the body through a process known as endocytosis whereby the mucosal cells internalise the bacterium

## What are the factors that increase your risk of IMD?

## Risk factors relating to host<sup>1-4</sup>



## Age – infants, young children and adolescents

Lack of serum bactericidal antibodies, e.g., in infants

## Absence or abnormal function of the spleen

Host defence defects, e.g.,  
altered immunoglobulin production

## Complement disorders

## Respiratory tract infections, such as flu

## Risk factors relating to environment<sup>1-4</sup>



Crowded living conditions,  
e.g., students living in dormitories

Closed populations, e.g., Hajj pilgrimage

## Active and passive smoking

Close and prolonged contact with asymptomatic carriers or patients, e.g., intimate kissing

## Check your understanding

**True or false:**

*N. meningitidis* can overcome host defenses and penetrate the mucosa in the nasopharynx and enter the bloodstream, leading to invasive meningococcal disease.<sup>1,2</sup>

True

False

**Select the correct answer:**

Which *N. meningitidis* serogroups cause most cases of invasive meningococcal disease?<sup>3</sup>

A, B, C, W-135, X and Y

A, B, C, W-135 and Y



## Module summary

- ✓ IMD is a life-threatening infection and is a leading cause of bacterial meningitis and septicaemia in many parts of the world.<sup>1,2</sup>
  - ✓ The *Neisseria meningitidis* bacteria – often referred to as meningococcus – can overcome host defenses and penetrate the mucosa in the nasopharynx and then spread to the bloodstream, causing invasive meningococcal disease.<sup>3,4</sup>
  - ✓ Clinical presentation of invasive meningococcal disease in England:<sup>5</sup>
    - Meningitis – in 26.1% of cases
    - Septicaemia – in 45.6% of cases
    - Meningitis and septicaemia – in 21.2%
  - ✓ Most cases of IMD are caused by six *N. meningitidis* serogroups: A, B, C, W-135, X and Y.<sup>6</sup>
  - ✓ *N. meningitidis* is spread by airborne droplets and direct contact with respiratory secretions or saliva, e.g., through intimate kissing.<sup>7,8</sup>
  - ✓ IMD risk factors relating to the host include age (infants, children < 5 years old and adolescents), lack of serum bactericidal antibodies, absence or abnormal function of the spleen, host defence defects, complement disorders, or respiratory tract infections.<sup>3,6,9,10</sup>
  - ✓ IMD risk factors relating to the environment include crowded living conditions, closed populations (e.g., Hajj pilgrims), active and passive smoking or close and prolonged contact with asymptomatic carriers or patients.<sup>3,6,9,10</sup>