

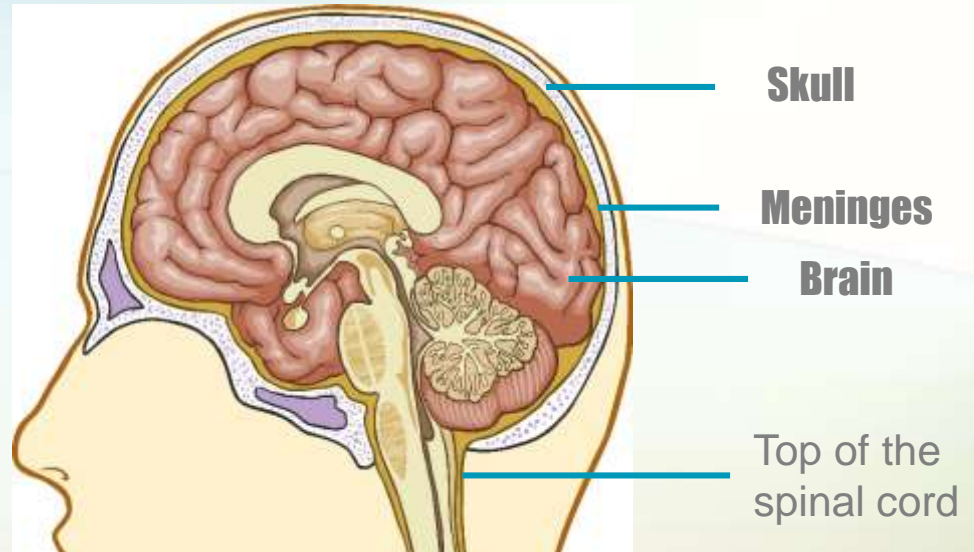


# **Viral and Bacterial Meningitis**

*Dr. Amin Aqel,  
Professor of Medical Microbiology  
CNS, 3ed year students  
Faculty of Medicine, Mutah University*

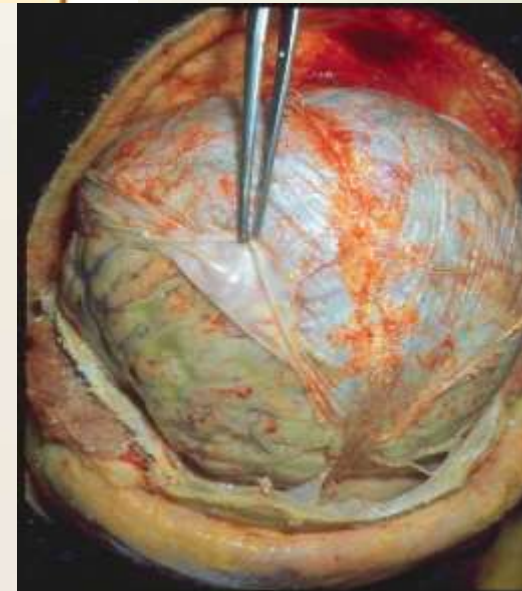
# What is meningitis?

Meningitis is an infection which causes inflammation of the membranes covering the brain and part of spinal cord.

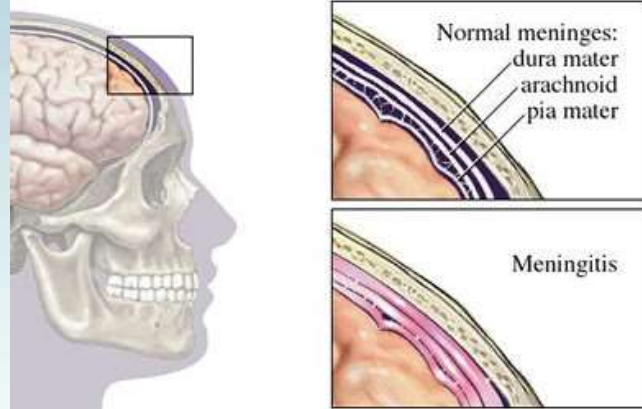


## What is septicaemia?

Some bacteria that cause meningitis can also cause septicaemia (blood poisoning). Septicaemia is a cause of sepsis - a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs.



# Meningitis.....



- Non-bacterial meningitis is often referred to as ‘aseptic meningitis’ – eg. viral meningitis
- Bacterial meningitis may be referred to as ‘purulent meningitis’.

## Common causes and risks

The most common causes of meningitis are viral infections that usually resolve without treatment.

Bacterial infections of the meninges are extremely serious illnesses, and may result in death or brain damage even if treated.

# What causes meningitis?

Meningitis is most commonly caused by bacteria or viruses

## Bacterial

- **Meningococcal** (most common cause)
- Pneumococcal
- TB
- Group B streptococcal
- *E. coli*
- Hib

## Viral

- Enteroviruses
- Herpes Simplex
- Mumps (now rare)

# Definitions

- Doctors call meningitis caused by the bacteria *Neisseria meningitidis* meningococcal meningitis
- TB meningitis Tuberculous meningitis is caused by *Mycobacterium tuberculosis*.
- *S. agalactiae*, or group B streptococcus or GBS causes pneumonia and meningitis in newborns and the elderly
- Pneumococcal meningitis is caused by *Streptococcus pneumoniae* bacteria (also called pneumococcus, or *S. pneumoniae*).
- Hib meningitis *Haemophilus influenzae* type b (Hib) is a bacterium that infects the lining of the brain, causing meningitis.

# Viral and bacterial meningitis

## Viral meningitis

Rarely life-threatening

Pain relief, fluids and rest

Not considered to be contagious

After-effects include headaches, tiredness and memory loss

## Bacterial meningitis

Life-threatening

Rapid admission to hospital, treated with antibiotics

Can be contagious and may require public health action

After-effects include deafness, acquired brain injury and limb loss (septicaemia)

# CSF

	Appearance	Opening Pressure mmHg	WBC (cell/ $\mu$ L)	Protein (mg/dl)	Glucose (mg/dL)
<b>Normal</b>	Clear	90-180	< 8	15-45	50-80
<b>Bacterial Meningitis</b>	Turbid	Elevated	>1000-2000	>200	<40
<b>Viral Meningitis</b>	Clear	Normal	<300; Lymphocytic predominance	<200	Normal
<b>Fungal Meningitis</b>	Clear	Normal- elevated	<500	>200	Normal - Low

# **Meningococcal disease**

- **A term used to describe two major illnesses – meningitis and septicaemia (blood poisoning) caused by meningococcal bacteria**
- **Meningococcal disease is the most common cause of bacterial meningitis in the UK**
- **There are five main groups of meningococcal bacteria that commonly cause disease - MenA, MenB, MenC, MenW, MenY**












# **Recognising the signs and symptoms**

- **Meningitis and septicaemia often happen together. Be aware of all the signs and symptoms**
- **Symptoms can appear in any order. Some may not appear at all**
- **Someone with meningitis or septicaemia can get a lot worse very quickly. Keep checking them**

# What are the symptoms?

**Meningitis symptoms alert!**



			
Fever/ vomiting	Severe headache	Stiff neck	Dislike of bright lights
			
Very sleepy/ vacant /difficult to wake	Confused/ delirious	Rash	Seizures

**meningitis.org**  
Free helpline  
**080 8800 3344**

Reg. Charity England & Wales  
No 1091105 & Scotland No  
SC037586 Reg. Office:  
Newminster House,  
Baldwin Street, Bristol BS1 1LT

**Septicaemia symptoms alert!**









Symptoms can appear in any order. Not everyone gets all symptoms. Septicaemia can occur with or without meningitis.

Other symptoms in babies:

- Unusual grunting sounds
- Tense or bulging soft spot
- Refusing to feed
- Irritable when picked up, with a high pitched or moaning cry
- Stiff body with jerky movements, or floppy/ifeless

If under 3 months fever often absent.

Trust your instincts. Someone can become seriously ill quickly. Get medical help.









			
Fever/ vomiting	Limb/joint/ muscle pain	Cold hands/ feet/shivering	Pale or mottled skin
			
Breathing fast/ breathless	Rash	Very sleepy/ vacant /difficult to wake	Confused/ delirious

# Meningitis Symptoms



			
Fever/ vomiting	Severe headache	Stiff neck	Dislike of bright lights
			
Very sleepy/ vacant /difficult to wake	Confused/ delirious	Rash	Seizures

# Septicaemia Symptoms

			
Fever/ vomiting	Limb/joint/ muscle pain	Cold hands/ feet/shivering	Pale or mottled skin
			
Breathing fast/ breathless	Rash	Very sleepy/ vacant /difficult to wake	Confused/ delirious

# The Rash



- A *non blanching* rash is a late sign of septicaemia
- It is not present in all cases of meningitis

## The tumbler test

Use a clear glass - if the rash does not fade, get medical help immediately

# The Rash



- On dark skin the rash may be more visible in paler areas, e.g.

- soles of feet
- palms of hands
- abdomen
- inside the eyelids
- inside the mouth



Courtesy D A Warrell

# Babies with meningitis or septicaemia can also get these symptoms

Not every baby gets all these symptoms and they can appear in any order.

## Meningitis Baby Watch

Is your baby getting worse fast? Babies can get ill very quickly, so check often.



- Tense or bulging soft spot
- High temperature (more than 2 months: less than 38°C or 100.4°F)
- Very sleepy/staring, expressionless face, sleepy to wake up
- Irritable when picked up, with a high-pitched, moaning or odd cry
- Extreme shivering
- Pin prick red or white or purple bruise anywhere on the body
- Sometimes diarrhoea
- Cold hands and feet
- Unusual grunting sounds
- Vomiting/refusing to feed
- Breathing fast/difficultly breathing
- Baby's skin getting pale or turning blue
- A stiff body with jerky movements or slow floppy and white
- Possible: Irritability, Horn muscle ache or severe fontanelle pain

For information and support call our free helpline  
0800 8800 3344 (UK) 1800 41 33 44 (Ireland)  
helping@meningitis.org  
www.meningitis.org



- Stiff body, jerky movements, or abnormal posturing
- Irritable, particularly when handled, with a high pitched, moaning or odd cry
- Unusual grunting
- Poor feeding
- Vacant staring or poorly responsive or lethargic
- Tense/bulging fontanelle
- Pale or blue skin

## Always remember...

- Trust your instincts
- Symptoms can appear in any order
- Not everyone gets all the symptoms
- Meningitis and septicaemia can occur together or separately
- Someone who has meningitis or septicaemia needs medical help urgently



# A devastating disease

- Meningitis and Septicaemia...
  - Can severely disable
  - Can kill in hours
  - Can affect anyone at any age

# How can meningitis be prevented?

- Vaccines are the only way to prevent meningitis
- BUT vaccines are not available to prevent all types of meningitis
- Know the signs and symptoms to look out for, and the action to take



# The impact of meningitis and septicaemia

- Following bacterial meningitis 10% will die
- It's estimated up to one person in every two or three who survives bacterial meningitis is left with one or more permanent problems
- After-effects are more common following bacterial meningitis or septicaemia

# After-effects following meningitis and septicaemia

## Physical

- Hearing loss
- Sight problems
- Speech problems
- Limb loss, weakness or paralysis
- Skin scarring/damage
- Organ damage

## Neurological and Emotional

- Epilepsy
- Learning and behavioural problems
- Headaches
- Memory and concentration issues
- Emotional difficulties

***Meningitis can devastate lives within hours and its impact can last a lifetime***

# Viral (aseptic) Meningitis

**Definition:** A syndrome characterized by acute onset of meningeal symptoms, fever, and cerebrospinal fluid pleocytosis, with bacteriologically sterile cultures.

## Laboratory criteria for diagnosis:

No evidence of bacterial or fungal meningitis

## Case classification

*Confirmed:* a clinically compatible illness diagnosed by a physician as aseptic meningitis, with no laboratory evidence of bacterial or fungal meningitis

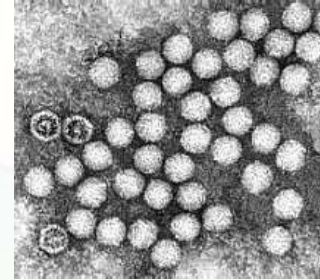
## Comment

Aseptic meningitis is a syndrome of multiple etiologies, but most cases are caused by a viral agent.

# Viral Meningitis

## ❖ Etiological Agents:

- Enteroviruses (Coxsackie's A,B and echovirus): most common.
- Adenovirus
- Measles virus
- Herpes Simplex Virus
- Varicella
- Arbovirus



## ❖ Modes of transmission:

- Primarily person to-person and arthropod vectors for Arboviruses

## ❖ Incubation Period:

- Variable. For enteroviruses 3-6 days, for arboviruses 2-15 days

## ❖ Treatment: *No specific treatment available or symptomatic.*

**Most patients recover completely on their own.**

- **Treat like bacterial meningitis until the 72 hrs culture comes back negative**

# Laboratory Diagnosis

- Virus Isolation
- Serology
  - Neutralization tests or EIAs are used but are very cumbersome and thus not offered by most diagnostic laboratories
- Molecular
  - PCR

# **Viral meningitis - Treatment**

- Supportive
- No antibiotics
- Analgesia
- Fever control
- Often feel better after LP
- No isolation - Standard precautions



# Viral meningitis - Outcomes

- Adverse outcomes rare
- Infants <1 year have higher incidence of speech & language delay
- Neurological complications are rare
- Encephalitis may develop, though this is rare. **(HSV1, Measles, Flaviviruses)**



# **MENINGITIS CAN AFFECT ANYONE**



**It can strike quickly and kill  
within hours**



**saving lives,  
rebuilding futures**

**[www.MeningitisNow.org](http://www.MeningitisNow.org)**

Registered Charity No. 803016 (England & Wales) SC037790 (Scotland)

[www.meningitis.org](http://www.meningitis.org)

Referencing, Some of the slides from the above sites