

MEDICAL MICROBIOLOGY

Lec. 10

Gram-negative cocci

Neisseriae

By:

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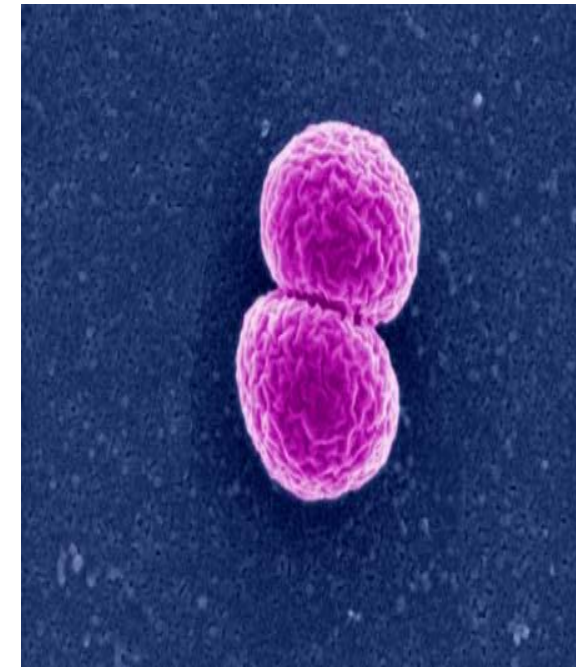
Neisseriae:

The most important species are:

- *Neisseria gonorrhoea*
(gonococci)
 - *Neisseria meningitidis*
(meningococci)
- both of them are strict human pathogen
 - found inside polymorphonuclear cells.
 - Others are normal flora of human respiratory tract.

Gram-negative cocci

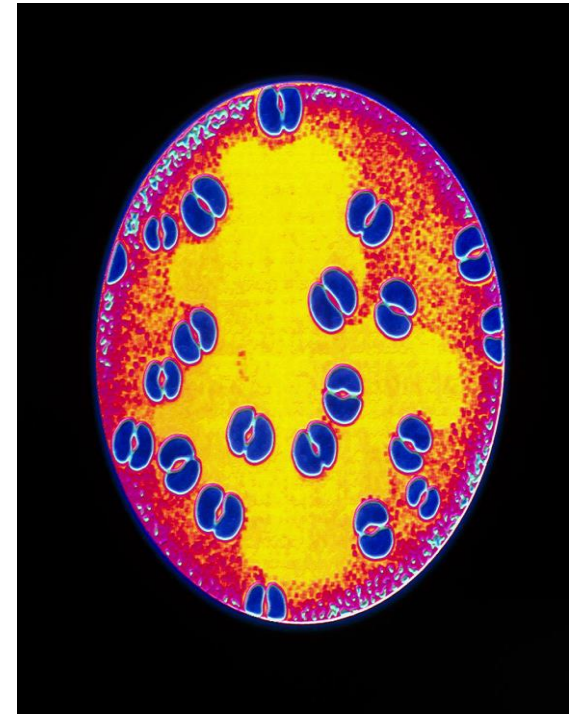
Neisseriae



❖ Morphology:

- Gram negative cocci arranged in pairs.
- Kidney or coffee bean shape (the flat or concave sides are adjacent).
- Non-sporing, non-motile
- Oxidase-positive that differentiate them from streptococci.
- Most are catalase-positive.

Gram Negative
cocci
Neisseriae



❖ Culture:

- fastidious bacteria grow on enriched media; Mullar-Hinton, Modified Thayer-Martin or Heated blood agar (Chocolate agar).
- They produce convex glistening, non-pigmented, non-hemolytic colonies.
- They required 5% CO₂ (Candle jar).
- Ferment sugars producing acid but not gas.

Gram Negative
cocci
Neisseriae



☯ *Neisseria gonorrhoea*:

The causative agent of gonorrhoea and ophthalmia neonatorum.

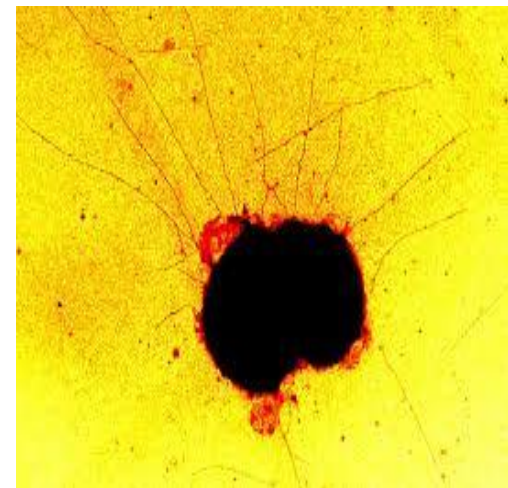
❖ Virulence factors:

1. Pili :

- Pilin protein.
- Attachment to host cell and resist phagocytosis.

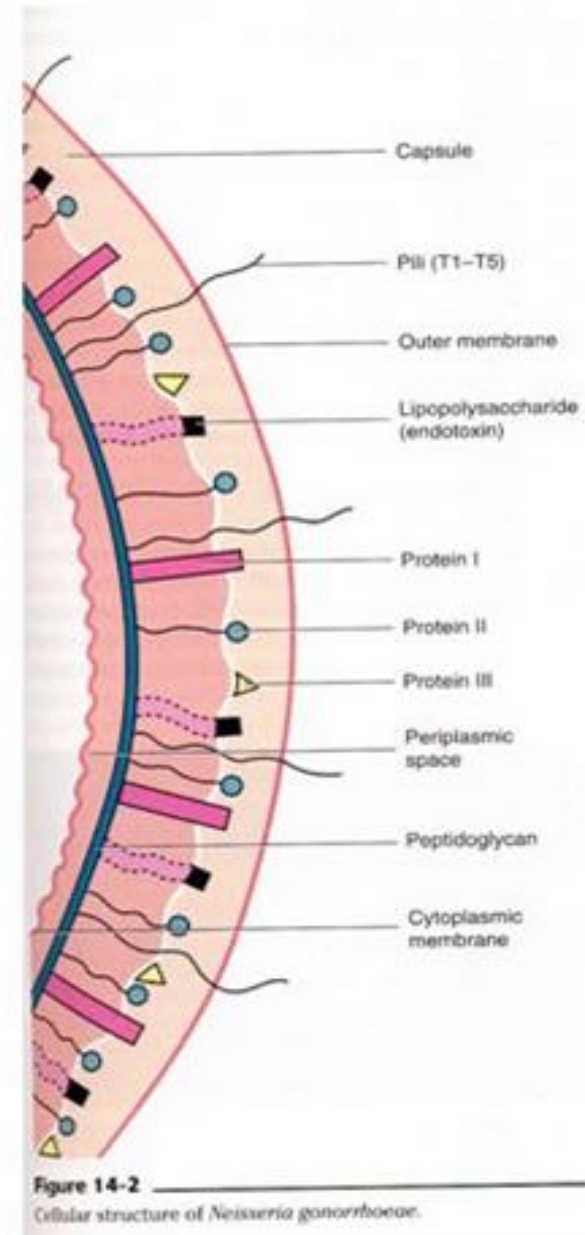
2-IgA protease: split the IgA, major mucosal immunoglobulin.

Virulence factors



3. Cell wall components:

- Por: preventing phagolysosome fusion
- Opa (Opacity): enhance adherence of gonococci within colonies
- Rmp (Reduction Modifiable protein)
- Lipooligosaccharide: possess endotoxic activity.



❖ Pathogenesis:

➤ Gonorrhea:

- Transmitted by sexual contact.
- Gonococci attach themselves to the mucosal cells by pili and protein II (Opa)
- Invasion of cell.
- pass through the cells into the subepithelial space, thereby establishing the infection.
- Lipopolysaccharide: endotoxin
- IgA Protease: destroys immunoglobulin IgA



❖ Clinical findings:

- **In male:**

- symptoms: urethra, purulent discharge, dysuria
- incubation period: 2-7 days after infection
- Complication: epididymitis, prostatitis, periurethral abscesses

- **In female:**

- symptoms: frequently asymptomatic. When symptomatic: cervix, vaginal discharge, dysuria, abdominal pain,
- Complication: ascending genital infection, salpingitis, tubo-ovarian abscess, pelvic inflammatory disease (PID)

- **Post-gonococcal urithritis (PGU):** is common chronic sequelae of untreated or badly managed gonorrhoea, usually caused by different pathogens.
- **Gonococcal ophthalmia neonatorum:** An infection of the eye of newborn acquired during passage through infected birth canal.



❖ Immunity:

- Antibody against Opa proteins and LOS.
- No protection against reinfection. due to the antigenic changes of the pili and outer membrane proteins.

❖ Treatment:

- PPNG have increased in prevalence
- Ceftriaxone, and Doxycycline for concomitant chlamydial infection substituted by erythromycin in pregnant women.

Neisseria meningitidis:

- The causative agent of meningitis, meningococemia (life-threatening form is **Waterhouse-friderichsen syndrome**)
- Serogroups A, B, C, Y and W- 135.
- 5-30% of the normal population carrier

❖ **Virulence factors:**

- **Polysaccharide capsule:** antiphagocytic
- **IgA protease**
- **LPS**



Fig. 110 Haemorrhagic rash (adult with meningitis).

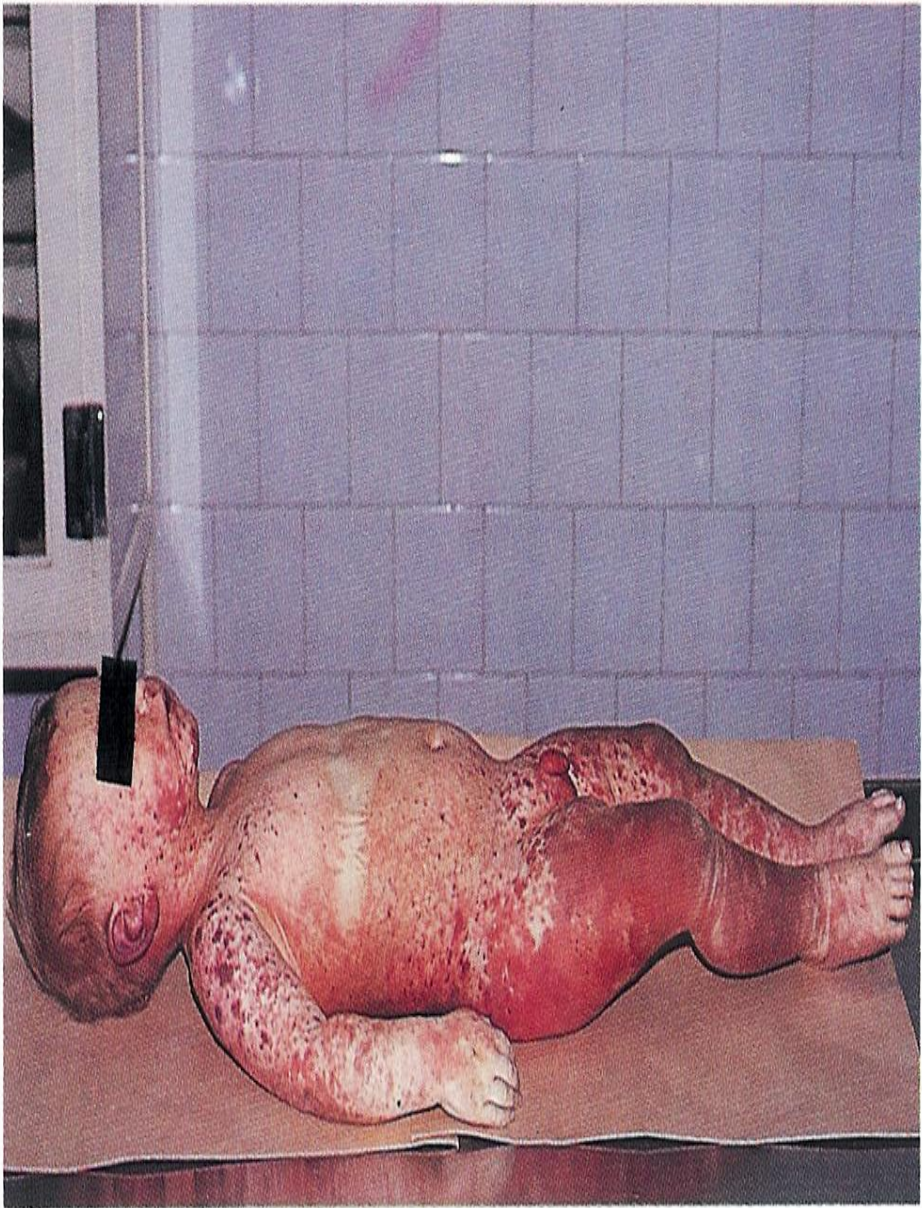
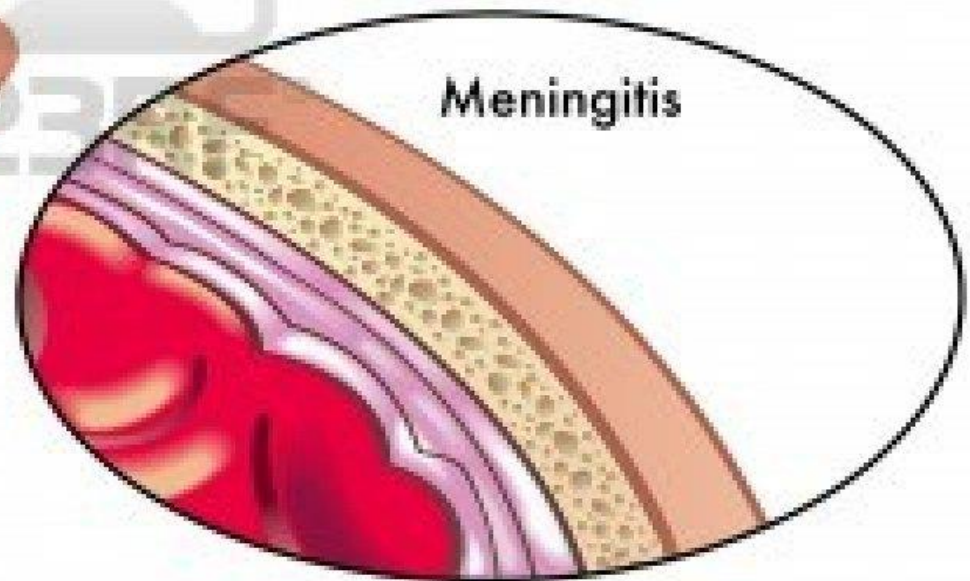
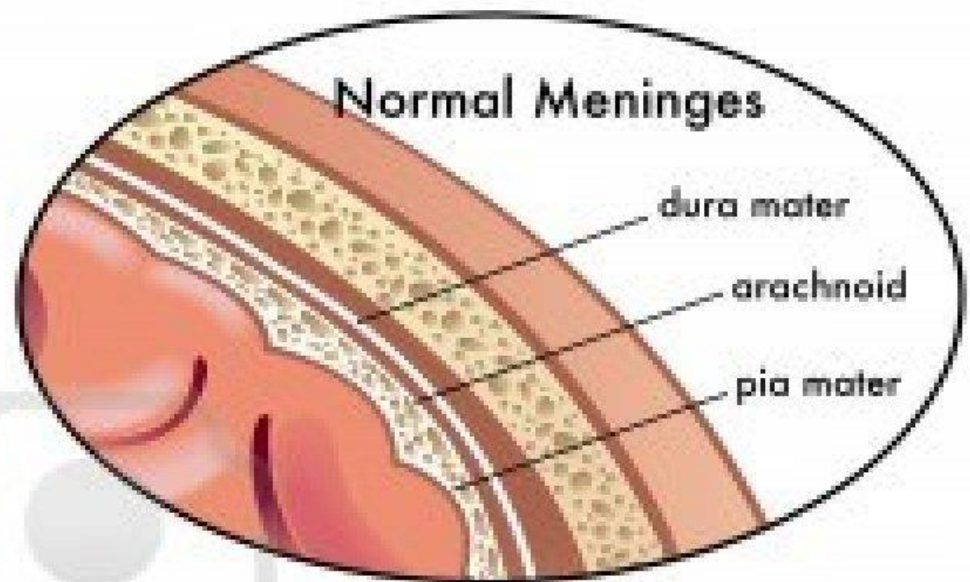
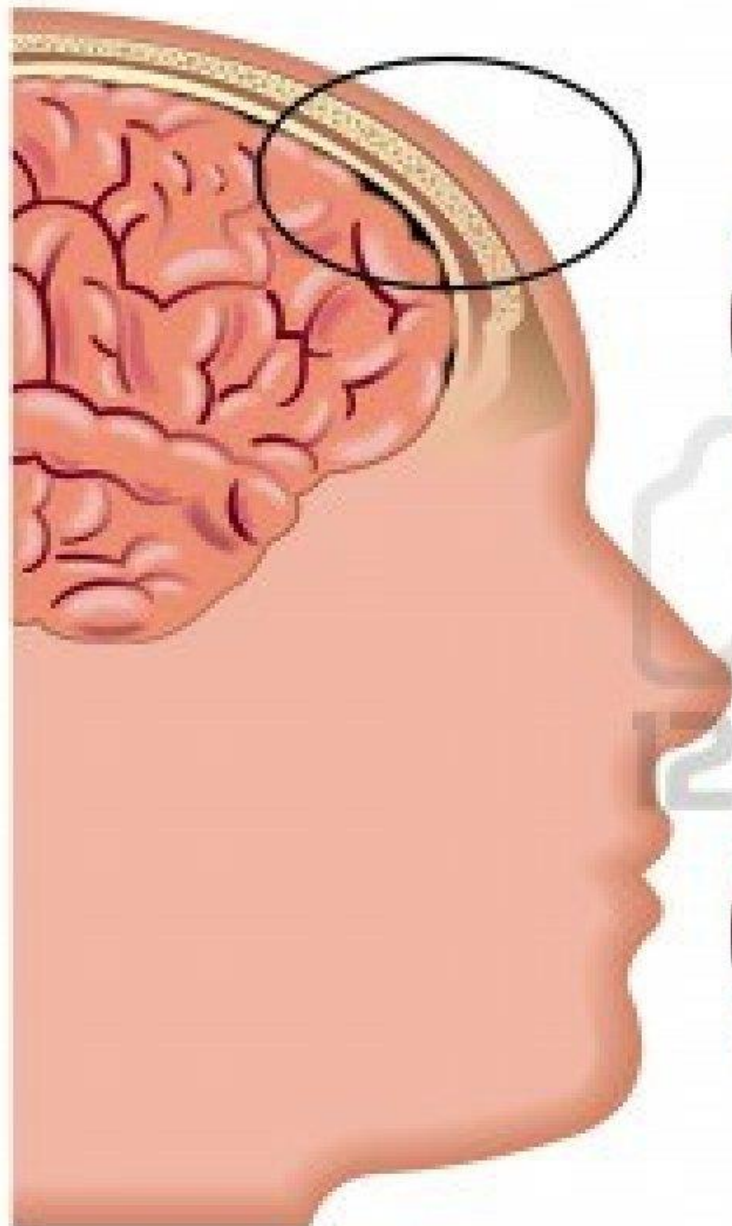


Fig. 113 Death from Waterhouse–Friderichsen syndrome.

❖ Pathogenesis and clinical findings:

- portal of entry: nasopharynx and gain access to CNS:
- Invasion of blood stream: causing bacteremia.
- Direct contiguous spread
- Meningitis is the most common complication of meningococcemia.
- Headache, vomiting and stiff neck.
- Waterhouse-Friderichsen syndrome: high fever, hemorrhagic rash, disseminated intravascular coagulation, and circulatory collapse



❖ Immunity:

- the immunizing antigen is capsular polysaccharide
- There are 2 types of vaccine:
 - Non conjugated tetravalent vaccine
 - Conjugated

❖ Treatment:

- Penicillin G

A person wearing a light blue shirt and a blue tie is holding a small, square chalkboard with a light-colored wooden frame. The chalkboard has a black surface with the words "ANY" and "questions?" written in white chalk. The person's hands are visible on the left and right sides of the chalkboard, holding it steady. The background is a plain, light-colored wall.

ANY
questions?

A hand-drawn 'thank you' card. The words 'thank you' are written in a black, cursive script. The text is surrounded by delicate, hand-drawn floral and leaf patterns in blue and yellow. The card is white and is being held by a person's hand, which is visible on the left side of the frame. The background is a solid grey color.

thank
you