

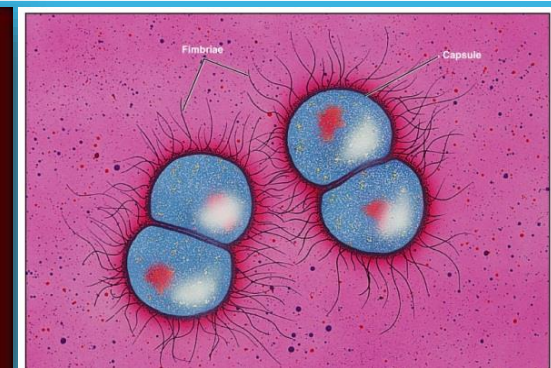
Gram Negative Cocci

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2017-2018

Neisseria

General Overview

- Gram-negative cocci in pairs (diplococci) with adjacent sides flattened (like coffee beans)
- Aerobic, Nonmotile
 - Oxidase positive
 - Most catalase positive
 - Acid from oxidation of carbohydrates, not from fermentation.
 - Several species; some of which are normal colon flora
 - Fastidious nutritional requirements
 - Grow best on chocolate agar
- Notable pathogenic species
 - *Neisseria meningitidis*
 - *Neisseria gonorrhoeae*



NEISSERIA GONORRHOEAE

- **Gram-negative diplococci flattened along the adjoining side**
- **Fastidious and susceptible to cool temperatures, drying and fatty acids**
- kidney bean shaped
- cannot survive in environment
- no animal reservoir
- Antigenically heterogeneous and capable of changing surface antigens
- **often intracellular in clinical samples**
- **Causes gonorrhoea**
 - Requires complex media pre-warmed to 35-37C
 - Grow best in moist atmosphere supplemented with CO₂
- **Readily transmitted by sexual contact**
- **Produce acid from glucose, but not from other sugars**

DISTRIBUTION OF *NEISSERIA GONORRHOEAE*



DIFFERENCES BETWEEN MEN & WOMEN WITH GONORRHEA

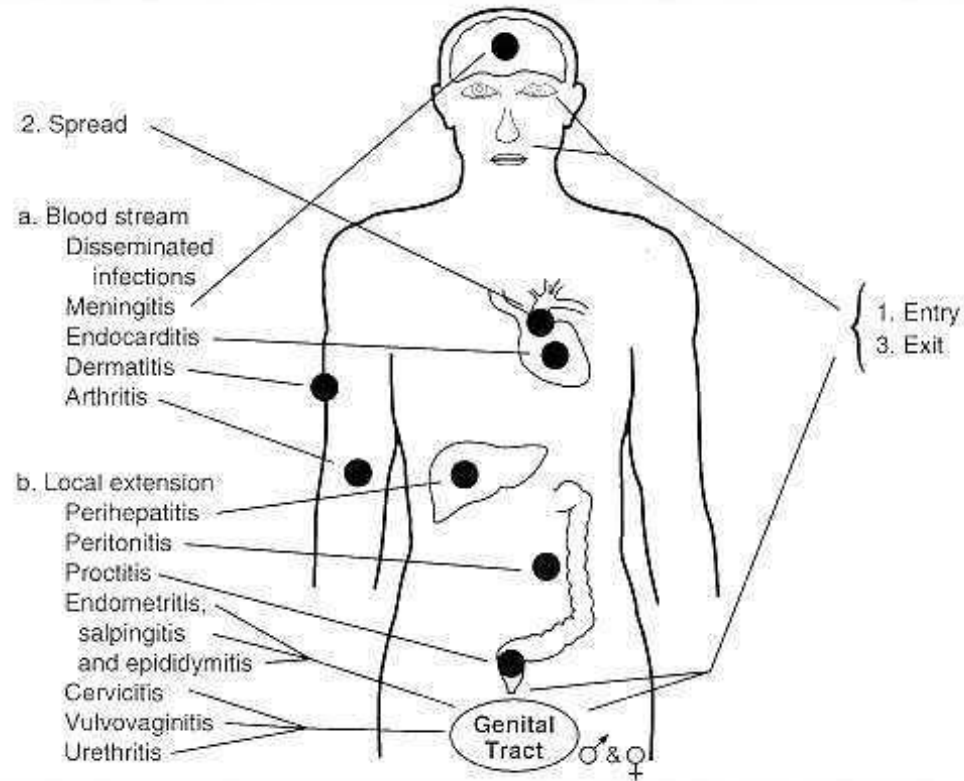
MEN

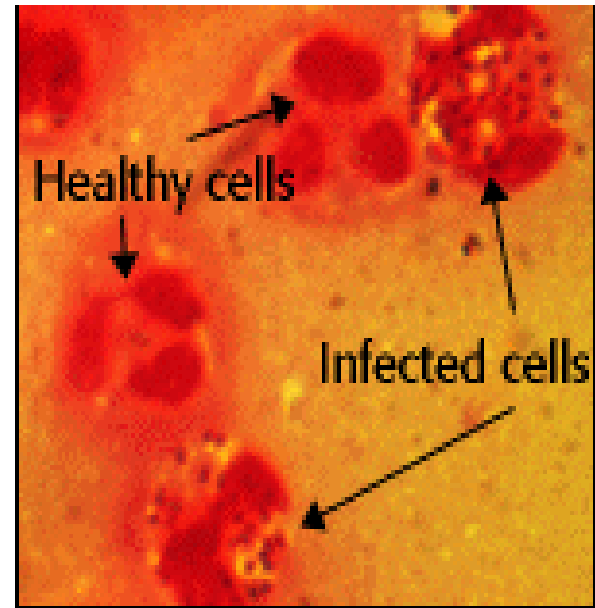
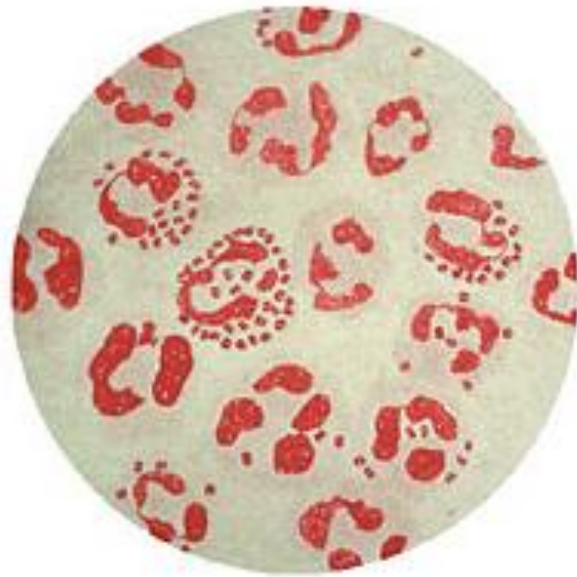
- Urethritis; Epididymitis
- Most infections among men are acute and symptomatic with purulent discharge & dysuria (painful urination) after 2-5 day incubation period
- Male host seeks treatment early preventing serious sequelae, but not soon enough to prevent transmission to other sex partners
- The two bacterial agents primarily responsible for urethritis among men are *N. gonorrhoeae* and *Chlamydia trachomatis*

WOMEN

- Cervicitis; Vaginitis; Pelvic Inflammatory Disease (PID); Disseminated Gonococcal Infection (DGI)
- Women often asymptomatic or have atypical indications ; Often untreated until PID complications develop
- Pelvic Inflammatory Disease (PID)
 - May also be asymptomatic, but difficult diagnosis accounts for many false negatives
 - Can cause scarring of fallopian tubes leading to infertility or ectopic pregnancy
- Disseminated Gonococcal Infection (DGI):
 - Result of gonococcal bacteremia
 - Often skin lesions
 - Petechiae (small, purplish, hemorrhagic spots)
 - Pustules on extremities
 - Arthralgias (pain in joints)
 - Tenosynovitis (inflammation of tendon sheath)
 - Septic arthritis
 - Occasional complications: Hepatitis; Rarely endocarditis or meningitis

GONOCOCCAL DISEASES





DIAGNOSIS, TREATMENT , PREVENTION & CONTROL

Diagnosis : gram stain of urethral specimens is accurate for symptomatic males only .
Culture is sensitive and specific but has been replaced with molecular probe techniques in many laboratories .

Prevention: consists of patient education. Avoid sexual relations outside of marriage.
Effective vaccines are not available

Treatment : **Ceftriaxone**

Invitro susceptibility should be determined in cases unresponsive to therapy, because antibiotic resistance is increasing

penicillin should be avoided ?

Doxycycline or **azithromycin** should be added for infections complicated by Chlamydia.

For neonates , prophylaxis with 1% **silver nitrate**(**now: tetracycline**), ophthalmia neonatorum is treated with **ceftriaxone** .

NEISSERIA MENINGITIDIS

Gram negative diplococci with fastidious growth requirements.

Growths best at 35 C to 37 C .

Oxidase and catalase positive. Acid produced from glucose and maltose oxidatively .

Outer surface antigens include polysaccharide capsule, pili and lipooligosaccharides.

13 serogroups identified based on capsular polysaccharids..Most important are A, B, C, X, Y and W-135 (Group A and C are associated with epidemics)

Virulence :capsule protects bacteria from antibody mediated phagocytosis.

Specific receptors for meningococcal pili allow colonization of nasopharynx

bacteria can survive intracellular killing in the absence of immunity.

Endotoxin mediates most clinical manifestations.

Epidemiology : Humans are the only natural hosts.

Person to person spread occurs via aerosolization of respiratory tract secretions .

Highest incidence of disease is in children younger than 5 years .

Disease occurs worldwide most commonly in the dry, cold months of the year.

PATHOGENESIS

Humans only host → asymptomatic carriers exist → nasopharynx is the portal of entry (attachment by pilli) → URT symptoms → bloodstream → bacteremia → high fever → hemorrhagic rash → circulatory collapse → death



SYMPTOMS OF MENINGITIS

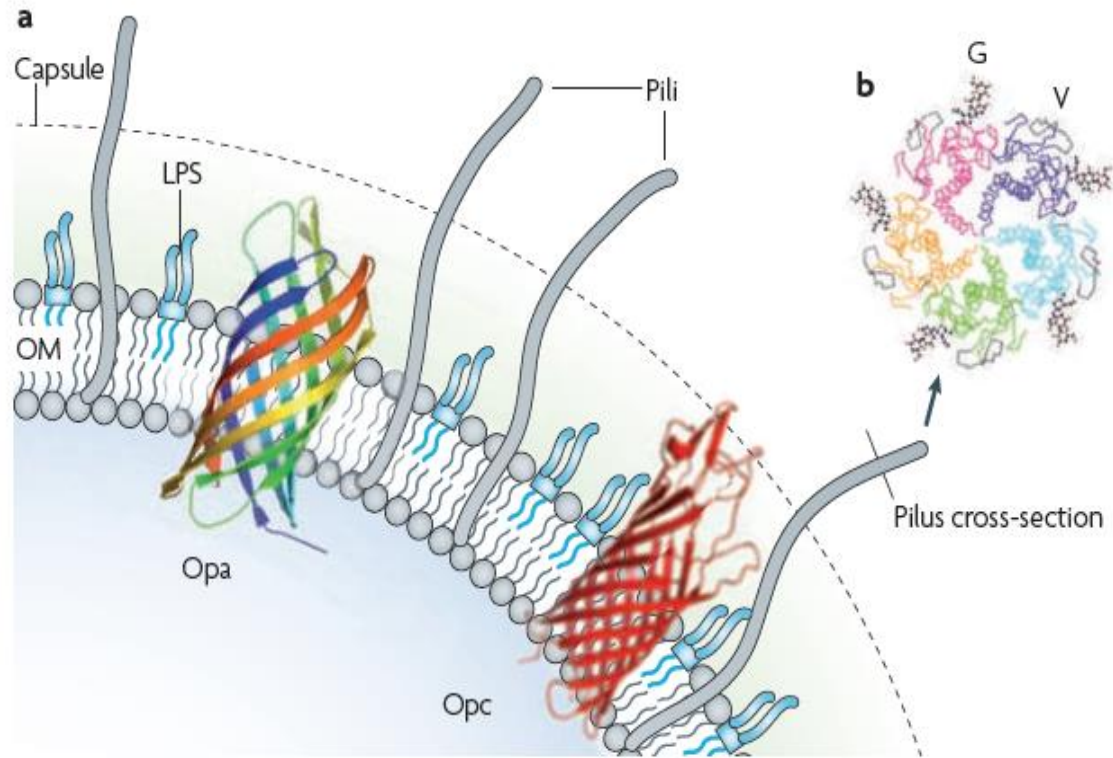
The most common symptoms of meningitis are **headache** and **neck stiffness** associated with **fever, vomiting**, and an inability to tolerate light (**photophobia**) or loud noises (**phonophobia**). Coma followed by death

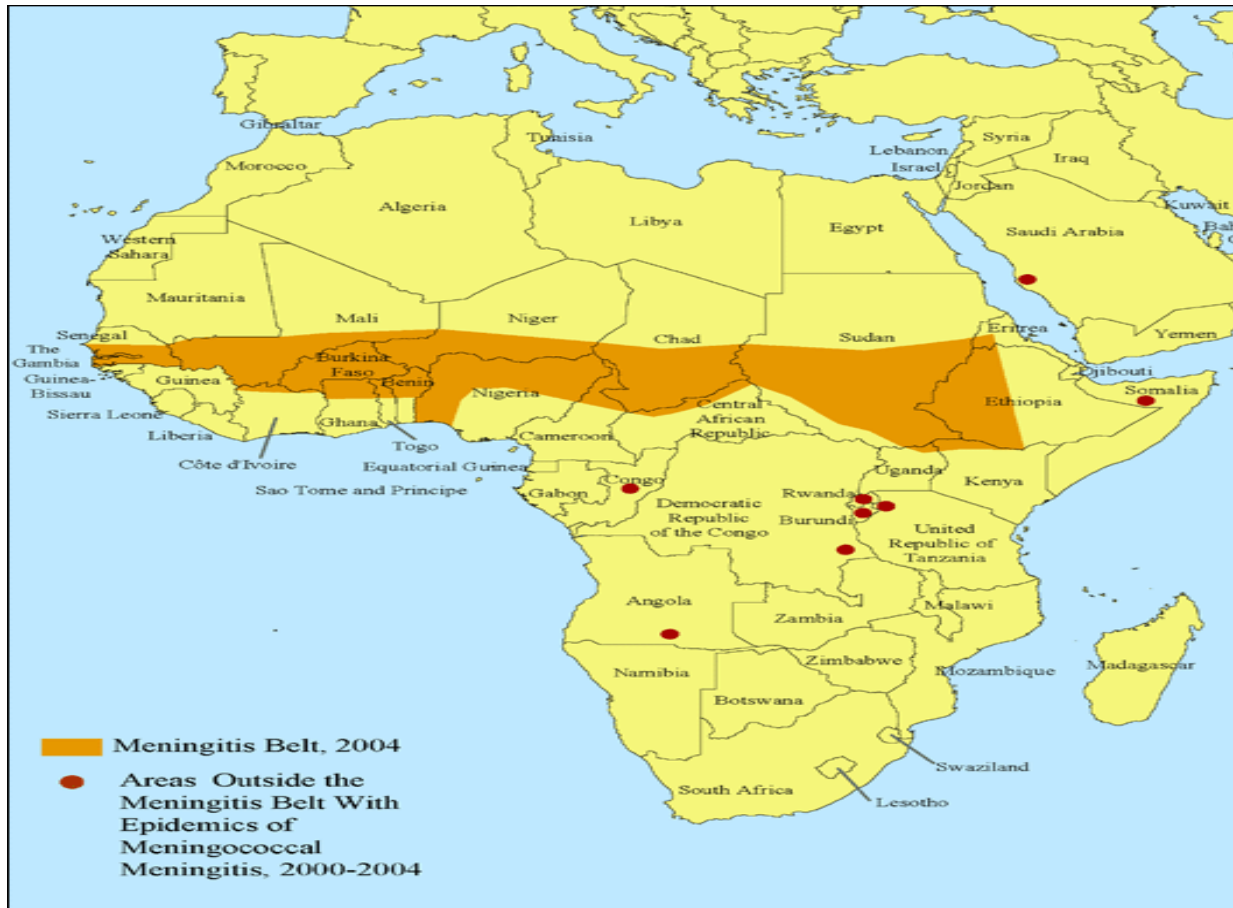
Children often exhibit only nonspecific symptoms, such as irritability and drowsiness.

accompanied by a characteristic rash.

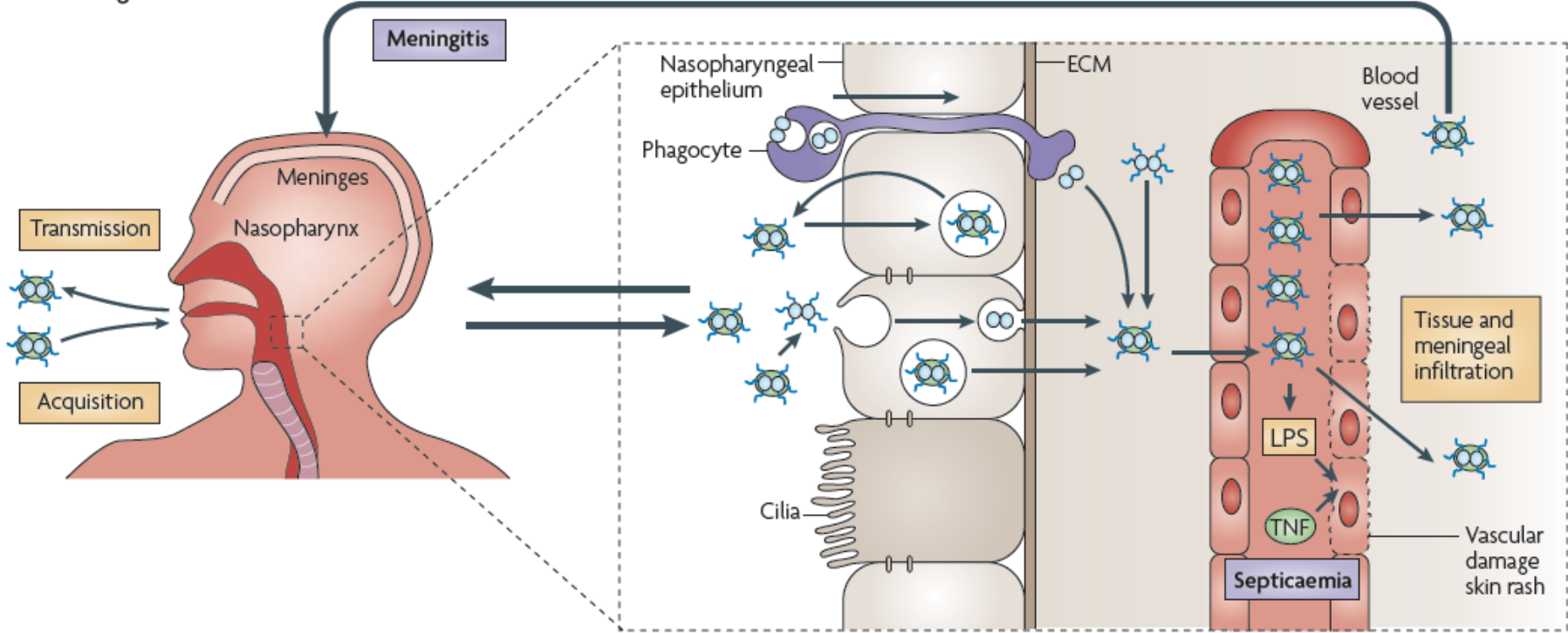
Other symptoms include: **Arthritis, myocarditis, skin lesions**

VIRULENCE FACTORS





a *N. meningitidis*



Diagnosis: gram stain of **cerebrospinal fluid(CSF)** is **sensitive** and **specific** but is of limited value for **blood specimens**.

Culture is definitive , but organism is fastidious and dies rapidly when exposed to cold or dry conditions .

Chocolate agar. Incubation at 37C and 5%CO₂

Treatment: **penicillin** **OR** **chloramphenicol** in people with allergy .

Vaccine: **Available to some serogroup**