



Ministry of Higher education and scientific research

University of Tikrit

College of science

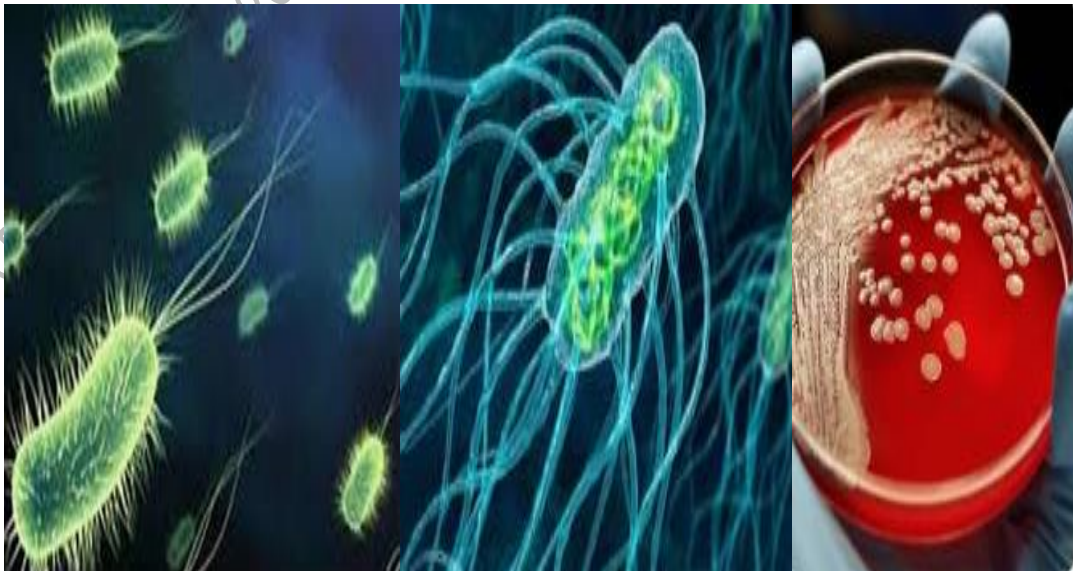
Department of Biology

Lectures of Pathogenic Bacteria

For Diploma students – Pathological analyses - 2024-2025

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Gram-negative cocci, aerobic.

The genus *Neisseria* consists of G⁻, aerobic, cocci. Two *Neisseria* species are pathogenic for humans.

Neisseria gonorrhoeae (commonly called gonococcus). The causal agent of gonorrhea and

Neisseria meningitidis (commonly called meningococcus) are frequent causes of meningitis.

Neisseria gonorrhoeae, also known as gonococci (plural), or gonococcus (singular), is a species of Gram-negative coffee bean-shaped diplococci bacteria, frequently observed within the polymorphonuclear leukocytes.



N. gonorrhoea was first described by Albert Neisser in 1879. responsible for the sexually transmitted infection gonorrhea, usually transmitted during:

1-Sexual contact

2- More rarely vertically (during the passage of baby through an infected birth canal)

Structure : Gonococci are unencapsulated (unlike meningococci), piliated, and non-motile, and they resemble a pair of kidney beans

1- Pili: enhance attachment of organism to host epithelial and mucosal cell surface act as important virulence factors, and also antigenic.

2- Lipooligosaccharide (LOS): have shorter, more highly branched, nonrepeat O- antigen side chains than do lipopolysaccharide found in other Gram-negative bacteria. The bacterial antibodies in normal human serum are IgM molecules directed against LOS antigens. The gonococcus is also capable of high frequency variation of the LOS antigens presented on the cell surface.

3- Porin Protein: This bacteria express a single porin type, known as Por B. Different strains express either PorB1A or PorB1B.

4- Opacity proteins: Opacity (Opa) protein (formerly called PII proteins) are so named due to their tendency to impart an opaque quality to gonococcal colonies.

Pathogenesis:

- 1- Pili and Opa proteins facilitate adhesion of the gonococcus to epithelial cells of the urethra , rectum , cervix , pharynx ,and conjunctiva , thereby making colonization possible .
- 2- Both gonococci and meningococci produce an IgA protease that cleaves IgA1.
- 3- To establish infection in human males , the gonococcus must express proteins that facilitate iron acquisition from either transferrin or lactoferrin .

Clinical Significance :

A higher proportion of females than males are generally asymptomatic , and these individuals act as the reservoir for maintaining and transmitting gonococcal infection more than one sexually transmitted disease (STD) may be acquired at the same time , such as gonorrhea in combination with syphilis (*Treponema pallidum* infection) , chlamydia , human immune deficiency virus , or hepatitis B virus.

Patients with gonorrhea may therefore , need treatment for more than one pathogen .

1- Genitourinary tract infections.

In male : a yellow , purulent urethral discharge and painful urination .

In female :A greenish , yellow cervical discharge is most common . often accompanied by inter menstrual bleeding .

2- Rectal infections.

3- pharyngitis

4- Ophthalmia neonatorum : occur in newborns .

5- Disseminated infection : bacteria have limited ability to multiply in blood stream , therefore bacteria with gonococci is rare . In contrast , meningococci multiply rapidly in blood .

Note: Gonococcal infection is the most common cause of septic arthritis in

sexually active adults .

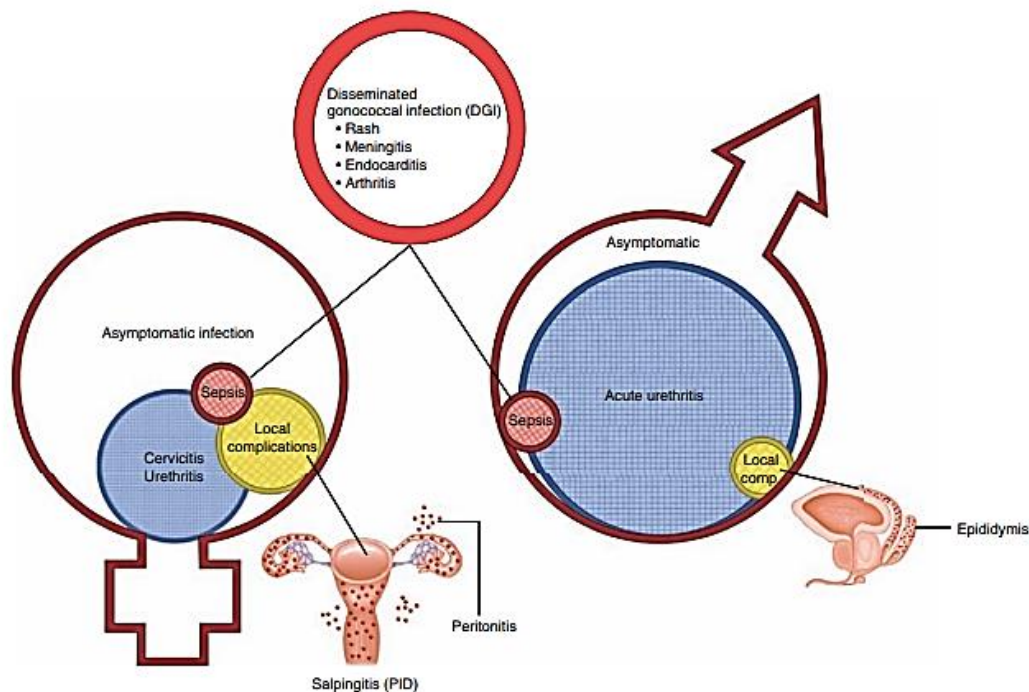


FIGURE 30-8. Gonorrhea in men and women. The majority of cases in women are asymptomatic. Local extension up the fallopian tubes causes salpingitis. The majority of men have acute urethritis, and only a small percentage have local extension to the epididymis. A very small part of either spectrum results in bacteremia and disseminated gonococcal infection.

Laboratory identification :

- In male: finding of numerous neutrophils containing G- diplococci in a smear of urethral exudate .

- In females : a positive culture is needed to diagnosis gonococcal infection as well as at sites.

If disseminates infection is suspected . Appropriate culture : should be set up as indicated for example of skin lesions , joint fluid , and blood .

1- Growth conditions for culture :

a- Bacteria grows : best under aerobic conditions , and most strains require enhanced CO₂ .

b- Gonococcus utilize glucose but not maltose , lactose ,or sucrose .

Meningococcus utilize both glucose and maltose .

c- All Neisseria genus Oxidase +

2- Selective media : Gonococcus : very sensitive to heating and drying ,chocolate agar supplemented with several antibiotics that suppress the growth of nonpathogenic Neisseria and other normal and abnormal flora . The bacteria on this media appear as gold standard.

Treatment :

More than 20 % of current isolates of N. gonorrhoeae are resistant's to penicillin , tetracycline, cefoxitin ,and /or spectinomycin.

Penicillinase producing N. gonorrhoeae ,however , most organisms still respond to treatment with third generation cephalosporins .

Prevention:

Gonorrhea involves evaluating and arrangement of sexual contacts of the patient

1- Generally using antibiotics as prophylactically in an exposed individual even in the observe of symptoms .

2- Barrier methods

Neisseria meningitidis

Is one of the most frequent causes of meningitis when meningococcus is isolated from blood or spinal fluid , its invariably encapsulated . The meningococcal polysaccharide capsule is antiphagocytic . Antibodies to capsule carbohydrate are bactericidal . According to the epidemiological classification , this bacteria is classified in to > 13 serogroups depended on polysaccharide capsule and > 20 serotypes depended on outer membrane proteins .

Most infections are caused by serogroups A,B,C,W-135 , and Y(approximately 90% are due to A,B,C). The meningococcus express Por A and Por B-type porins .

Epidemiology :

Transmission occurs through inhalation of respiratory droplets from a carrier or a patients in the early stages of the disease . In addition to contact with carrier , risk factors for disease include recent viral or mycoplasma upper respiratory tract infection, active or passive smoking , and complement deficiency .