

Micro, lec 1:

Reproductive Bacterial infections

Normal flora of the genitourinary tract

← vaginal flora عند adult woman موجود فيها بشكل أساسي الـ lactobacillus
وهي مفيدة من ناحية أنها تعمل على إنتاج الـ lactic acid وتحمي الـ vaginal pH من الـ acidic
وبإدخال الـ acidic فإن الـ pH يزداد في الـ overgrowth of pathogenic organisms ، حيث الـ pH يزداد
الـ vaginal يكون low .

← قبل البلوغ وبعد الـ menopause يكون الـ estrogen نسبة قليلة والـ pH عالية ،
نتيجة إنه الـ lactobacilli تكون rare

← دائماً الـ normal flora في أي مكان يكون في الحارس فيه بالتالي الـ lactobacilli لا تسمح لـ
pathogenic bacteria إذا تدخلت للكائن ، بالتالي لو راجعت الـ lactobacilli ليس الـ growth
لـ pathogenic والـ (candida albicans) fungus .
bacteria

كثرة استعمال الـ antibiotics خاصة الـ broad spectrum
تزيد من إمكانية الـ lactobacilli

← مهم نعرف إنه الـ urine في الـ bladder يكون sterile ، يلي ممكن يسبب وجود البكتيريا في
الـ urine هو انتقال الـ urinary system with reprod. وترفعه الدم الحار في بن خلال
الـ urethra ، حيث حوالي الـ urethra يوجد بكتيريا خاصة عند الـ male
طبيب من الأساس ليس الـ urine يكون sterile
لونه (acidic) ولتونه منعج stream بالتالي لا يحدث stagnation .

← البكتيريا التي تكون على الـ skin حوالي الـ urethra هي الـ S. epidermis .
E. coli يلي جايه من الـ stool أو الـ diphtheroid أو الـ non-hemolytic streptococci

لهم حقاً أضرار موجودة ، لا لتسبب

ببؤس المشاكل

← البكتيريا حوالي الـ urethra عند النساء والرجال يلي يكونوا من الـ circumcised ليس فيها
secretions قد الـ Mycobacterium smegma ، حيث هاي البكتيريا تنتج مادة اسمها smegma حيث
هي مادة لزجة تلتصق بها الـ overgrowth للبكتيريا .

← skin: جنوني منطقة ال genitourinary يتكون فيها ال staphylococcus
tract
saprophyticus.
هذه البكتيريا يلبى بقتل (Honey moon cystitis) حيث هلك البكتيريا موجودة دائماً لكن ما ينقر بعد invasion
إلا لوقت، وكان تدخل منه، ال staph aureus ما ينقل أيضاً.

← هناك بكتيريا اسمها ال Gardnerella vaginalis، جنوني naturally grow في ال vagina، او
overgrowth بعد حاجة اسمها Bacterial vaginosis وليس vaginitis.
← (هذه اسمها) sexually transmitted.

← هذا يرجع تدخل ال بكتيريا يلبى مكان تدخل عندي مشاكل، حيث بعض ال organisms التي
تسبب infection of genital - sexually transmitted.

← يوجد حوالي 10-20% من group B β -streptococci في ال vagina، هلك يلبى تسبب حمى
ال meningitis وال pneumonia عند الوليد أثناء ال delivery.

← جنوني مكان حوالي 5% يوجد staphylo. aureus في ال vagina، يلبى بقتل ال TSS
(toxic shock syndrome)

هذه ال كلم موجودة normally وما ينقلوا حاجة، لكن لو نشطوا لتسبب
كان وقتها يرج يسببوا حمى (disease)، وهذه كلم جنوني sexually
transmitted ولما موجودة بطبيعتنا عند بعض الناس

Normal Flora of the Genitourinary Tract

- The vaginal flora of adult women consists primarily of *Lactobacillus* species.
- Lactobacilli are responsible for producing the acid that keeps the pH of the adult woman's vagina low.
- Before puberty & after menopause, when estrogen levels are low, lactobacilli are rare & the vaginal pH is high.
- Lactobacilli appear to prevent the growth of potential pathogens, since their suppression by antibiotics can lead to overgrowth by *C. albicans*.
- Overgrowth of *C. albicans* can result in *Candida* vaginitis.

Normal Flora of the Genitourinary Tract

- The vagina is located close to the anus & can be colonized by members of the fecal flora.
- Women who are prone to recurrent UTI harbor organisms such as *E. coli* & *Enterobacter* in the introitus.
- About 15% to 20% of women of childbearing age carry group B streptococci in the vagina. This organism is an important cause of sepsis & meningitis in the newborn & is acquired during passage through the birth canal.
- The vagina is colonized by *S. aureus* in approximately 5% of women, which predisposes them to toxic shock syndrome.

Normal Flora of the Genitourinary Tract

- Urine in the bladder is sterile in a healthy person, but during passage, through the outermost portions of the urethra, it often becomes contaminated with
 - *S. epidermidis*
 - coliforms
 - diphtheroids
 - non-hemolytic streptococci.
- The area around the urethra of women & uncircumcised men contains secretions that carry *Mycobacterium smegmatis*, an acid-fast organism.
- The skin surrounding the genitourinary tract is the site of *Staphylococcus saprophyticus*, a cause of UTI in women.

Neisseria gonorrhoea

هناك نسيت موجودة بشكل normal في حيزه الـ (neisseria) هيا موجودة:

1) Neisseria meningitidis

2) Neisseria gonorrhoea (cause gonorrhoea disease) ^{السيلا}

→ it's sexually transmitted, and never invade alone without a reason.

معنى انه لا هي غير عند الـ اجل استر المست gonorrhoea بيوت (sexual course)

* Neisseria is a gram $\ominus$ diplococci, mainly it's intracellular, and has many serotypes, and it has a membrane with protein on its surface, also has lipooligosaccharides on its outer membrane as an endotoxin.

exotoxin → goes outside bacteria, it's a protein (lipoprotein)

endotoxin → inside the bacteria, it's a lipopolysaccharide

في صورة سلايد (١٥) ← على neutrophil كلة engulfment لا (neisseria) حيث لا paired تكون neisseria

له مطلوب منا تعرف ال media على يتفرع على ال organism ، لا كية ال media فلا شيا ملحوظ (سلايد ١٦)

سلايد (١٦) :

← مشكلة ال neisseria انه أثناء ولادة الستة يمكن تنتقل الجمل شديد العيون وتعمل عنه . blindness ال ophthalmium neonatorum على بعد ذلك يمكن تتسبب جرح ال

← ال neisseria بتكون حساسة للبرد على عكس ال organisms الأخرى على هذا ك كثير بتكون حريصا واحدا بتعمل العينة وبتأخرها

← جرحهم نغزنا ال neisseria هي sensitive organism (توبالفتح كانت) لدرجة ان كانت تودا بسرعة من ال penicillin ، لكن حاليا جرح ال broad spectrum أيضا .

← ال gonorrhea بتكون symptomatic في ال male لكن غالباً بيكون symptoms عند ال female حيث أنت عند ال males غالباً في urethral discharge ، بيضا ال women عند ه بلا ، ال gonorrhea لها حد شوي بتعمل ان سلايد وتعمل urethral discharge بالتالي هاد الوضع يكون غريب عند ال male لكن عند ال female مش هتغير نغزنا انما بسبب ال gonorrhea وتكون normally .

سلايد (١٧) :

← ال neisseria هي ال pathogen تشكل أهم عوامل ال virulence تبعاً بتساعدها بتدخل على ال mucosal surfaces وتدخل من ال urethra على فوق وتعمل infection للأجزاء التي فوق يعني اول اشي بتعمل urethral discharge يعني جرح على ال prostate وتعمل (prostatitis) ثم ترجع على ال epididymis وتعمل epididymitis ثم تنزل على ال testis وتعمل عنده orchitis .
* ال urethral discharge يكون profused وكثير كثير .

← مهم كثير تعرف انه الفطار العيوي حالها ما يجيب فيها لكن يقال ال infection فمصح chronic وليس عند الشخص حاجة اسما morning drop وبعد ذلك بيبدأ ال infection يسبح ويكمل على التجزاء الأخرى

← لا بيتاخذ culture ال neisseria وشو الصبغة يلي بتعطي gram staining وشان ال neisseria ٥ حيلع معانلون أثرق ماروينا نبي المنطق احناش حاجة ال culture لتاثيرها روح جي ب discharge فلتاقي ههنا لحالي.

← بالنسبة ال woman : بتعمل عشي vaginal infection وكان تعمل عشي urethritis برخوخة cervicitis وإذا ح extension كان ترجع تعمل عشي infection في ال ureter وفي ال fallopian tube ويعبر عشي adhesions العلاقات وما يصير عند الست حمل وال ovum ماتون قرا و كان يصير salpingitis وتدخل ال infertility.

← رخص ال gonorrhea ال مضاعفات بعيدا عن ال genital system زي ال arthritis فخرجنا عينة synovial fluid من ال joint ما نلاقي ال organism في العينة مع إنه الرتبة منتخبة والوضع كربت

treatment of gonorrhea → Broad spectrum antibiotic.

← ال neisseria عندنا (IgA protease) يلي بي hydrolyze ال (secretory IgA) و بيتلا عند ال neisseria الميكانيكية للاتصال

← ال gonorrhea عندنا عن الناس يلي ال sexual desire عالية عندهم كثير و كان رخص ال gonorrhea لا تعمى بتخلي عند الشخص sexual desire عالية لأنه زي كانه في irritation في المنطقة

← ال Female تكون ال source ال infection لأنه التفرع بتربا ما بتبين عليها وال organism عندها مش easily discovered.

← ال main host defense يكون ال (IgA antibody) وال (G) و رخص يكون في antibody mediated opsonization و Killing by phagocytosis يعني ما في antibodies دائمة تكون عند ال neisseria يعني كل ما يصير sexual وتكون ال organism موجود هيصر في infection يعني ما ال life-long immunity وكما قلت الملقحة ح ال distant infection.

← gonococci يتغل localized infection ولكن dissemination seeding
other spaces

← discharge يكون ثقيل (pus, purulent) لكن في البداية يكون perfused يعني كمية كبيرة

← woman يكون mainly في cervix ويتغل purulent vaginal discharge ويمكن
يعبر bleeding لكن يرتبط على الأثر على فترة menstruation.

← يتغل culture على (Thayer-Martin media)

← sexual transmitted disease يمكن تستغل rectum فيبرعسي proctitis يمكن يعبر

pharyngitis نتيجة الـ (sexual oral transmission) ، يمكن يرتبط مع infection في العين ، وهذا الأماكن
← نتيجة الـ orosexual transmission وغير عندي
تغير تطلع purulent discharge
بيني) للطفل أثناء الـ birth

← a-symptomatic ← يمكن ما غيرها ونقل الـ discharge يلزم لكن هي تكون (gonococcal infection)

← لو اللم كان عنها gonorrhea ، الطفل يمكن يتولد بـ blindness عندها
بعض الـ silver nitrate مباشرة بعد الولادة.

← في الـ male الموضوع يكون بسيط ، يتغل الـ discharge يتقره وينشفه ، لكن في الـ
woman إنه تستغل الـ gram stain alone يمكن يكون difficult لتتوال woman عندها
غير organisms

→ rapid tests are used for screening
← الـ ceftriaxone فعال لا يكون الـ infection من complicated يعني ما وجد لمرحلة الـ chronic

First line treatment → ceftriaxone

second line treatment → cefixime

الدكتور دقق على جرعة الأدوية

→ if the patient is presented with sexual transmitted disease, he or she must be screened for other sexual transmitted disease.

(PID) → pelvic inflammatory disease.

← prevention

- * condom وسيلة حماية 100% حيث يمكن تجنب rupture
- * gonococci لا في اللقاح vaccine

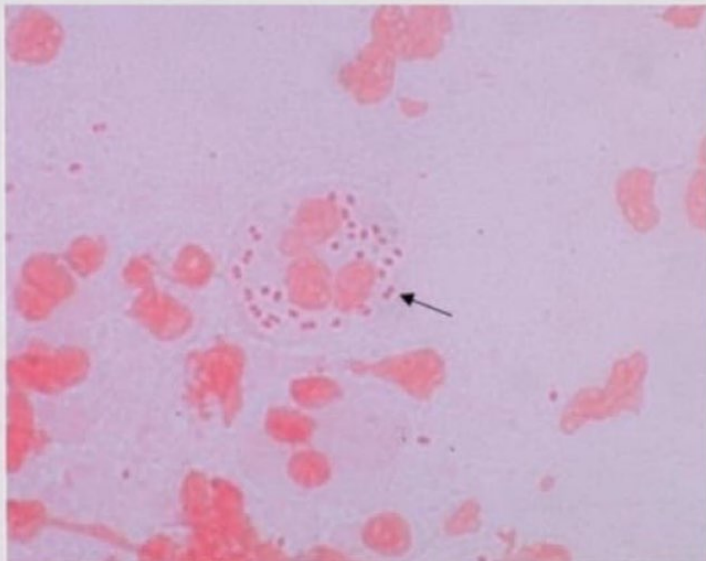
NEISSERIA GONORRHOEAE

- ❖ Neisseriae are gram-negative cocci that resemble paired kidney beans.
- ❖ *N. gonorrhea* causes gonorrhea,
- ❖ it is the second most common notifiable bacterial disease in the USA.

IMPORTANT PROPERTIES

- Neisseriae has no polysaccharide capsule but has multiple serotypes based on the antigenicity of its pilus protein.
- Gonococci have three outer membrane proteins (proteins I, II, & III). Protein II plays a role in the attachment of the organism to cells & varies antigenically as well.
- Neisseriae contain a lipooligosaccharide (LOS), endotoxin in their outer membrane.

Neisseria gonorrhoeae—
Gram stain.
Arrow points to
typical "kidney-
bean" shaped
gram-negative
diplococci within a
neutrophil.



IMPORTANT PROPERTIES

- The growth of both gonococci is inhibited by toxic trace metals & fatty acids found in certain culture media, e.g., blood agar plates.
- They are therefore cultured on "chocolate" agar containing blood heated to 80°C, which inactivates the inhibitors.
- Neisseriae are oxidase-positive, i.e. they possess the enzyme cytochrome c.
- This is an important laboratory diagnostic test in which colonies exposed to phenylenediamine turn purple or black as a result of oxidation of the reagent by the enzyme.

NEISSERIA GONORRHOEAE PATHOGENESIS & EPIDEMIOLOGY

- Gonococci cause disease only in humans.
- The organism is usually transmitted sexually;
- newborns can be infected during birth.
- Because gonococcus is quite sensitive to dehydration & cool conditions, sexual transmission favors its survival.
- Gonorrhea is usually symptomatic in men but often asymptomatic in women.

NEISSERIA GONORRHOEAE PATHOGENESIS & EPIDEMIOLOGY

- Pili constitute one of the most important virulence factors, because they mediate attachment to mucosal cell surfaces & are antiphagocytic.
- Two virulence factors in the cell wall are LOS (a modified form of endotoxin) & the outer membrane proteins.

- The organism's IgA protease can hydrolyze secretory IgA, which could block attachment to the mucosa.
- Gonococci have no capsules.

NEISSERIA GONORRHOEAE
PATHOGENESIS & EPIDEMIOLOGY

- The main host defenses against gonococci are antibodies (IgA & IgG), complement, & neutrophils.
- Antibody-mediated opsonization & killing within phagocytes occur, but repeated gonococcal infections are common primarily as a result of antigenic changes of pili & the outer membrane proteins.
- Gonococci infect primarily the mucosal surfaces, e.g., the urethra & vagina, but dissemination occurs.

NEISSERIA GONORRHOEAE
PATHOGENESIS & EPIDEMIOLOGY

- Certain strains of gonococci cause disseminated infections more frequently than others.
- The most important feature of these strains is their resistance to being killed by antibodies & complement.
- The mechanism of this "serum resistance" is uncertain, but the presence of a porin protein (porin A) in the cell wall, which inactivates the C3b component of complement, appears to play an important role.

- The occurrence of a disseminated infection is a function not only of the strain of gonococcus but also of the effectiveness of the host defenses.
- Persons with a deficiency of the late-acting complement components (C6–C9) are at risk for disseminated infections, as are women during menses & pregnancy.
- Disseminated infections usually arise from asymptomatic infections, indicating that local inflammation may deter dissemination.

CLINICAL FINDINGS

- Gonococci cause both localized infections, usually in the genital tract, & disseminated infections with seeding of various organs.
- Gonococci reach these organs via the bloodstream (gonococcal bacteremia).
- Gonorrhea in men is characterized primarily by urethritis accompanied by dysuria & a purulent discharge. Epididymitis can occur.

CLINICAL FINDINGS

- In women, infection is located primarily in the endocervix, causing a purulent vaginal discharge & intermenstrual bleeding (cervicitis).
- The most frequent complication in women is an ascending infection of the uterine tubes (salpingitis, PID), which can result in sterility or ectopic pregnancy as a result of scarring of the tubes.
- Disseminated gonococcal infections (DGI) commonly manifest as arthritis, tenosynovitis, or pustules in the skin.

- Disseminated infection is the most common cause of septic arthritis in sexually active adults.
- The clinical diagnosis of DGI is often difficult to confirm using laboratory tests because the organism is not cultured in more than 50% of cases.
- Other infected sites include the anorectal area, throat, & eyes.
- Anorectal infections occur chiefly in women & homosexual men. They are frequently asymptomatic, but a bloody or purulent discharge (proctitis) can occur.
- In the throat, pharyngitis occurs, but many patients are asymptomatic.

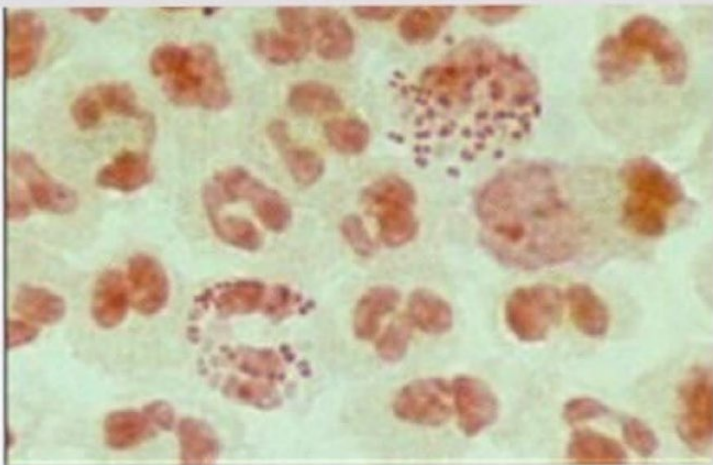
CLINICAL FINDINGS

- In newborns, purulent conjunctivitis (ophthalmia neonatorum)
- The incidence of gonococcal ophthalmia has declined greatly in recent years because of the widespread use of prophylactic erythromycin eye ointment (or silver nitrate) applied shortly after birth.
- Gonococcal conjunctivitis also occurs in adults due to the transfer of organisms from the genitals to the eye.

LABORATORY DIAGNOSIS IN MEN

- The diagnosis of localized infections depends on Gram staining & culture of the discharge.
- In men, finding gram-negative diplococci within PMNs in a urethral discharge specimen is sufficient for diagnosis.

- In women, using the Gram stain alone can be difficult to interpret; therefore, cultures should be done.
- Gram stains on cervical specimens can be falsely positive because of gram-negative diplococci in the normal flora & can be falsely negative because of the inability to see small numbers of gonococci when using the oil immersion lens.
- Cultures must also be used in diagnosing suspected pharyngitis or anorectal infections.



Neisseria gonorrhoeae

LABORATORY DIAGNOSIS

- Specimens from mucosal sites, such as the urethra & cervix, are cultured **on Thayer-Martin medium**, which is a chocolate agar containing antibiotics (vancomycin, colistin, trimethoprim, & nystatin) to suppress the normal flora.
- The finding of an oxidase-positive colony composed of gram-negative diplococci is sufficient to identify the isolate as a member of the genus *Neisseria*.
- Note that specimens from sterile sites, such as blood or joint fluid, can be cultured on chocolate agar without antibiotics because there is no competing normal flora.

- Two rapid tests that detect the presence of gonococcal nucleic acids in patient specimens are widely used as screening test. These tests are highly sensitive & specific.
- The amplification tests can be used on urine samples, obviating the need for more invasive collection techniques.
- Serologic tests to determine the presence of antibodies to gonococci in the patient's serum are *not* useful for diagnosis.

TREATMENT

- Ceftriaxone is the treatment of choice in uncomplicated gonococcal infections.
- Oral cefixime is an alternative drug of choice.
- Spectinomycin or ciprofloxacin should be used if the patient is allergic to penicillin.
- Because mixed infections with *C. trachomatis* are common, tetracycline should also be prescribed.

TREATMENT

- A follow-up culture should be performed 1 week after the completion of treatment to determine whether gonococci are still present.
- Treatment of complicated gonococcal infections, such as PID, typically requires hospitalization.
-

TREATMENT

- A follow-up culture should be performed 1 week after the completion of treatment to determine whether gonococci are still present.
- Treatment of complicated gonococcal infections, such as PID, typically requires hospitalization.
-

PREVENTION

- The prevention of gonorrhea involves the use of condoms & the prompt treatment of symptomatic patients & their contacts.
- Cases of gonorrhea must be reported to the public health department to ensure proper follow-up.
- A major problem is the detection of asymptomatic carriers.
- Gonococcal conjunctivitis in newborns is prevented most often by the use of erythromycin ointment.
- Silver nitrate drops are used less frequently.
- No vaccine is available.

← prevention

- * الـ condom مثل وسيلة حماية 100% حيث يمكن تجنب الإصابة rupture
- * الـ gonococci ط في الواح vaccine

Chlamydia

- ← في الزمانات كانت يُعتقد إنها virus لكن بعد ذلك كواهي bacteria ، بعض هي بين البكتيريا والـ virus ، أيه بيزمنها هاد الكلام ؟ لأن الـ chlamydia ما بتتزرع إلا على كائن حي
- له هي تحتوي على RNA و DNA إذن مثل virus ، وما بتتزرع على الـ culture العادية ، هي مثل بكتيريا ، يعني لاهلي ولا هلي لكن جامعة بعضها حنفات الجبريتا .

← الـ chlamydia الواح ما يقارب ما نوع ، حيث تسبب مجهول الـ pneumonia والـ conjunctivitis

← وهي عبارة عن الـ obligate intracellular bacterium زي الـ virus حيث لا تستطيع النمو إلا داخل الـ cell .

← هي بتسبب الـ STD (sexual transmitted disease) ، لكن مثل زي الـ gonorrhea حيث حكة الـ discharge هان تليف (skanty) أمراض تناسلية → venereum

← الـ reiter syndrome هادي الـ syndrome ثلاثية وسببها (أحد أسبابها) العدوى أو الإصابة بالـ chlamydia trachomatis

← الواح (rigid cell wall) بس ما الواح (peptidoglycan layer) ← هيك بتتولد الـ penicillin والـ cephalosporin ما يجيوا فيها

← انتقال الـ chlamydia يكون مجرد اختلاط الشخص العامل للكائن من أشخاص آخرين ، يعني مثل جنسي يعني الـ sexual transmission ، يعني لو سلت على شخص حامل للكائن حاد حكة بيوتك ممكن يصير معالسا (chlamydial conjunctivitis) أو الـ trachoma وهي واحدة من أشهر أسباب الـ blindness حول العالم ملاحظة

← يعني المختصر : لما أنتوث الـ organism هادا ما يقتر أخيرا أنه حاد في sexual course ولكن الـ gonorrhea لما أنتوثا لا بد تكون منتجة بشكل sexual .

← هناك أنواع من الـ chlam من A حتى K و Type L (L_1, L_2, L_3) يعالجوا

lymphogranuloma venereum ← (sexually transmitted)

chlamydial pneumonia ← Type D-K هؤلاء يمكن يصيبوا العين أو يعالجوا

lymph → lymph node

→ chlamydia may cause chlamydial pharyngitis

granuloma → نسيج

← في الـ women : salpingitis ← كثير خطيرة / صعبة / قاتلة فالرطب في قناة كثير فتحة

عنى أي -- inflammation بعد جرح يجعل تقييق شديد و adhesions كثيرة بالتالي مائي طبعها

ovum ، ويمكن نقل الـ ovum داخل القناة ونقل عيسى ectopic pregnancy (حمل خارج الرحم)

← Laboratory diagnosis

* يمكننا إظهار ما ينتج عن artificial media ، وينبغي (Giemsa stain)

* الـ DNA analysis يكشف أي organism ، ويمكن نستخدم الـ ELISA التي تحتاج وجود

إما Ag أو Ab

* الـ chlamydia تنوع على الـ cell culture (يعني culture حية) ، يحتاجوا على الـ

cell culture عادة اسما cycloheximide تمنع نمو الخلايا تنبت ، لا culture وتوسع فقط يضر

و إنتاج الـ chlamydial proteins

الـ capistaci → cause pneumonia, transmitted by

* لو حملنا الـ urine وطلع في pus cells ، وادام في pus cells يبقى في infection ، هذا

عنا عينة زراعة لقينا ما في growth لأي organism فيقول chlamydia ، وينسى

هذا الشيء Sterile pyuria

drug of choice for sexually transmitted disease is Azithromycin

لـ يوم واحد مرة واحدة في اليوم

clarithromycin ← مرة كل 12 ساعة erythromycin ← مرة كل 6 ساعات

* الإحباط بالـ gonorrhea والـ C. trachomatis مع بعض فوسه كثير عالية ، عشان هذا لا

تعالج الـ لا لازم بطريقنا نعالج الـ chlamydia

* الـ erythromycin غير مستحب ويتناول نبت عنه لكنو يعالج hepatitis وينعطي الـ الـ

azithromycin والـ chlarithr

← وهذا أحسن للأطفال عشان يتم إظهاره مرة واحدة

prevention → primary : to prevent complications and transmission to others
secondary :
tertiary

Treponema pallidum

سبب مرض السيلان ، وهو ميكروب لا يتسبب في التهابات الميكروبات ، وسببها ميكروب
Fluorescent أو dark teilled

three genera :

- 1) treponema → cause (syphilis) which is sexually transmitted and it's painless
- 2) Borrelia → cause (lyme disease and relapsing fever)
- 3) leptospira → cause (leptospirosis)

← تظهر على الميكروب كجارية ، سببها ميكروب لا يتسبب في التهابات الميكروبات (dark microscope)

important properties →

- ← ميكروب T. pallidum لا يتسبب في التهابات non-patho ولا يمكن تنزيعه
- ← الـ penicillin فعالة مناعية ، ولها مميزات resistant لها ، لكن حساسا لدرجة عالية
- ← حساسا لا يتلقوا أي علاج إلا أنهم ما يفسدوا حاجة
- ← الـ syphilis يعتبر من الـ common causes للإصابة عن النساء الحوامل ولولا
- ← انتقاله عن الأم إلى الجنين (congenital) ، حيث ينتقل الـ treponema
- ← من خلال المشيمة ، أي من خلال الـ placenta ، أي من خلال الـ delivery
- ← Intimate contact : معالما لا بد من حصول sexual course لنقل الـ organism
- ← يمكن انتقاله عن طريق blood transfusion ، حقن الوخس الـ antibodies بتقنيات الدم
- ← وطول النتيجة ⊕ negative ، يمكن أن يكون الـ organism موجودا لكن حساسا لا العود
- ← حاد ، والحلق يكون أحمر ، حمراء

CHLAMYDIAE: INTRODUCTION

Chlamydiae are obligate intracellular bacteria
They can grow *only* within cells.

They are the agents of:

- Common STDs, such as urethritis & cervicitis
- Lymphogranuloma venereum

DISEASES

Chlamydia trachomatis causes

- Genital tract (urethritis, lymphogranuloma venereum) infections.
- *C. trachomatis* is the most common cause of STDs in USA
- Infection with *C. trachomatis* is also associated with Reiter's syndrome, an autoimmune disease.

IMPORTANT PROPERTIES

- They have a rigid cell wall but do not have a typical peptidoglycan layer.
- Their cell walls resemble those of gram-negative bacteria but lack muramic acid.
- Chlamydiae have a replicative cycle different from that of all other bacteria.

IMPORTANT PROPERTIES

- All chlamydiae share a group-specific lipopolysaccharide antigen detected by complement fixation tests.
- They also possess species-specific & immunotype-specific antigens (proteins), which are detected by immunofluorescence.

TRANSMISSION & EPIDEMIOLOGY

- *C. trachomatis* infects only humans & is usually transmitted by close personal contact, e.g., sexually or by passage through the birth canal.
- Individuals with asymptomatic genital tract infections are an important reservoir of infection for others.

TRANSMISSION & EPIDEMIOLOGY

- STDs caused by *C. trachomatis* occur worldwide
- Patients with a STD are coinfectd with both *C. trachomatis* & *Neisseria gonorrhoeae* in approximately 10% to 30% of cases.
- Types D–K cause genital tract infections, which are occasionally transmitted to the eyes or the respiratory tract.

In men,

- it is a common cause of non-gonococcal urethritis characterized by a urethral discharge. This infection may progress to epididymitis, prostatitis, or proctitis.

In women,

- cervicitis develops & may progress to salpingitis & pelvic inflammatory disease (PID). Repeated episodes of salpingitis or PID can result in infertility or ectopic pregnancy.

PATHOGENESIS & CLINICAL FINDINGS

- Infants born to infected mothers often develop muco-purulent conjunctivitis (neonatal inclusion conjunctivitis) 7 to 12 days after delivery, & some develop chlamydial pneumonitis 2 to 12 weeks after birth.
- Chlamydial conjunctivitis also occurs in adults as a result of the transfer of organisms from the genitals to the eye.
- Patients with genital tract infections caused by *C. trachomatis* have a high incidence of Reiter's syndrome, which is characterized by urethritis, arthritis, and uveitis.

PATHOGENESIS & CLINICAL FINDINGS LYMPHOGRANULOMA VENEREUM

- *C. trachomatis* L1-L3 immunotypes cause lymphogranuloma venereum, a STD with lesions on genitalia & in lymph nodes.
- Infection by *C. trachomatis* leads to formation of antibodies & cell-mediated reactions but not to resistance to reinfection or elimination of organisms.

Lymphogranuloma venereum is caused by the invasive serovars L1, L2, or L3 of *Chlamydia trachomatis*.

This young adult experienced the acute onset of tender, enlarged lymph nodes in both groins.



LABORATORY DIAGNOSIS

- Chlamydiae form cytoplasmic inclusion, which can be seen with special stains (e.g., Giemsa stain) or immunofluorescence.
- The Gram stain is not useful.
- In exudates, the organism can be identified within epithelial cells by fluorescent antibody staining or hybridization with a DNA probe.
- Chlamydial antigens can also be detected in exudates or urine by ELISA.
- A PCR-based test using the patient's urine can also diagnose chlamydial STD.
- Tests not involving culture are now more commonly used than culture-based tests.

LABORATORY DIAGNOSIS

- Chlamydiae can be grown in cell cultures treated with cycloheximide, which inhibits host cell but not chlamydial protein synthesis, thereby enhancing chlamydial replication.
- In culture, *C. trachomatis* forms inclusions containing glycogen, whereas *C. psittaci* & *C. pneumoniae* form inclusions that do not contain glycogen.
- The glycogen-filled inclusions are visualized by staining with iodine.
- Exudates from the eyes, respiratory tract, or genital tract give positive cultures in about half of cases.

LABORATORY DIAGNOSIS

- Serologic tests are rarely helpful in diagnosing disease caused by *C. trachomatis* because the frequency of infection is so high that many people already have antibodies.

TREATMENT

- All chlamydiae are susceptible to tetracyclines, such as doxycycline, & macrolides, such as erythromycin & azithromycin.
- The drug of choice for *C. trachomatis* STDs is azithromycin.
- Because the rate of coinfection with gonococci & *C. trachomatis* is high, any patient with a diagnosis of gonorrhea should also be treated for *C. trachomatis* with azithromycin.
- The drug of choice for neonatal inclusion conjunctivitis & pneumonia is oral erythromycin.

PREVENTION

- There is no vaccine against any chlamydial disease.
- The best preventive measure against *C. trachomatis* STDs is to limit transmission by prompt treatment of both the patient & the sexual partners, including persons who are asymptomatic.
- Sexual contacts should be traced, & those who had contact within 60 days should be treated.
- Several types of STDs are often present simultaneously. Thus, diagnosis of one requires a search for other causative agents.

Spirochetes: Introduction

Three genera of Spirochetes cause human infection:

1. *Treponema*, which causes syphilis & nonvenereal treponematoses;
2. *Borrelia*, which causes Lyme disease & relapsing fever;
3. *Leptospira*, which causes leptospirosis

Spirochetes: Introduction

- Spirochetes are thin-walled, flexible, spiral rods.
- They are motile through undulating axial filaments under the outer sheath.
- Treponemes are so thin that they are seen only by darkfield microscopy, silver impregnation, or immunofluorescence.

• *Treponema Pallidum*

• Important Properties

- *T. pallidum* has not been grown on bacteriologic media or cell culture.
- Nonpathogenic treponemes, part of the normal flora of human mucous membranes, can be cultured.
- *T. pallidum* grows very slowly. The medical importance of that fact is that antibiotics must be present at an effective level for several weeks to kill the organisms & cure the disease.
- For example, benzathine penicillin is the form of penicillin used to treat primary & secondary syphilis because the penicillin is released very slowly from this depot preparation & bactericidal concentrations are present for weeks after administration of the antibiotic.

• *Treponema Pallidum*

• Important Properties

- The antigens of *T. pallidum* induce specific antibodies, which can be detected by immunofluorescence or hemagglutination tests in the clinical laboratory.
- They also induce nonspecific antibodies (reagin), which can be detected by the flocculation of lipids (cardiolipin) extracted from normal mammalian tissues, e.g., beef heart.
- Both specific anti-treponemal antibodies & nonspecific reagin are used in the serologic diagnosis of syphilis.

Transmission

- *T. pallidum* is transmitted from spirochete-containing lesions of skin or mucous membranes (e.g., genitalia, mouth, and rectum) of an infected person to other persons by intimate contact.
- It can also be transmitted from pregnant women to their fetuses.
- Rarely, blood for transfusions collected during early syphilis is also infectious.

Epidemiology

- Syphilis occurs worldwide, & its incidence is increasing.
- It is one of the leading notifiable diseases in the United States. Many cases are believed to go unreported, which limits public health efforts.
- There has been a marked increase in the incidence of the disease in homosexual men in recent years.

Pathogenesis & Clinical Findings

- *T. pallidum* produces no important toxins or enzymes.
- The organism often infects the endothelium of small blood vessels, causing endarteritis.
- This occurs during all stages of syphilis but is particularly important in the pathogenesis of the brain & cardiovascular lesions seen in tertiary syphilis.

Pathogenesis & Clinical Findings

In primary syphilis

- The Spirochetes multiply at the site of inoculation & a local, nontender ulcer (chancre) usually forms in 2 to 10 weeks.
- The ulcer heals spontaneously, but Spirochetes spread widely via the bloodstream (bacteremia) to many organs.