



GENITOURINARY SYSTEM

SUBJECT : Micobiology

LEC NO. : 3

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وَقُلْ رَبِّ زِدْنِي عِلْمًا

Chlamydia

The most common sexual

- Three of the nine species cause disease in humans.

- **Chlamydia trachomatis** →

هاي هي يلي بتهمنا

■ is the most important human pathogen as a major cause of **genital infection** and **conjunctivitis**.

شو بتعمل؟

■ **trachoma**, is the leading preventable cause of blindness in the world. →

يعني منقدر نمنع حدوثها

– **Transmission direct contact**

- **Chlamydophila pneumoniae**

- **Chlamydophila psittaci**

■ **often infects birds**

هاي هي ال trachoma

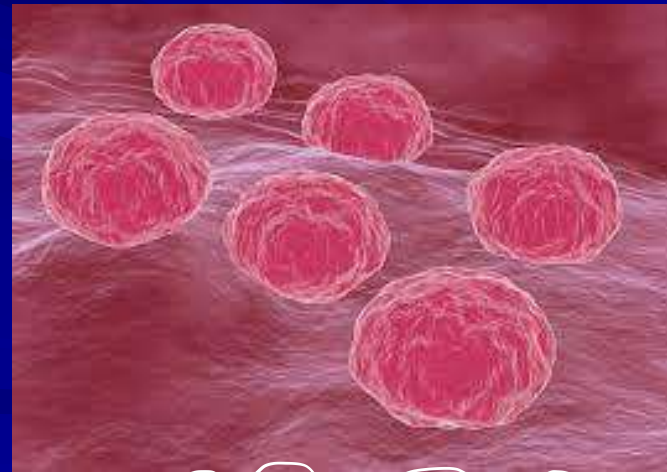
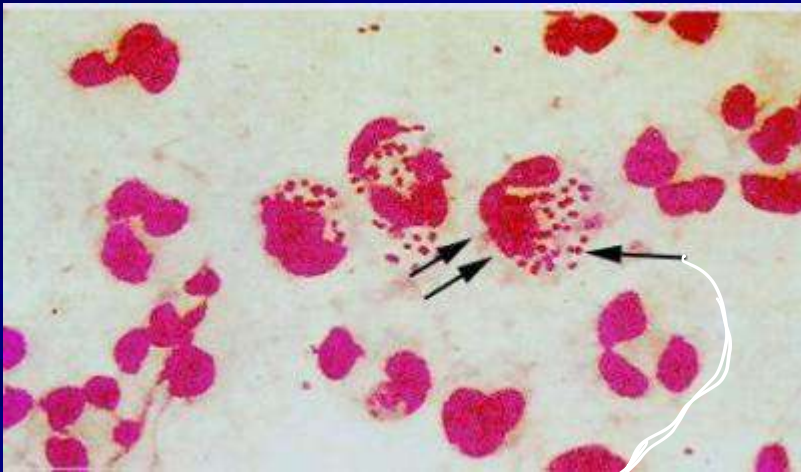


هدول حكي مش مهمات ب النسبة الننا

Chlamydia trachomatis

■ *C. trachomatis*

- round cells between 0.3 and 1 μm in diameter depending on the replicative stage. هاي من الفروقات يلي بتمييزها عن الGonorrhea
- lack the peptidoglycan layer اول اشني انو عندها replicative stage و الGonorrhea ما عندها تاني اشني انها لا تمتلك peptidoglycan layer و تالت اشني انها intracellular على عكس الGonorrhea يلي هي extracellular
- obligate intracellular parasites



و طبعاً لانها intracellular فال culture لازم تكون داخل الخلية
منزوعها عليها حتكون غير

REPLICATIVE CYCLE

- Involves two forms of the organism:

Elementary body (EB)

- a small, hardy metabolically inert infectious form

inactive

Can survive for few minutes



a larger fragile intracellular replicative form termed the **Reticulate body (RB)**.

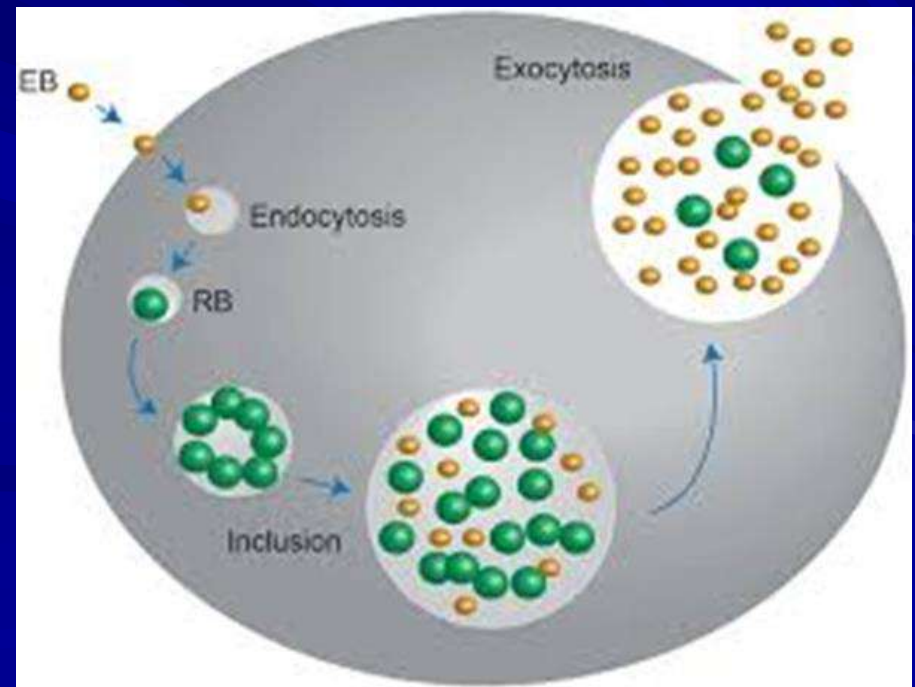
– Star shape

Active

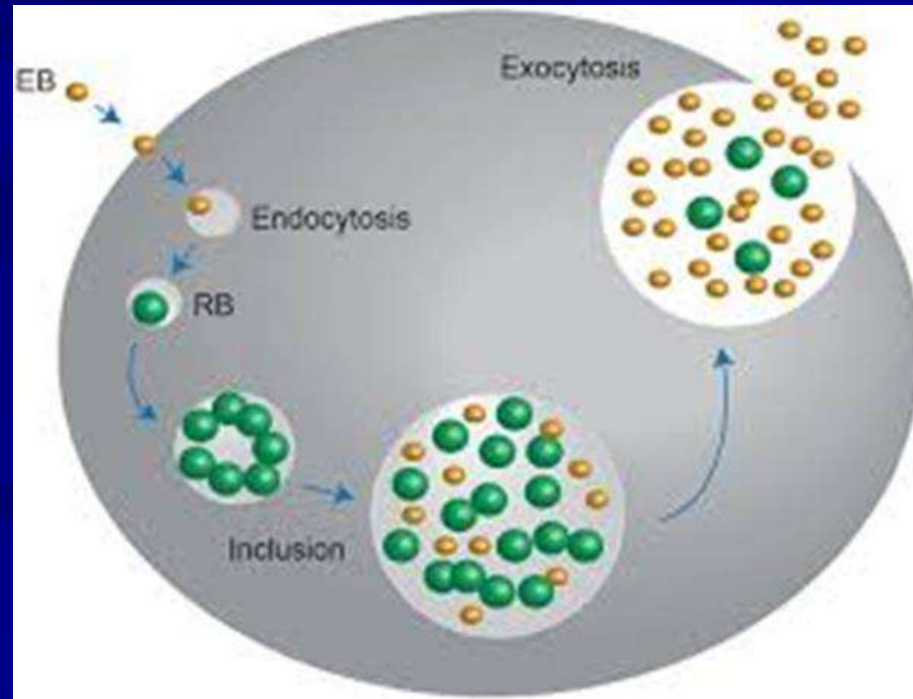
REPLICATIVE CYCLE

- The EB attaches to unknown receptors on the plasma membrane (usually columnar or transitional epithelial cells).
- It then enters the cell in an endocytotic vacuole and begins the process of converting to the replicative RB.

رح أشرحهم ب سلايد منفصل تحت



- As the RBs increase in number, the endosomal membrane expands by fusing with lipids of the Golgi apparatus eventually forming a large inclusion body. After 24 to 72 hours, the process reverses and the RBs reorganize and condense to yield multiple EBs.



- The endosomal membrane then either disintegrates or fuses with the host cell membrane, releasing the EBs to infect adjacent cells.
- *C. trachomatis* also inhibits apoptosis of epithelial cells, thus enabling completion of its replicative cycle.

الفكرة كالتالي :

أول اشي ال EB يلي هي ال inactive form بترتبط ب receptors موجودة على ال plasma membrane يلي بكون موجود يا ع ال eyes يا ع ال genital tract و غالباً بتكون columnar أو transitional epithelial cells

المهم بتفوت ع الخلية ع شكل ال endocytotic vacuole و بتبلس تتحوّل هاي ال EB ل RB يعني من active ل inactive

بعدين لما تبلس ال RB يزيد عددها بروح ال membrane تا ع ال vacuole بتمدد ، كيف؟ عن طريق انو يتحد مع ال lipids الموجودة بال Golgi apparatus ف بالآخر بيتكوّن عندي ال large inclusion body ، بعد ٢٤ ل ٧٢ ساعة بصير العكس ، يعني ال RB بتتحوّل ل EB يعني ال active بتحوّل ل inactive ، بعدين ال membrane يلي تمدد يا اما بتفتت يا اما بتحد مع ال membrane تا ع الخلية ف بتطلع ال EB من الخلية و بتروح بتهاجم خلايا اخرى

غير هيك ال chlamydia trachomatis بتعمل inhibition ل انو ال epithelial cells تعمل apoptosis لحالها و هيك بتعطي لحالها وقت مشان تكمل ال replicative cycle

Chlamydia trachomatis Diseases

EPIDEMIOLOGY

- *C. trachomatis* causes disease in several sites, including the conjunctiva and genital tract.
- It is the most common sexually transmitted disease.
- Humans are the sole reservoir. ما بتصيب إلا الإنسان
- Neonatal conjunctivitis contracted from maternal genital infection (2 to 6% of newborn infants).
يعني أثناء الولادة الطبيعية
بنتقل من الأم لل neonate

PATHOGENESIS

■ Chlamydiae

- endocervix and upper genital tract of women,
- the urethra, rectum and conjunct. of both sexes.

IMMUNITY

- *C. trachomatis* infections do not reliably result in protection against reinfection

لما ينصاب ما بيوخذ مناعة ضد المرض
لا ممكن ينصاب أكثر من مرّة عادي

CLINICAL ASPECTS

ما حگی اسی برّا، لسلاید

Genital Infections

- The clinical spectrum of sexually transmitted infections with *C. trachomatis* is similar to that of *Neisseria gonorrhoeae*. *C. trachomatis*
 - cause urethritis and epididymitis in men
 - cervicitis, salpingitis, and a urethritis in women.

■ *C. trachomatis* urethritis

- dysuria
- a thin creamy urethral discharge.

In contrast with *N.gonococcal* which cause sever pain along with thick purulent discharge

هون ما بكون فيه pain و ال discharge بكون creamy و
thin على عكس ال gonorrhoea يلي بكون فيها severe
pain و ال discharge بكون purulent و thick

- Infections of the uterine cervix may produce vaginal discharge, usually asymptomatic.
- Ascending infection in the form of salpingitis and pelvic inflammatory disease.
- The scarring produced by chronic or repeated infection is an important cause of sterility and ectopic pregnancy.

انوال infection بطلع من الurethra لل
uterine tubes و بعمل salpingitis

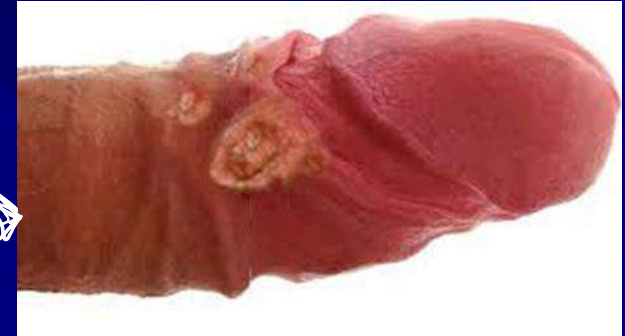
لما يضل يصير infection رح يصير في عنا scarring ف بمنع عملية
ال fertilization ف يصير عنا sterility او ممكن يصير ectopic
pregnancy

■ three strains of *C. trachomatis* cause Lymphogranuloma venereum LGV,

– L1, L2, or L3. ^{نوع}

■ It is characterized by

– transient genital lesions

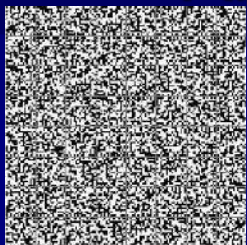


– followed by multilocular suppurative involvement of the inguinal lymph nodes.

inflammation of inguinal lymph nodes (lymphadenopathy)

– The primary genital lesion is usually a small painless ulcer or papule, which heals in a few days.

– Abscesses, strictures, fistulas if chronic.



← ازا ما تعالج .



Neonatal chlamydia

- More than 50% of all infants born to mothers excreting *C. trachomatis* during labor show evidence of infection during the first year of life.
- Most develop inclusion conjunctivitis, but 5 - 10% develop infant pneumonia syndrome.

و ممکن تعمل sepsis و meningitis

هاي شو مبدأها؟ مبدأها انو :

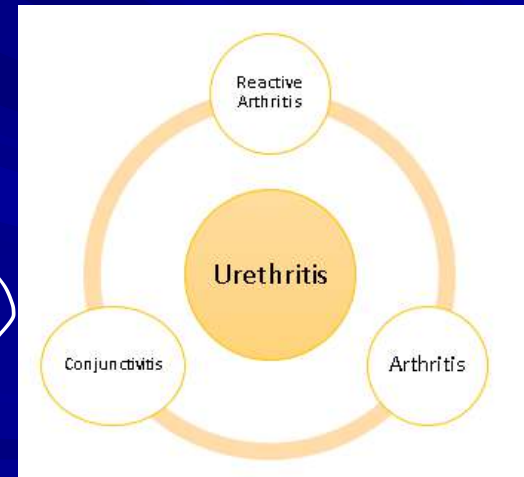
Certain antigen of chlamydia are similar to certain antigens of joints so the antibodies against chlamydia will attack the joints

- **Conjunctivitis(trachoma)**
- **Urethritis**
- **Reactive arthritis (Ab attack the joint)**

– Reiter's syndrome

- You cant see (Because of conjunctivitis)
- You cant pee (Urethritis)
- You cant climb a tree (Urethritis)

Triad of symptoms



DIAGNOSIS

- Epithelial cells from the site of infection are required for detection.
- For genital infections, cervical specimens are preferred in females and urethral scrapings in males.
- Isolation of *C. trachomatis* has been the “gold standard” for diagnosis.
 - It is achieved in cell culture .

هون مش متل ال gonorrhea انو بوخد swap من ال discharge لا ، هون لانو الخلية intracellular ف انا لازم اوخد شوية من الخلايا نفسها ف هون بكون اصعب من ال gonorrhea

- Ligase chain reaction (LCR) or polymerase chain reaction (PCR)
 - the most sensitive, most specific methods of diagnosis.
- Serodiagnostic methods have little use in diagnosis of chlamydial genital infection
 - difficulty of distinguishing current from previous infection.

دھاد ۽ انسار مش دھلوب سبب الله لیسر علاء۔
السلایر یلے رتت هو دھلوب۔

non-LGV C. trachomatis infection	Azithromycin
pregnant women and infants	Erythromycin
drug of choice for treating LGV	doxycycline

tetracyclines, macrolides and some fluoroquinolones

Chlamydia coverage: Azithromycin (Zithromax), 1 g PO in a single dose or
Doxycycline, 100 mg PO bid x 7 days

Recommended treatment regimens for gonococcal infections: cervicitis, urethritis, proctitis

- **Single dose + chlamydia coverages (Azithromycin or Doxycycline)**
 - Cefixime (suprax) 400mg or ofloxacin 400mg or Cipro 500mg
 - Single large dose IM ceftriaxone 125mg
- Chlamydia coverage: Azithromycin (Zithromax), 1 g PO in a single dose or Doxycycline, 100 mg PO bid x 7 days

Ureaplasma and mycoplasma

- Smallest free living bacteria
- Atypical bacteria
- No cell wall
- Cell membrane contain sterols
- No cell wall inhibitors → لانو ما عندها cell wall مشان هيك ما بتأثر
- No microscopic
- No stain → ما في cell wall تلزق فيه الstain
- No fixed shape → ما عندها cell wall ف شكلها بضل يتغير
- Slow growing
- Many female asymptomatic carrier
- M hominis, M genitalium, Ureaplasma urealyticum (facultatively anaerobic)
- M pneumonia (aerobic)

Ureaplasma urealyticum

- Cause genitourinary tract infections.
- highly pleomorphic,
 - may appear as coccoid bodies, filaments, and large multinucleoid forms.
- Ureaplasma is distinguished from Mycoplasma by its production of urease.

لا
التنتين ما عندهم cell wall بس ال ureaplasma
بتنتج urease اما ال mycoplasma لا

MANIFESTATIONS

يعني لما يبجي شب عندو urethritis و لما نعملو culture
يطلع gonorrhea & chlamydia negative دغري رح
افكر بال ureaplasma

- one half of cases of nongonococcal, nonchlamydial urethritis in men may be caused by *U. urealyticum*.
- In women, *Ureaplasma* has been shown to cause chorioamnionitis and postpartum fever.
→ امشان هيك منخاف تكون pregnant امشان ممكن تعمل amniotic infection بال
postpartum fever و ممكن تعمل ، fluid that surrounds the fetus
- The organism has been isolated from 10% of women with the latter syndrome.
- **Pain, discharge, and itching of the genital area**

DIAGNOSIS AND TREATMENT

- **Tetracycline** is the treatment of choice because it is also active against *Chlamydia*,

رکزوا انو ما منستخدم cell wall inhibitors antibiotics

- *protein synthesis inhibitors (tetracyclines and macrolides), as well as, bactericidal agents that inhibit DNA replication (fluoroquinolones).*

■ Bacterial vaginosis (BV),

- formerly known as nonspecific vaginitis, was named because bacteria are the etiologic agent in this infection and an associated inflammatory response is lacking.

■ BV is the most common cause of vaginitis.

Non-infectious vaginitis is often caused by an allergic reaction or an irritation from vaginal sprays, vaginal deodorants, spermicidal products, soaps, condoms if there is an allergy to latex

Allergy or irritation

PATHOGENESIS

- Vaginal flora becomes altered, causing an increase in the local pH.
- This may result from a reduction in the H_2O_2 producing lactobacilli.

الدكتور هيك حكى ب المحاضرة :
انو ال overgrowth بصير نتيجة ال sexual
activity ، ال vagina يكون acidic و ال semen يكون
alkaline فلما يتغير ال PH بصير overgrowth

alteration in the vaginal ecology It is **overgrowth**

هون سبب المرض
هو ال overgrowth

Gardnerella vaginalis

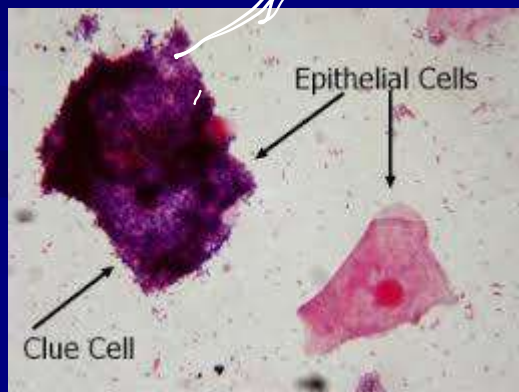
■ *G. vaginalis*

- facultatively anaerobic
- gram-variable rod.
- one of the organisms responsible for bacterial vaginosis.

Gardnerella vaginalis

- It is associated microscopically with clue cells, epithelial cells بال بكتيريا بتكون ملزقة بال
 - epithelial cells covered in bacteria.
- Although BV is not considered a sexually transmitted disease, 😂😂 حاسيتها مهمة
- sexual activity has been linked to development of this infection.

نفس يلي كتبتها ب
السلامة يلي قبل



شوفوا كيف
بتكون ملزقة



CLINICAL ASPECTS

MANIFESTATIONS

- Symptoms of infection typically include a gray, thin, and homogeneous vaginal discharge that is adherent to the vaginal mucosa, associated with a "musty" or "fishy" odor → α β



CLINICAL ASPECTS

MANIFESTATIONS

- there is little vulvar or vaginal irritation associated with this infection,
- the pungent odor is usually the chief complaint.

DIAGNOSIS

- A wet mount preparation of physiologic saline mixed with vaginal secretions should be examined under low- and high-power objectives.
- The characteristic "clue cells" are identified as numerous stippled or granulated epithelial cells.
- Cultures are seldom necessary to establish a diagnosis.

TREATMENT

- The treatment of choice for *G. vaginalis* is oral metronidazole, 500 mg twice daily for 6 days.
- The drug is contra-indicated during early pregnancy and lactation.

Quiz

1- a 34 years old women came to the clinic suffering of vaginal irritation , the doctor performed pelvic examination and he found gray , thin , hemogeneous discharge that has a pungent oder , the pathogen of choice is :

- A- gram positive cocci
- B- gram negative cocci
- C- atypical bacteria
- D- gram variable rods
- E- gram positive bacillo

2- a 27 years old women came to the hospital with her baby who was born 4 days ago , when you looked at him you found his eyes red and swollen and you asked for cell culture and the result was round cells that lack peptidoglycan , the mode of transmission here of this bacteria is :

- A- sexually transmission
- B- feco-oral route
- C- vertical transmisson
- D- direct contact
- E- air droplets

3- a 53 years old man came to your clinic wondering of an painful ulcer that appeared on his penis and when you performed the routine physical examination you felt the swollen inguinal lymph node on his right side , the pathogen of choice is :

- A- Chlamydophila pneumoniae
- B - Chlamydophila trachomatis L2
- C- Chlamydophila psittaci
- D- Gardnerella vaginalis
- E- Ureaplasma urealyticum

4 - All the following are sexually transmitted except :

A- *Neisseria gonorrhoeae*

B- Human papillomavirus

C- *Chlamydia trachomatis*

D- hepatitis B

E- *Gardnerella vaginalis*

5- a pregnant woman came to the emergency with severe pain in the lower abdomen , her vital signs : Bp : 130/90 , HR : 115 , her body temperature : 39 ° c , the doctor took sample of her fetus amniotic fluid , and the diagnosis was chorioamnionitis , the microorganism that caused these findings is :

A- *Ureaplasma urealyticum*

B - *Neisseria gonorrhoeae*

C- *Chlamydia trachomatis*

D- *Gardnerella vaginalis*

E- *Chlamydia psittaci*

Answers :

1- D

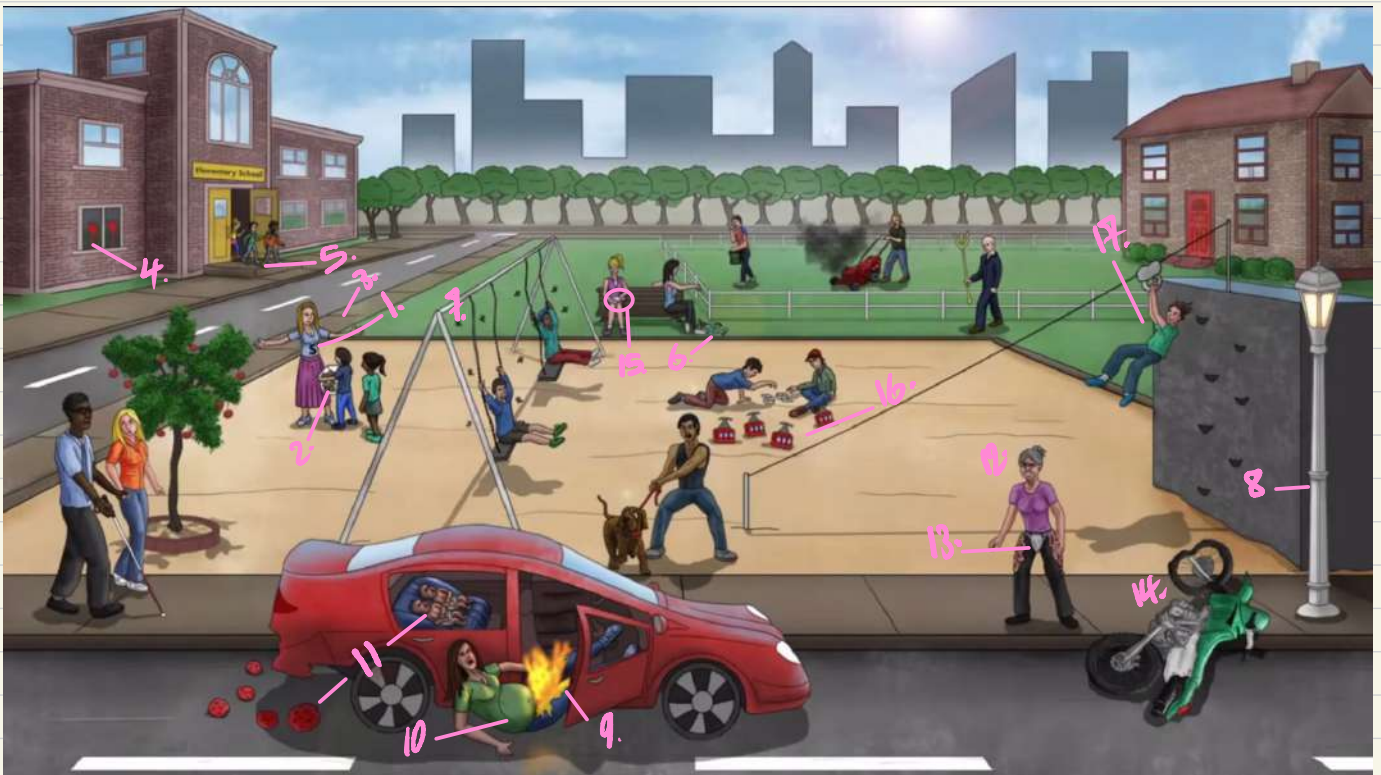
2- C

3- B

4- E

5- A

chlamydia trachomatis



1. Sexually transmitted 2. Obligate intracellular (cannot make own ATP)

3. Elementary bodies enter the cell via endocytosis

4. Reticulate bodies replicate inside of the cell by fission

5. Reticulate bodies are reorganized into elementary bodies, released from the cell, and then infect adjacent cells

6. The cell wall lacks peptidoglycan layer

7. Diagnosed using PCR which amplifies bacterial DNA or RNA sequences

8. Stereotypes L1, L2, L3 9. cause urethritis 10. increases the risk of ectopic pregnancy

11. causes neonatal pneumonia with eosinophilia 12. L1, 2,3 cause lymphogranuloma venereum

13. L1, 2, 3 cause painless genital ulcers 14. treated with doxycycline 15. Reiter syndrome

16. Gonorrhoeae coinfection

17. Treated with azithromycin

<https://youtu.be/wbH9eWYjZsA?si=mw2T5S8ebHternyN>

