

وَقُلْ رَبِّ زِدْنِي عِلْمًا



RESPIRATORY SYSTEM

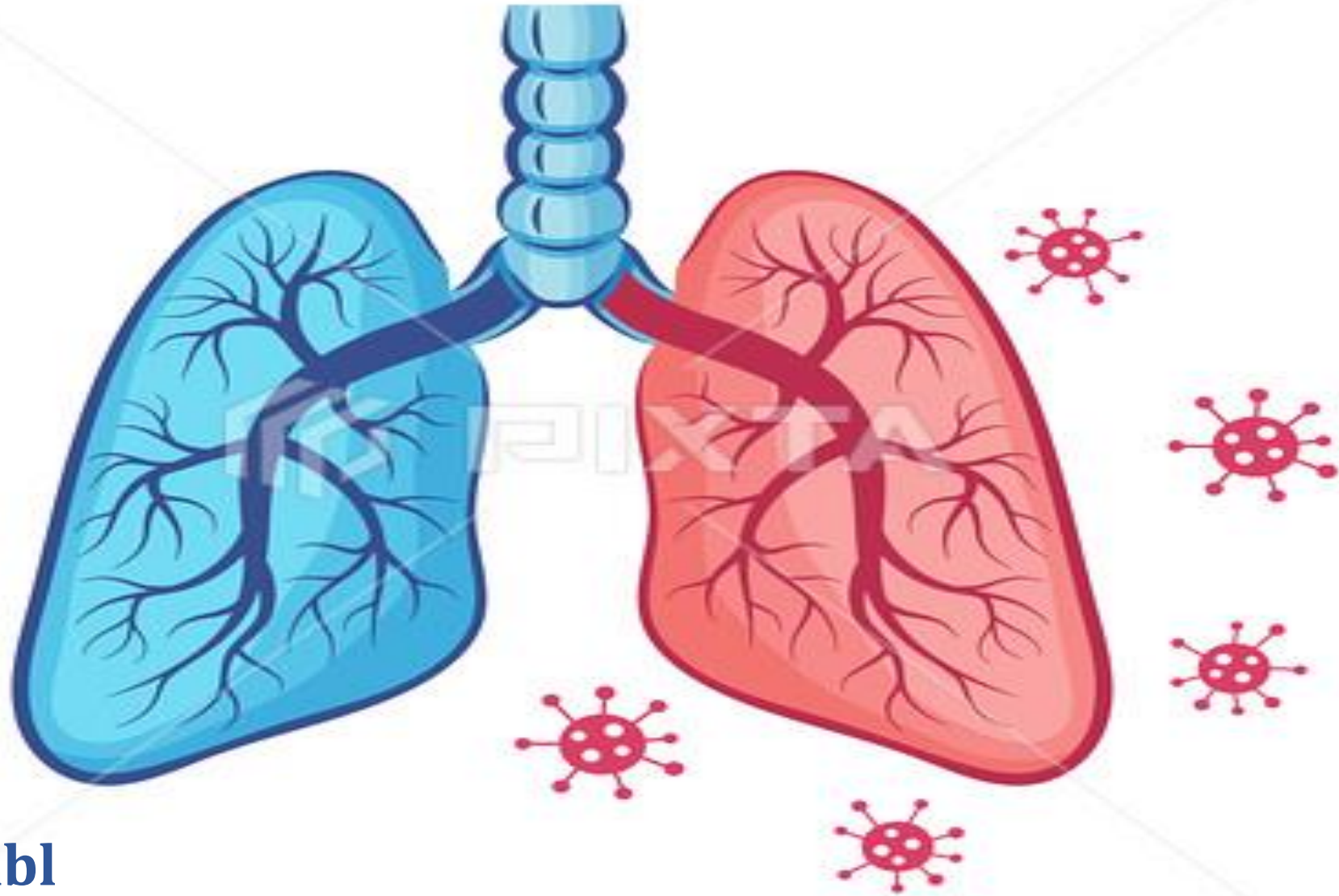
HAYAT BATCH

SUBJECT : _____

LEC NO. : 5

DONE BY : Tabark Aldaboubi

RESPIRATORY TRACT INFECTIONS - V



By
Prof. Hala Tabl

ATYPICAL PNEUMONIA

Streptococcus pneumoniae الالتهاب الرئوي

Typical pneumonia

Sudden onset, severe course commonly require hospitalization

Lower respiratory tract involvement *involvement the Lung*

High fever, dyspnea, chest pain and productive cough

Lobar consolidation on chest radiography *بتأثر على لobe كامل بالرئاه*

The causative organisms can be isolated on routine media in the diagnostic laboratory

Respond to B-lactams → *Penicillin تستجيب لل Cephalosporin*

Streptococcus pneumoniae *or other bacteria Associated with typical character of pneumonia*
Hemophilus influenza
Staphylococcus aureus,...

Atypical pneumonia

Gradual onset, mild course (do not usually require hospitalization) and self resolution.

Upper and lower respiratory tract involvement

Mild fever, sore throat, fatigue and dry cough

Patchy or interstitial infiltrate ← *radiological examination*

The causative organisms cannot be isolated on routine media in the diagnostic laboratory

Responded differently to antibiotics

Mycoplasma pneumoniae, Chlamydia pneumoniae, Chlamydia psittaci, Legionella pneumophila, Coxiella burnetii

Lobar consolidation on chest radiography



Typical pneumonia

Patchy or interstitial infiltrate



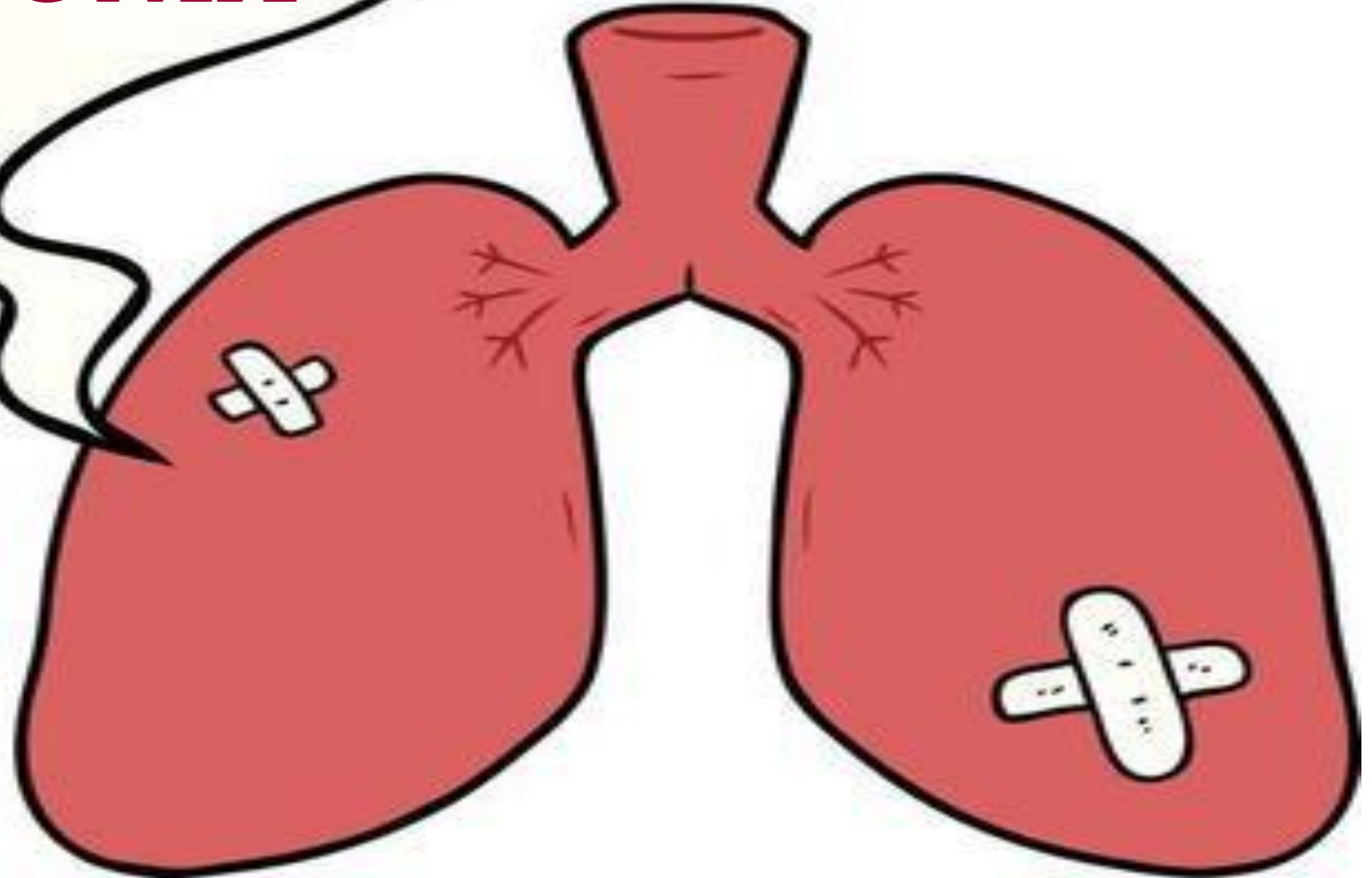
Atypical pneumonia

جايّة من Fungi

لأننا ادلهما اكتشفوه كانوا

مفكرين - Fungi

MYCOPLASMA PNEUMONIA



Morphology:

➤ Very small in size (not seen by ordinary light microscope).

➤ **Lack a rigid cell wall** and thus they are:

ما عندها الخلية cell



✓ Highly pleomorphic. لهيئات ما لها شكل محدد

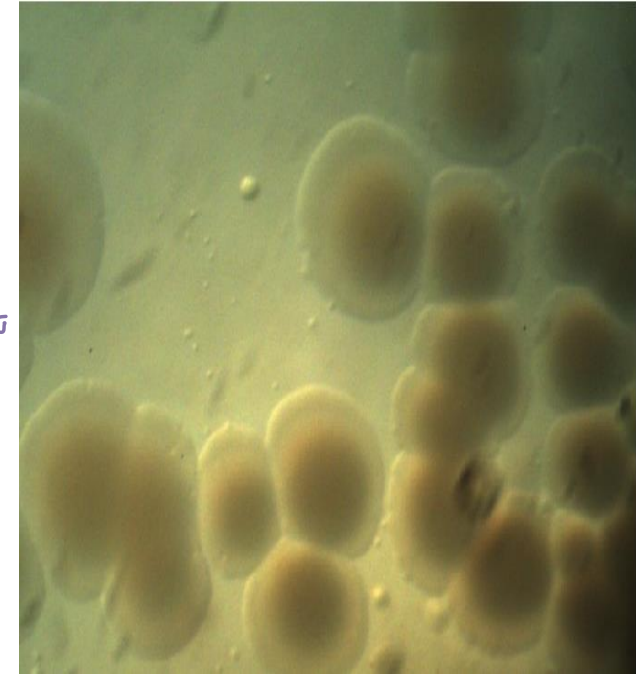
✓ Can not stained or visualized with Gram.

✓ Completely **resistant** to penicillins and cephalosporins. Antibiotic target the cell wall (B-lactam) بتكون لثي resistant

➤ Plasma membrane is the outermost layer and it is the only bacterial membrane that contains **Sterol** (a sterol usually found in eukaryotic cell membranes).

Cultural characters:-

- Facultative anaerobes; better growth occurs at 10 % CO₂.
- **Require cholesterol for growth** (medium supplemented with sources of cholesterol e.g. **Eaton's agar**).
تحتاج الى كوليسترول حتى تنمو
- They grow slowly (require 2-3 weeks).
- Colonies are very small and typically embedded beneath the agar with raised dark centers and thinner outer edges giving a characteristic “**Fried egg**” appearance (detected with a hand lens or a plate microscope).



بنتكون مدفونت بال Agar وال center تاعها dark و raised
ال edges تاعها بنتكون منخفضة فومضوها بشكل Fried egg



Pathogenesis & Clinical findings:

- Transmitted by **respiratory droplets**.
- Mycoplasma pneumonia is ^{ويقال} **the most common cause of atypical pneumonia** and accounts for about 5% to 10% of all community-acquired pneumonia and **the most common cause of pneumonia in people** ^{من} **between the ages of 5 to 15 years.**
- The disease is mild with an insidious onset, mild flu like illness and resolves spontaneously (no need for bed rest or hospital stay) ^{← ممكن استخدمها لـ Atypical بشكل عام} **“walking pneumonia”**.
- During Mycoplasma pneumonia infection, **autoantibodies** are produced against red cells (**cold agglutinins**).
<sup>↓
Causing hemolysis</sup>

Cold agglutinins

- They are **IgM antibodies** directed against mycoplasma antigen and **cross react** with antigen present on erythrocytes.
 ← ال binding بنتهي ب hemolysis
- The binding of antibodies to erythrocytes is **triggered by a lower temperature** in the extremities and **causes hemolysis**.
 ← ال reaction بصير بين بال lower temperature (binding)
- Cold agglutinin antibodies have been observed in 50–70% of M. pneumonia infections and evidence of subclinical hemolysis.
 ← ال hemolysis بتكون حفيفا
- **Rarely**, severe hemolysis with other extra-pulmonary complications such as skin rashes, encephalitis and myocarditis may occur.

Laboratory diagnosis:

↓ Gold Standard method of diagnosis

Serologic testing: is the **mainstay** of diagnosis.

اعمل الي بتتكون اثناء infection
detection to Antibody

a) Fourfold or greater rise in **specific IgM** antibody titer.

b) A **cold-agglutinin test:**

• Patient serum + human group “O Rh -ve” RBCs and incubated at 4°C.

عشان استبعد احتمال حدوث Reaction مع Antigen الي على ال RBC

• Positive result shows clumping of RBCs, which dissociated at 37°C.

لونه بدرجات الحرارة المنخفضة ال Antibody يتمسك بال RBC ويتعطلها Clumping

التفعل Reversible اذا رفعت الحرارة ل 37 بلك ال clumping

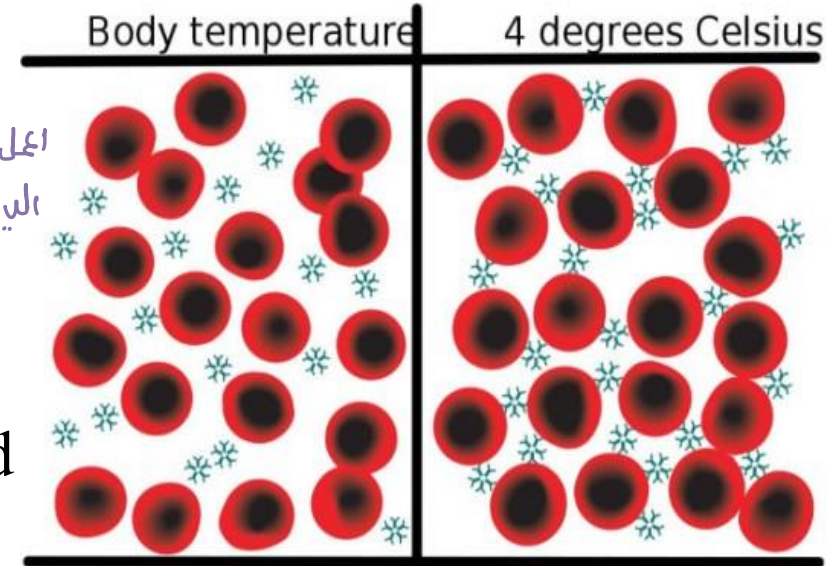
• The test is positive in 50-70% of patients.

• The test is **nonspecific** (false-positive results occur in influenza virus and adenovirus infections).

Direct smear: is of no value. → Non stained of gram

Culture of sputum: on Eaton’s agar “fried egg” appearance.

→ Not practical method



Legend: ● Red blood cell * Antibody



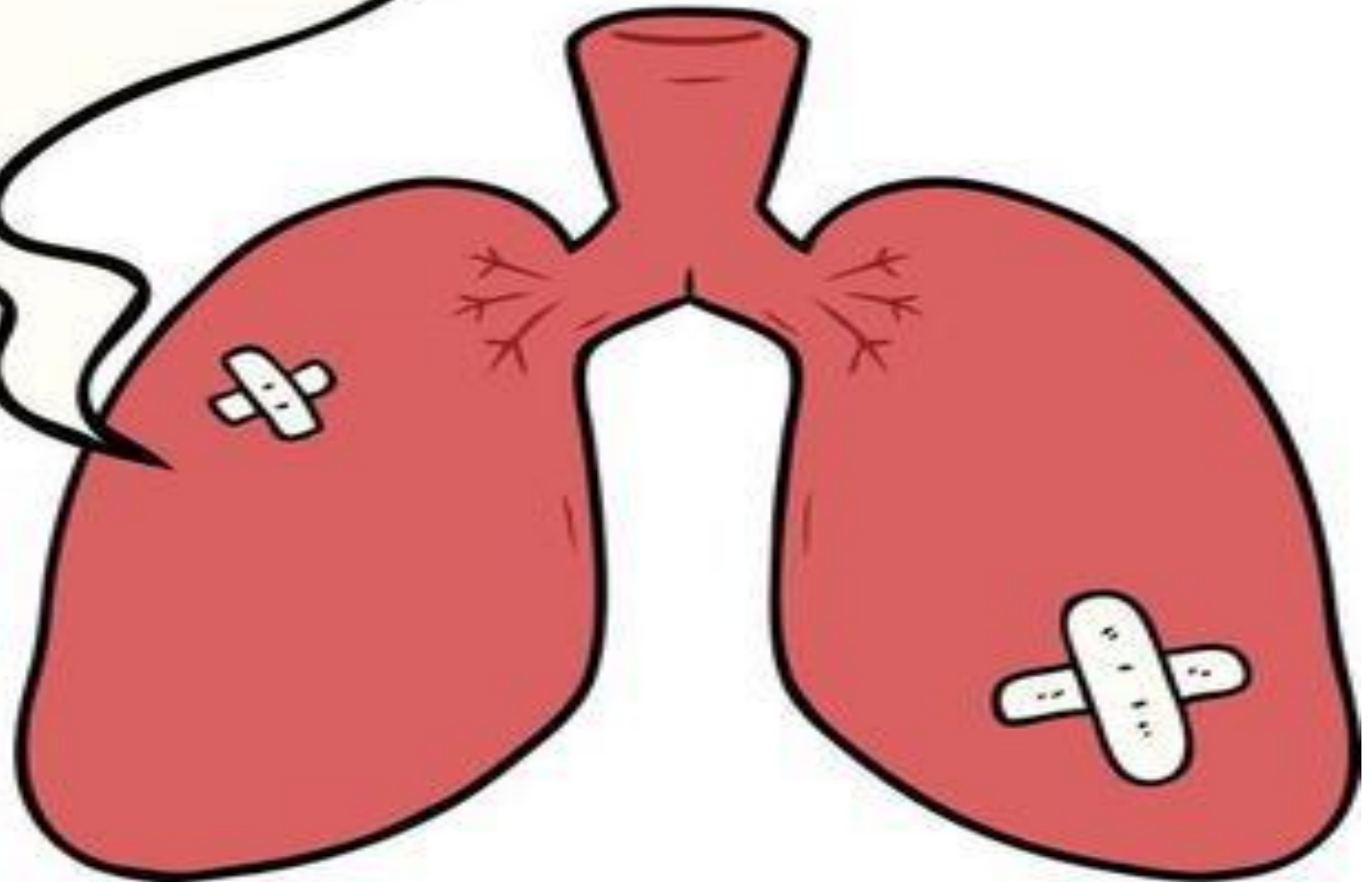
Treatment

- The treatment of choice is either a macrolide, such as erythromycin or azithromycin, or a tetracycline. The fluoroquinolone is also effective.

- Penicillins and cephalosporins are **inactive** because the organism **has no cell wall.**

بہن ہاکیہ
حفظ

**LEGIONELLAE
PNEUMOPHILA**



Morphology:

Aerobic G-ve bacilli, stain **faintly** with the standard Gram stain, best stained with silver stains.

Cultural characters:

- Can not grow on ordinary media.
- Grow on complex media as **buffered charcoal - yeast extract agar (BCYE)**, special medium supplemented with iron and cysteine.
- Oxidase & Catalase positive.

هو الي بخليا لونها اسود

لازم يكونوا موجودات

حتى تنمو



Virulence factors & Pathogenesis:

- *L. pneumophila* causes **both community and hospital acquired pneumonia.**
- Legionellae are associated chiefly with **environmental water sources** such as air conditioners, hot tubs, and water cooling towers.
- Outbreaks of pneumonia in hospitals been attributed to **inhalation** of aerosols of contaminated air-conditioning systems, sinks, water taps and shower heads.
الذي يتطلع كرداد من هياي المصادر ومشي من اشخاص مصابين
- Despite airborne transmission, **NO person to person spread.**
وهمة جداً
- The typical candidate for Legionnaires' disease is **an old man who smokes.**
Patients with chronic lung diseases and **immunocompromised** are also predisposed to Legionella pneumonia.

Clinical findings:

Legionnaire's disease (named after the famous outbreak of pneumonia among people attending the American Legion convention in Philadelphia in 1976).

- Fever, chills, malaise, non - productive cough (Atypical pneumonia).
- extrapulmonary manifestation ↴*
- GIT symptoms like diarrhea and vomiting.
- Neurological symptoms like mental confusion and severe headache.

Pontiac fever (named after the city in Michigan that was the site of an outbreak in 1968)

- Mild, flulike form of Legionella infection that does not result in pneumonia.

Laboratory diagnosis:

➤ **Direct fluorescent antibody test (FAT)** of sputum specimen.

وجدوا انه هاي البكتيريا بتطلع بال Urine لهنك ممكن اعمل هاضم ال
Test
↓

➤ **Urinary antigen test:** Enzyme immunoassay for detection of L.
سريع جداً

pneumophila antigens in the urine is a rapid means of making a diagnosis.

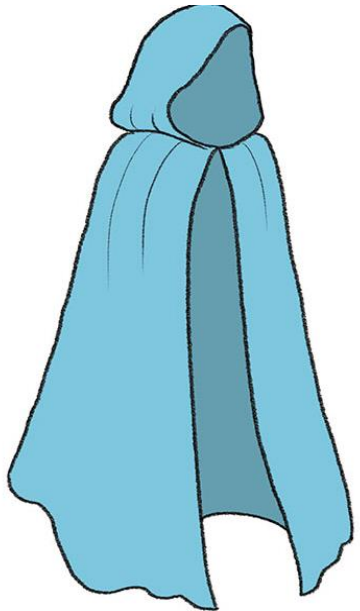
➤ **Polymerase chain Reaction (PCR)**

➤ **Culture:** On BCYE agar

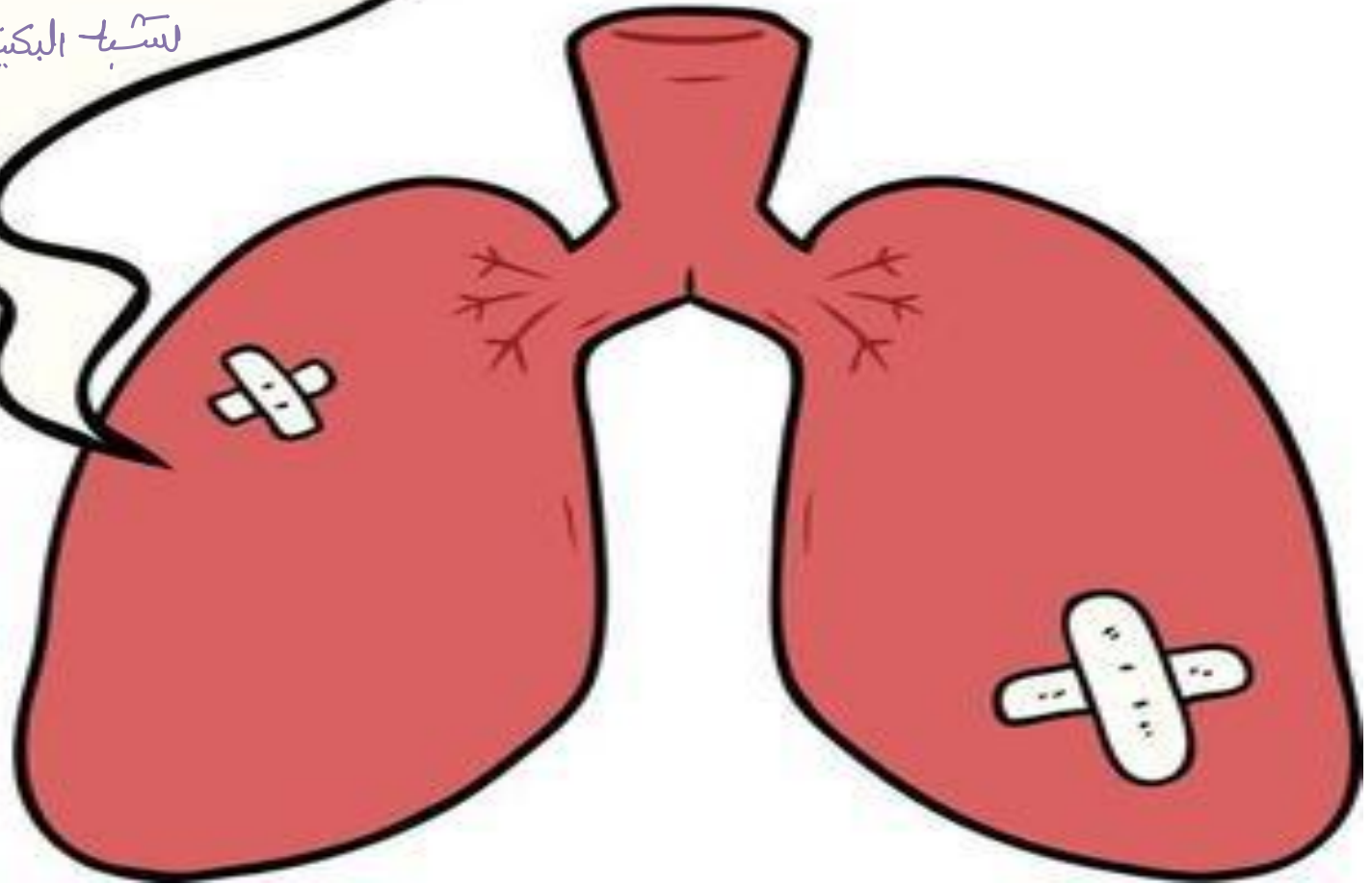
buffered charcoal yeast extract agar

CHLAMYDIA

لَسْبِيَة البكتيريا في حجاجته والفيروسات في حجاجته

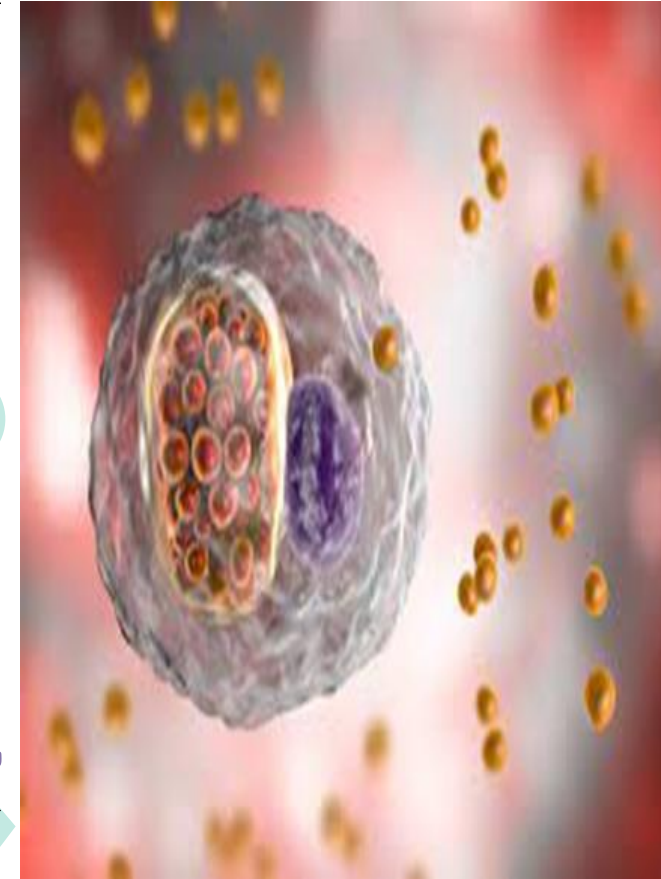


Cloak like ← *organism* اَلْب اِكْتَشَف اَل
اَطْلَق عَلَيْهِ
حَتَّى يَوْمَئِذٍ بِأَنَّهَا
Something hidden



General characters of Chlamydia:

- Chlamydiae are **obligate intracellular** bacteria (i.e., grow ^{artificial media} ^{بقدرش اعزلها على ال} **only within living cells**) as it ^{زي الينوسات} can't synthesize ATP.
- They have a rigid cell wall. Their cell walls **resemble those of gram-negative bacteria but lack muramic acid.** ^{مثل البكتيريا}
- Can not stained with gram, best stained with اسم الصبغة المستخدمة
Giemsa. ^{لهيئ ما بتنصبغ بصبغات ال gram}
- Chlamydiae have a special replicative cycle, they alternate between two forms, **reticulate (infective)** and **elementary** ^{بس يدخل جوا الخلية} **(replicative) bodies**, which appear as ^{مع بعض يكونوا} **intracytoplasmic inclusion body** ^{بتفضل لتضاعف لحد ما تهمل rupture} within the host cell.



نوع ال atypical ال بتعلوا ↓

Chlamydophila psittaci (Psittacosis)

- Psittacosis is a **disease of birds** (e.g., parrots, pigeons, and poultry).
- Man is infected (**Zoonosis**) usually by **inhaling** dust contaminated by **dry bird feces**.
اكثر ناس عرضة ال الي بربوا طيور
- In human psittacosis, there is **NO person to person transmission**.
- Psittacosis in man occurs usually in the form of bronchopneumonia.

Chlamydophila pneumonia

- C. pneumonia infects **only human** and transmitted **from person to person** by **inhalation**.
- It is one of the leading cause of **community acquired pneumonia** especially in **elderly**. It has recently been associated with atherosclerosis and Alzheimer's disease.

↓
ال age group بهايه
المحاضرة مهم جدًا

Laboratory diagnosis:

➤ Direct fluorescent antibody test (FAT) of specimen.

➤ Culture: Chlamydiae can be grown in **cell cultures**,

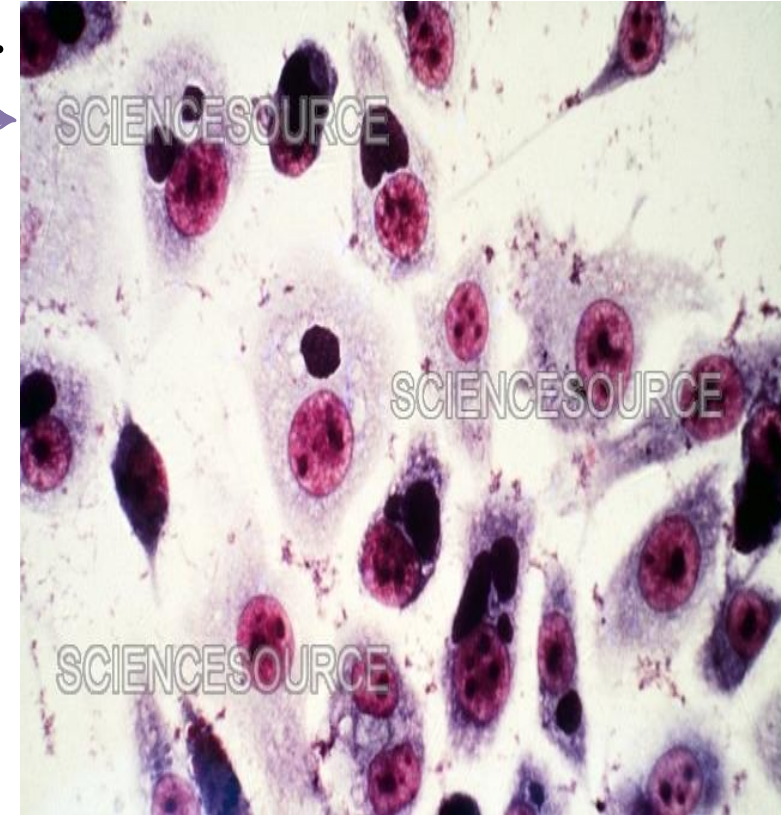
بِس تَنو و تَتَمَاعَف بَتَكُون *Cytoplasmic inclusion* و بِصِبْفَهَا حَتَّى اسْتَوْفَهَا

cytoplasmic inclusions can be seen with special stains

اسْم الصِبْغَاتِ

(e.g., **Giemsa stain**).

➤ Polymerase chain Reaction (PCR)

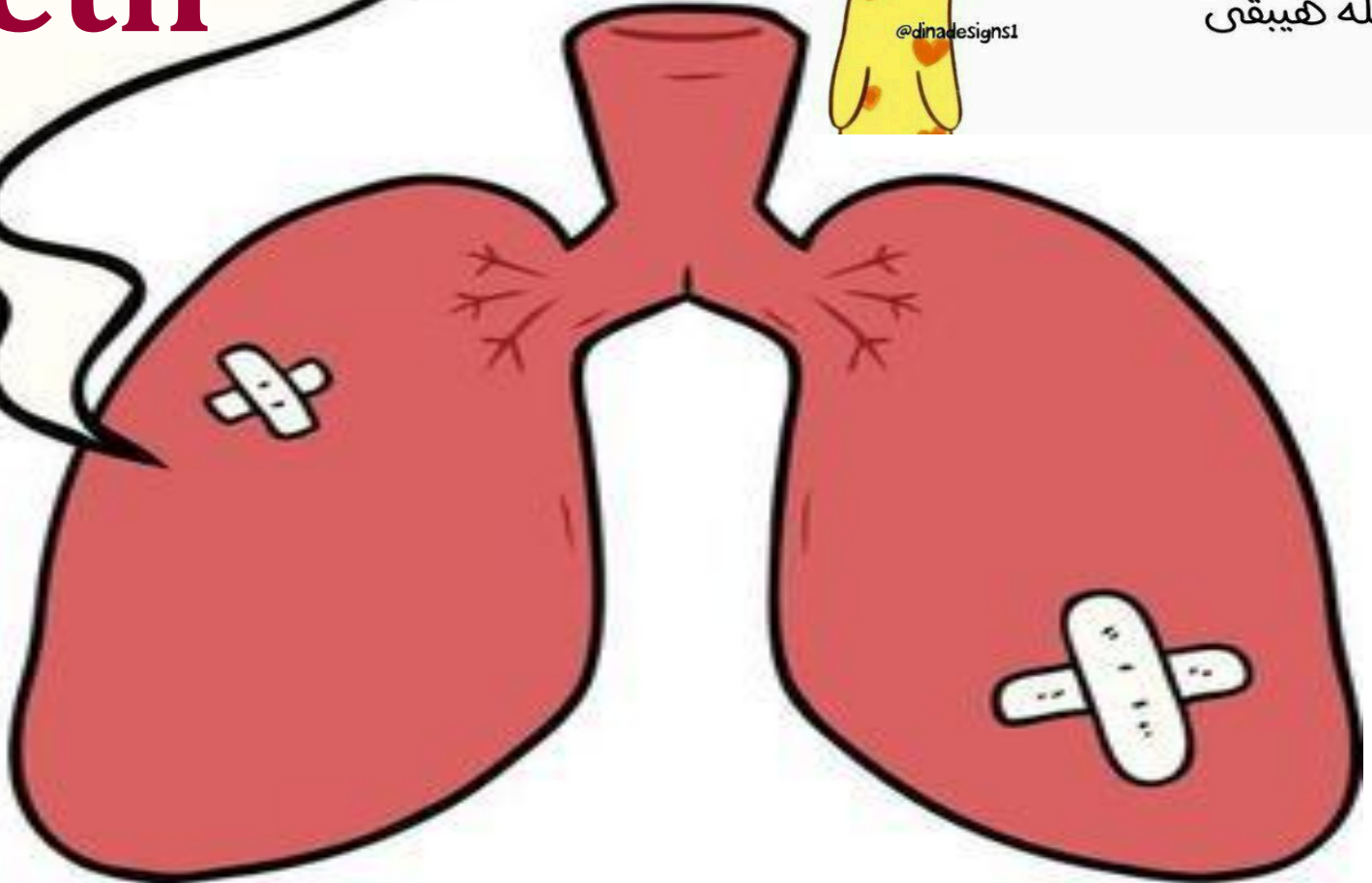


Coxiella Burnetii

من اساقف العلماء الحية
وصفوا ال organism



أنا بس حبيت أفكر ل
إنك عديت باوقات
كثير اصعب من كذا
وعدت على خير،
ودي كمان هتعدى
على خير إطمئن
ومتقلقش كله هيبقى
كويس.



General characters of Coxiella burnetii

Genetic and physiologic character يتخلف عنده بال



One of **Rickettsial** groups, characterized by:

- **Obligate intracellular** organisms, therefore, **must be grown in cell culture**.
- Structurally, their cell wall **resembles that of gram -ve rods**.
- They **stain poorly with Gram stain**, best stained with **Giemsa**.
- Highly resistant to environmental stresses (biological weapon).
- Two antigenic forms, **phase I (virulent) & phase II (avirulent)**.

↳ heat و dryness

diagnosis phase لهي ال against ال Antibodies ال (ال بتكونوا مهمات جدًا بال)

Q Fever

- The “Q” comes from “query” fever, the name of the disease until its true cause was discovered in the 1930s.
- Q fever is a **zoonosis**. The important reservoirs and sources of human infections are cattle, sheep, and goats.
- *C. burnetii* infections are transmitted by **inhalation of animal aerosols** (especially from urine, feces, placental tissue, and amniotic fluid of the animals) (**Not transmitted by arthropod bite as other Rickettsia**).
بنخلف عن الـ Rickettsia بحريته الاشتغال
بتنقل عن طريق
arthropod bite
inhalation ← Q الـ
- Q fever is usually an **occupational hazard**. People at high risk include farmers, abattoir workers and veterinarians as well as laboratory personnel.

Clinical findings

➤ Acute Q fever: (phase II antigen)

- It begins with fever, headache, cough, and other Influenza like symptoms.

Atypical

- Pneumonia ensues in about 50 % of patients.

مع بعض

- Hepatitis is frequent enough that the **combination of pneumonia and hepatitis should suggest Q fever.**

- There is **NO rash** (unlike in most of the other rickettsial diseases).

➤ Chronic Q fever: (phase I antigen)

كل الأنواع الباقية منهم rash الـ هون ما يتبل rash

high level of Antibodies against phase I يكون عندهم

Characterized by chronic cough, intermittent fever, frequent headache and can be complicated **with life-threatening endocarditis.**

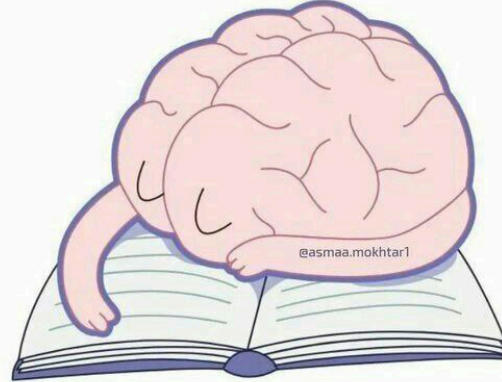
Laboratory Diagnosis:

- **Serology:** The **mainstay** of diagnosis. Detection of specific antibodies against phase I & II antigens.
مع ال chronic بتكون املی → *مع ال acute بتكون املی*
- **PCR.** *سريع و sensitive*
- Isolation of the organism: in cell culture is of limited usefulness.

Prevention:

Prevention of Q fever vaccination of occupationally exposed (**killed vaccine**).

لا تنس إحتساب أجرِ تعبِكَ
وقت المذاكرةِ لله،
وتأكد أن الله لا يُضيعُ تعبِكَ.



نهاية مادة الميـد 🧠

بالتوفيق ولا تنسوني من دعواتكم 🙏❤️