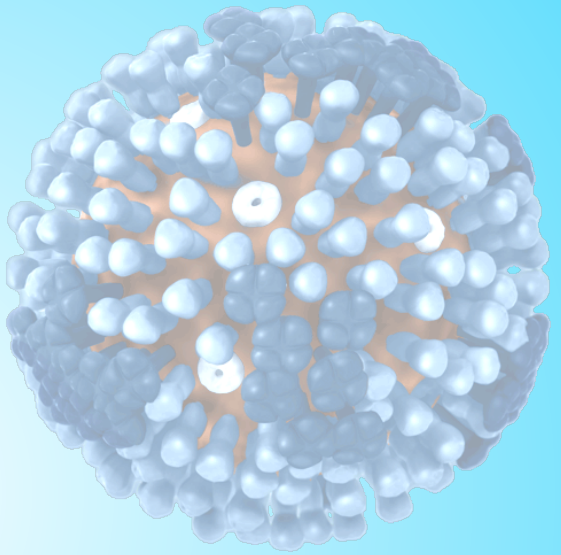
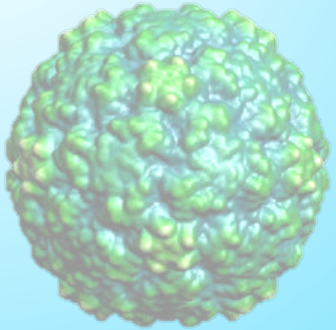


TUBERCULOSIS



concentrate on the slide i say important

Introduction

- Tuberculosis (TB): an ancient chronic disease affects humans.
- caused by *Mycobacterium tuberculosis* complex.
- A major cause of death worldwide.
- Usually affects the lungs, other organs can be affected in one third of cases.
- It is curable if properly treated, but fatal if untreated in most cases.

Epidemiology

this slide is important
know everything

- TB affects **1/3** of human race (2 billions) as a latent dormant tuberculosis.
- **Incidence**: a worldwide disease , more common in developing countries.
- Affects all age groups who are subject to get the infection.
- The WHO estimated 8.9 million new cases in 2004 & 2 - 4 million death.
- **Incidence : in KSA** : 32-64 cases /100,000. **in USA** :5.2 cases/100,000

  in Southeast Africa : 290 cases /10,000 due to coupling with HIV infection.
- Transmission mainly through inhalation of airborne droplet nuclei (< 5 μm) in pulmonary diseases case ,rarely through GIT & skin.
- **Reservoir:** patients with open TB.
- **Age**: young children & adults
- **People at risk :** lab. technicians, workers in mines, doctors ,nurses. HIV pts., diabetics end stage renal failure, contacts with index case.

Characteristics of the genus Mycobacteria

-Slim

-rod shaped

-non-motile

- do not form spores.

know these important information

-No Gram stain because it Contains high lipid conc. (Mycolic acid) in the cell wall which resist staining .

-It is called **Acid- alcohol fast (AFB)**.

Why ? it resists decolorization with up to 3% HCL, 5% ethanol or both.

Mycobacterium Tuberculosis Complex

this slide is important know everything

1. M.tuberculosis: Human type
2. M.bovis: Bovine type
3. M.africanum
4. BCG strains: From vaccines

they are called mycobacterium tuberculosis complex and they cause TB

Pathogenesis of TB

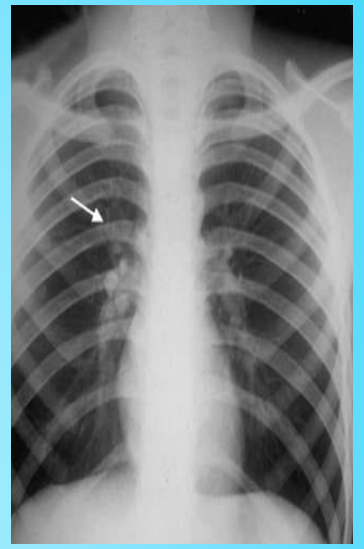
- ➔ the organism enters by airborne droplet.
- ➔ it reaches the alveolar macrophage, which engulfs it but is not able to phagocytose it. (The bacteria survive inside of phagosomes because they prevent the discharge of lysosomal contents into the phagosomal environment, With M. tuberculosis, bacterial cell wall components (sulfatides) are thought to be released from the phagosome that modify lysosomal membranes to inhibit fusion.).
- ➔ the bacteria's ability to survive inside the macrophage is the main virulence factor
- ➔ this activates cell mediated immunity (CMI) which controls the multiplication of the organism but does not destroy it.
- ➔ granulomas are formed, and the organism enters its dormant state (latent tuberculosis infection)About 90% of those infected with M. tuberculosis have asymptomatic, latent TB infections with only a 10% lifetime chance that the latent infection will progress to active tuberculous disease.

continue

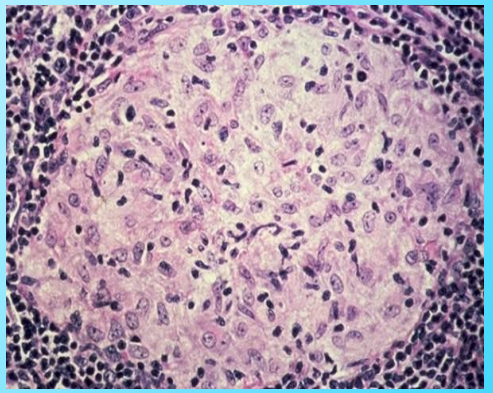
pathogenesis of TB

- ➔ Patient show evidence of delayed cell mediated immunity (CMI).
- ➔ Disease results due to destructive effect of CMI .
- ➔ Clinically the disease is divided into primary or secondary .
- ➔ Primary Tuberculosis
- ➔ Occurs in patients not previously infected.
- ➔ Inhalation of bacilli ⟶ Phagocytosis ⟶ lymph nodes calcify to produce GHON focus.
- ➔ ghon focus is generally located in either the upper part of the lower lobe, or the lower part of the upper lobe.(near the hilum)If the Ghon focus also involves infection of adjacent lymphatics and hilar lymph nodes, it is known as the Ghon's complex or primary complex.

Primary Tuberculosis



- Occurs in patients not previously infected
- characterized by the presence of ghon complex
- clinical presentation: Asymptomatic
- may spread from the pulmonary site to affect other organs e.g: TB meningitis, TB bone … etc
- it can develop into miliary TB
- Granuloma with caseation in the center is present
- cold abscess is present(An abscess not accompanied by heat or other usual signs of inflammation.)



this slide is important
know everything

Secondary TB

this slide is important know everything

- Infectious & symptomatic
- occurs in Immunocompromised patients
- clinical presentations: fever, cough, hemoptysis ,weight loss & weakness.
- how do we get the infection?

-we get it by two methods:

1- Endogenous: where the latent or sleeping bacteria gets re-activated (due to immunodeficiency)

2- Exogenous: being infected again with a previous history of TB infection

Primary TB	Secondary TB
Asymptomatic	Symptomatic and infectious
Occurs in people never infected before	Could be endogenous (due to immunodeficiency) or exogenous
Can spread through lymphatics and blood vessels	Remains localized (mostly in the upper apex)

*note:The difference between primary and secondary is that the tb bacteria had a previous contact with the body immunity in the secondary infection.

primary and secondary TB video:

https://www.youtube.com/watch?v=kHDS42fr17A

Tuberculin test

- •It is called mantoux or tuberculin skin test (TST)
- •It injects purified protein derivative (PPD) intradermal.
- •Activates synthesized lymphocytes to produce CMI which appear as skin induration.
- •The result of the test is read after 48-72 hours.
- •The diameter of the induration is measured to determine the diagnosis.

https://www.youtube.com/watch?v=bR86G-itrTQ

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(You must ask the patient his previous history)

Category of individuals	The diameter of induration to be considered TB positive (otherwise negative)
- recent contact with active TB - HIV or high risk for HIV - Chest x-ray shows signs of healed TB	> 5 mm
-IV drug user -Medical conditions (diabetes or malignancy) -Large group residents or employees (jail ,military) -Children less than 4 y\o -Patients from endemic areas -Microbiology lab workers	> 10 mm
-Normal individuals	> 15 mm

Negative tuberculin test result

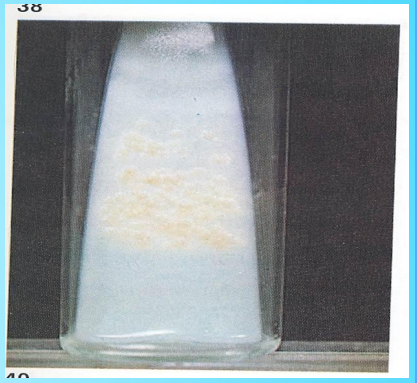
- No induration either due to:
  - No previous infection
  - Pre-hypersensitivity stage
  - Lost TB sensitivity with loss of Antigen.

Laboratory Diagnosis of TB

1- Specimens

2- Direct microscopy of specimen

3- Culture: the **gold standard** test for identification and sensitivity



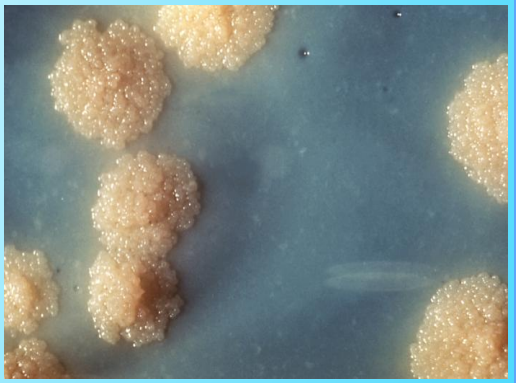
Identification

1- Morphology (growth at 37C + 5 -10 % CO2)

2- Biochemical tests (Niacin production & Nitrate test)

3- Sensitivity testing

4- Guinea pig inoculation (rarely done)



Management of a TB case

1- Isolation for 10-14 days

2- Treatment must be guided by sensitivity testing.

TB Treatment

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First Line	Second Line
• Isoniazide (INH) • Rifampicin (RIF) • Ethmbutol (E) • Pyrazinamide (P) • Streptomycin (S) • Directly Observed Therapy (DOT)	• Used if the bacteria was resistant to first line drugs. More toxic than the first line drugs. • PASA (Para-Amino Salicylic acid) • Ethionamide • Cycloserine, • Kanamycin, • Fluroquiolones

Prevention of TB

this slide is important know everything

- Tuberculin testing of herds.
- Slaughter of infected animals.
- Pasteurization of milk to prevent bovine TB.
- Recognition of new cases.
- Prophylaxis with INH of contacts.
- Follow up cases.
- Immunization with BCG to all new borne.

MCQ'S

1- Which of the following is not a characteristic of primary TB:

a) Asymptomatic
b)Occurs in people never infected before
c) infectious
d)Can spread through lymphatics and blood vessels

2- Which one of the following is a second line for TB treatment:

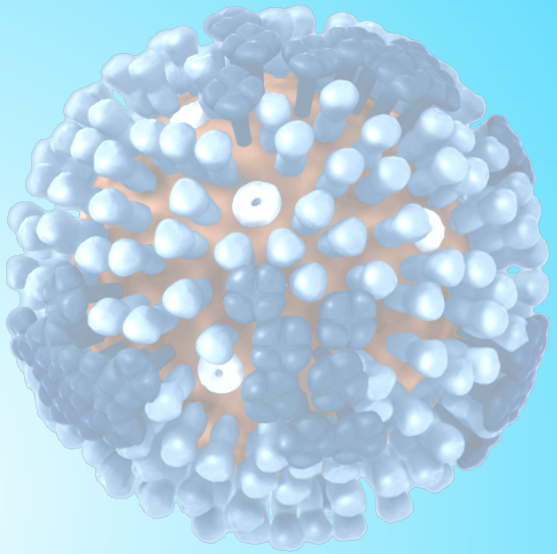
a)pyrazinamide
b)rifampicin
c)streptomycin
d)cycloserine

3-Acid- alcohol fast resists decolorization with up to 3% HCL and 10% ethanol:

a)true
b)false

4-The mantoux activates lymphocyte to produce cmi:

a)true
b)false



anws:

1-c

2-d

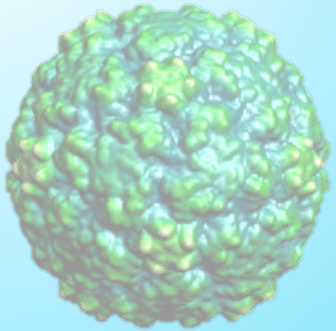
3-b

4-a

Good Luck

Done by :

Microbiology Team



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