MEDICINE

432 Team

54 Tuberculosis

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• Objectives

By the end of this lecture, students should know the following about Tuberculosis:

- **Overview of Tuberculosis (TB) Epidemiology**
- **Transmission and Pathogenesis of TB**
- **Testing for TB Infection and Disease**
- **Diagnosis of TB Disease**
- **Treatment for Latent TB Infection**
- **Treatment for TB Disease**
- **TB Infection Control**

Overview of Tuberculosis (TB)

Overview of Tuberculosis:

- **Bacterial infection**
- **Caused by Mycobacterium tuberculosis (also called tubercle bacillus)**
- **Damages a person's lungs or other parts of the body**
- **Fatal if not treated properly**

Epidemiology:

- **It is a worldwide disease**
- **TB infects 1.7 billion with 3 million deaths/yr**
- **UK: 1st half of 20th century: a lot of death secondary to TB epidemic**
- **90% of cases and 95% of death occurred in developing countries.**
- **Number of cases in developed countries has declined because of: case finding, RX and improved Nutrition.**
- **Tuberculous infection: a state in which the tubercle bacillus is established in the body without symptoms.**
- **Tuberculous disease: a state in which one or more organs of the body becomes diseased by the bacteria.(produces symptoms and signs)**
- **What increases the spread of the disease:**

  1) Crowding of living

  2) Migration of people from endemic area.

- **10% of infected people ---- active disease**

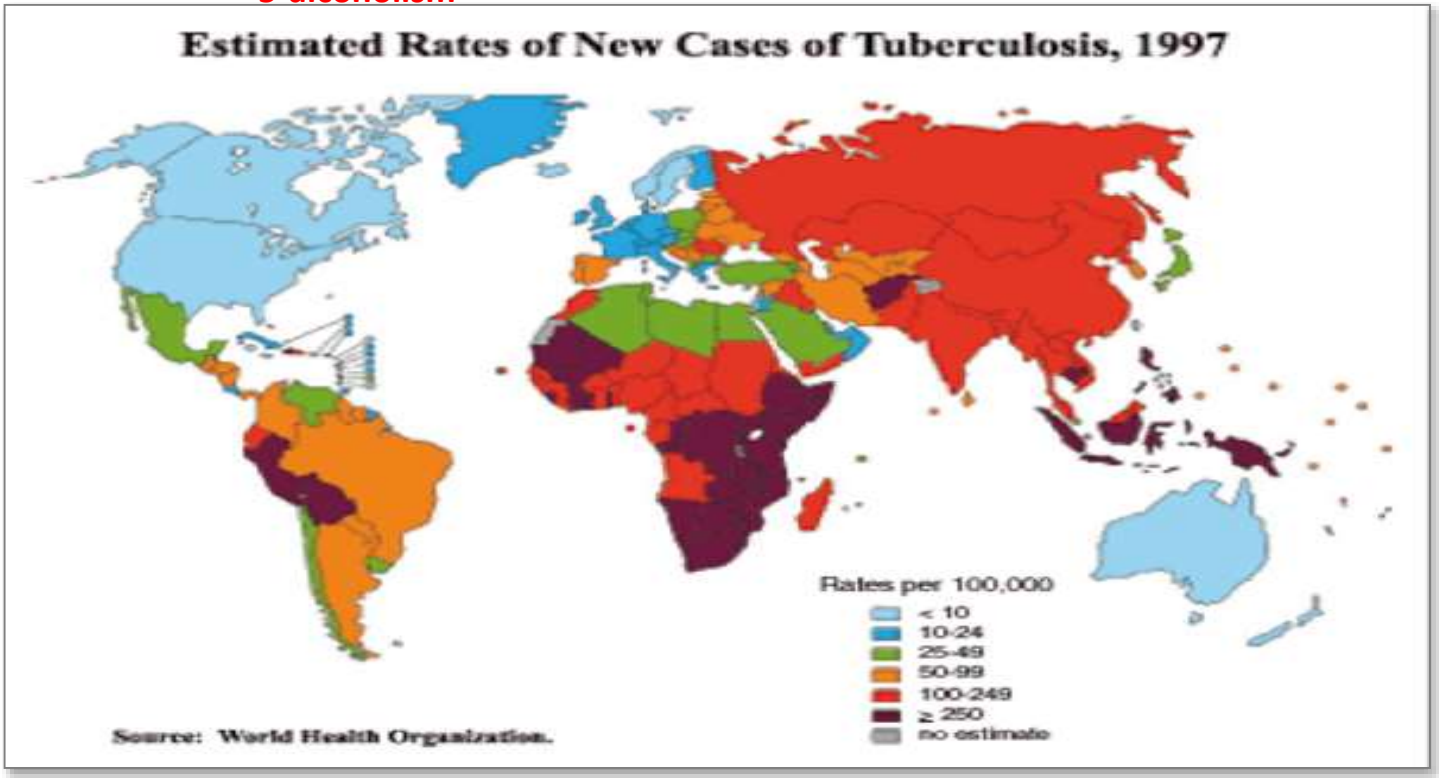
- **50%of active disease --- contagious** (half of the 10% are contagious)
- **What increases the risk of developing disease after TB infection?**

1. **Infecting dose**
2. **Host factors**

1-age: under 5 years 2- gastrectomy (because of low HCL) 3-Diabetes

4-debilitating illness and poor nutrition

5-alcoholism



Nationality= People from regions with high rates of TB — especially Africa, Asia and Latin America, are more likely to develop TB.

Sex= In most of the world, more men than women are infected with TB. Men are also more likely to die of the disease.

Race= In the United States, Hispanics, American Indians and blacks are at higher risk of TB than are whites. Asian-Americans have the highest TB rate.

Age=Older adults are at greater risk of TB because normal aging or illness may weaken their immune systems. They're also more likely to live in nursing homes, where mini-epidemics of TB can occur.

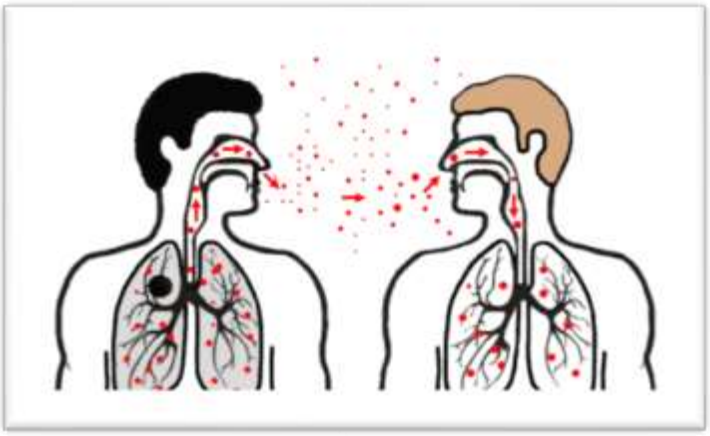
Substance abuse=Long-term drug or alcohol use weakens your immune system and makes you more vulnerable to TB.

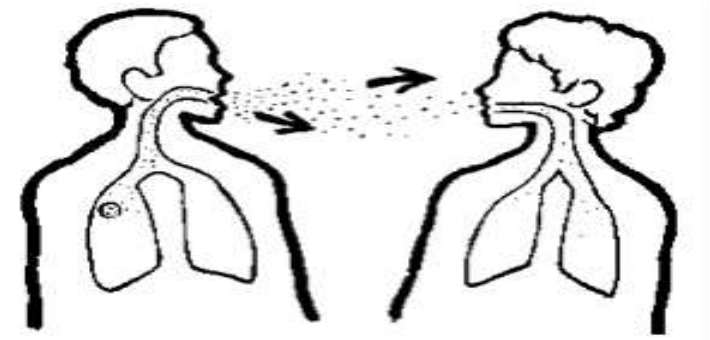
Malnutrition= A poor diet or one too low in calories puts you at greater risk of TB.

Lack of medical care= If you are on a low or fixed income, live in a remote area, have recently immigrated to the United States, or are homeless, you may lack access to the medical care you need diagnose and treat TB..

Mode of Spread & Transmission:

- **Inhalation of droplet nuclei**
- **Spreads through the air when a person with active TB: Coughs/ Speaks/ Laughs/ Sneezes/ Sings/shouts**
- **Another person breathes in the bacteria and becomes infected**
- **M.tb spread via airborne particles called droplet nuclei**
- **Transmission occurs when droplet nuclei inhaled and reach the alveoli of the lungs, via nasal passages, respiratory tract, and bronchi**





Note(s):

Mycobacterium TB can spread through both blood and lymphatics.

Most cases of TB disease are caused by activation of TB focus when immunity is reduced and not because of direct infection.

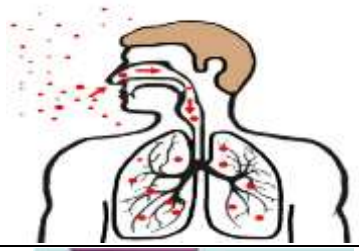
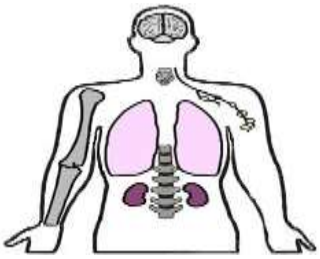
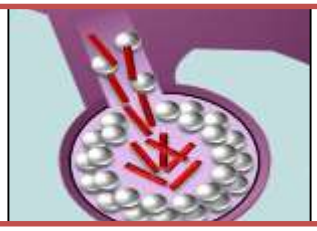
Granuloma is reaction of the body to control infection.

TB transmission needs some contact with infected people, unlike regular meningitis which is highly contagious.

Tuberculoma is accumulation of granulomas in the body. It can be central or peripheral.

Pathogenesis:

- **Droplet nuclei ---terminal air space**
- **Multiplication … initial focus**
  - **Sub-pleural**
  - **75% Single**
- **Migration through blood and lymph node --- another focus**
- **Ingestion of the bacteria by the macrophage --- slow multiplication**

	**Droplet nuclei containing tubercle bacilli are inhaled, enter the lungs, and travel to the alveoli.**
	**Tubercle bacilli multiply in the alveoli.**
	**A small number of tubercle bacilli enter the bloodstream and spread throughout the body. The tubercle bacilli may reach any part of the body, including areas where TB disease is more likely to develop (such as the brain, larynx, lymph node, lung, spine, bone, or kidney)**
 IMMUNO-COMPETENT HOST	**Within 2 to 8 weeks, special immune cells called macrophages ingest and surround the tubercle bacilli. The cells form a barrier shell, called a granuloma, that keeps the bacilli contained and under control (LTBI).Latent TB infection**
 IMMUNO-COMPROMISED HOST	**If the immune system cannot keep the tubercle bacilli under control, the bacilli begin to multiply rapidly (TB disease). This process can occur in different areas in the body, such as the lungs, kidneys, brain, or bone.**

Inside the Body:

- **Breathe in infected air and bacilli go to lungs through bronchioles**
- **Bacilli infect alveoli**
- **Macrophages attack bacteria, but some survive**
- **Infected macrophages separate and form tubercles**
- **Dead cells form granulomas**

As a person breathes in infected air, the bacilli go to the lungs through the bronchioles. At the end of the bronchioles are alveoli, which are balloon-like sacs where blood takes oxygen from inhaled air and releases carbon dioxide into the air exhaled.

TB bacilli infect the alveoli and the body immune system begins to fight them. Macrophages — specialized white blood cells that ingest harmful organisms — begin to surround and "wall off" the tuberculosis bacteria in the lungs, much like a scab forming over a wound.

Then, special immune system cells surround and separate the infected macrophages. The mass resulting from the separated infected macrophages are hard, greyish nodules called tubercles.

Active TB spreads through the lymphatic system to other parts of the body. In these other parts, the immune system kills bacilli, but immune cells and local tissue die as well. The dead cells form masses called granulomas, where bacilli survive but don't grow.

As more lung tissue is destroyed and granulomas expand, cavities develop in the lungs, which causes more coughing and shortness of breath. Granulomas can also eat away blood vessels which causes bleeding in the lungs, and bloody sputum.

Immunological Feature:

- **TB require CMI (cell mediated immunity) for its control**
-
- **Ab antibody response is rich but has no role.**

- **Multiplication proceeds for weeks (Until development of cell mediated immunity) both in:**
  1. **Initial focus.**
  2. **lymphohaematogenous metastatic foci.**

Davidson Page.688:

- Mainly macrophages will undergo transformation into epitheliod and Langhans cells, which aggregate with lymphocytes to form the classical tuberculous granuloma.

-Numerous granulomas aggregate to form a primary lesion (Ghon focus).Which is characteristically situated at the periphery of the lung. Spread of the organisms to the hilar lymph nodes is followed by a similar pathological reaction. The combination of the primary lesion and the regional lymph nodes in known as (The primary complex of Ranke).

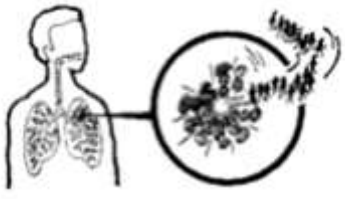
- Primary TB = Latent TB - Secondary TB= Active TB

Microbiology:

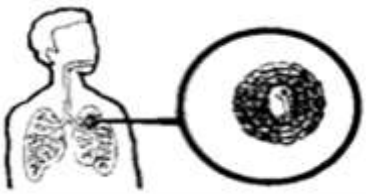
- **Organism:**
  1. **Mycobacterium tuberculosis**
  2. **Aerobic**
  3. **Non-spore forming ,non-motile**
  4. **Rod..: 2—5 mm long**
  5. **Resistant to disinfectant**
  6. **Once stained it resists de-colorization with acid and alcohol facultative intracellular organism**
- **Human is the main reservoir of MTB**

Clinical features Active VS. Latent Infection:

- **Unhealthy person**
  1) **Bacilli overwhelm immune system**
  2) **Bacilli break out of tubercles in alveoli and spread through bloodstream**
  3) **This is (active) TB**



- **Healthy person**
  1) **Initial infection controlled by immune system**



2) **Bacilli remain confined in tubercles for years**
3) **This is(latent) TB**

Difference between active and latent TB:

Person with Latent TB:

-Has no symptoms

-Does not feel sick

-Cannot spread TB to others

-Usually has a positive skin test

-Has a normal chest x-ray and sputum test

Person with active TB:

-has symptoms (cough, fever, weight loss, night sweats, loss of appetite, fatigue, swollen glands(lymph nodes), chill, pain while breathing)

-may spread TB to others

-has a positive skin test

-May have an abnormal chest x-ray, or positive sputum smear

Clinical Features:

- **Pulmonary 80%**
- **Extra pulmonary 20%**

- **Pulmonary tuberculosis**
  - **Primary: the lung is the 1st organ involved middle and lower lobe**

    -TB likes the apex (high Oxygenation), but if the CXR and clinical presentation are suggestive of bases or middle lobe involvement don't rule out TB.

    -Diabetic people have middle lobe TB Syndrome.

  - **Health: asymptomatic**
  - **Heals spontaneously**
  - **CXR normal**
  - **Post primary (reactivation)**
  - **Result from endogenous reactivation of latent infection and manifest clinically:**

- Fever and night sweat
- Weight loss
- Cough… non-productive then productive

- May have haemoptysis
- Signs: rales in chest exam
- Malnutrition
- HIV

  -HIV patients are more likely to develop active TB because HIV destroys T-cells.

  -In the west every HIV patient is tested for TB and vise versa.
- Severe cases
- primary lesion progress to clinical illness
- cavitating pneumonia
- lymphatic spread and lobar collapse due to LN
- 40% haematogenous dissemination

- **Extra pulmonary**
  - Lymph node
  - Pleural
  - Bone and joint
  - Meninges
  - Peritonium
  - Pericarditis and pericardial effusion
- **Tuberculous lymphadenitis 25 % The commonest**
- Localized painless swelling
- Common sites: cervical & supraclavicular
- Early: glands are discrete
- Late: glands are matted -/+ sinus
- Dx: FNA 30% in biopsy for histo and culture

– If lymph nodes were tender that means there is inflammation which is better than non-tender lymph nodes.
– Initially lymph nodes are discrete then as disease progresses and caseation increases they will become matted.

- Best samples of lymph nodes are excisional so choose the largest one if multiple lymph nodes were present and safest location (lymph node should be 1 cm +).
- After Excision lymph nodes should be dipped in saline only and not formalin because formalin may kill the organisms in tissue.

- **Pleural Tb**
- Result from penetration by few bacilli into the pleural space resulting into :
  - pleural effusion and fever
  - DX; aspirate --- exudate
  - AFB rarely seen
  - culture 30% positive
  - BX 80% granuloma

- **Skeletal Tb**
- Source:
  - reactivation of haematogenous focus
  - spread from an adjacent LN
- Common sites: spine --- hips --- knees

- **Spinal Tb:**
- Dorsal site is the commonest site
- Involve two vertebral bodies and destroy the disc in between
- Advance disease
- Collapse fracture of the bodies
- Kyphosis and gibbus deformity (thoraco-lumbar kyphosis resulting in sharp angulation).
- Paravertebral abscess (cold abscess)

- **Dx: CT scan and MRI**
- **Biopsy: histopath**

- **Tuberculous meningitis**
- **Most often: children and may affect adult**
- **Source:**
  - **Blood spread**
  - **Rupture of a sub-ependymal tubercle**
- **Symptoms:**
  - **fever**
  - **headache**
  - **neck rigidity (Not pathognomic for meningitis)**
- **Disease typically evolves in 2 wks.**
- **Dx; csf**
- **In children Asymptomatic state may cause miliary tuberculosis and TB meningitis**

TB & Aids:

- **Person with active TB are more frequent to have HIV than general population**
- **AIDS in HAITIANS: almost all children are positive for PPD --- active TB in 60%**
- **New York: 50% of active TB patients are HIV+**
- **Africans: 60% of active TB patients are HIV+**
- **TB can appear at any stage of HIV infection**

But presentation varies with the stage:

Early:

Typical pattern of upper lobe infiltrate -/+cavitation.

Late:

Diffuse infiltrate - no cavitation -LN

Sputum is less frequent to be + for AFB with HIV than without

Extra pulmonary is more common 40%

Pulmonary TB and HIV diagnosis is difficult:

- **sputum (-) in 40 %**
- **atypical CXR**
- **negative PPD**

Latent TB Infection:

- **Granulomas may persist (LTBI), or may break down to produce TB disease**
- **2 to 8 weeks after infection, LTBI can be detected via TST or interferon-gamma release assay (IGRA)**
- **The immune system is usually able to stop the multiplication of bacilli**
- **Persons with LTBI are not infectious and do not spread organisms to others**
- **In some, the granulomas break down, bacilli escape and multiply, resulting in TB disease**
- **Can occur soon after infection, or years later**
- **Persons with TB disease are usually infectious and can spread bacteria to others**
- **Positive *M. tb* culture confirms TB diagnosis**

LTBI vs. TB Disease:

Person with LTBI (Infected)	Person with TB Disease (Infectious)
Has a small amount of TB bacteria in his/her body that are alive, but inactive	Has a large amount of active TB bacteria in his/her body
Cannot spread TB bacteria to others	May spread TB bacteria to others
Does not feel sick, but may become sick if the bacteria become active in his/her body	May feel sick and may have symptoms such as a cough, fever, and/or weight loss
Usually has a TB skin test or TB blood test reaction indicating TB infection	Usually has a TB skin test or TB blood test reaction indicating TB infection
Radiograph is typically normal	Radiograph may be abnormal
Sputum smears and cultures are negative	Sputum smears and cultures may be positive
Should consider treatment for LTBI to prevent TB disease	Needs treatment for TB disease
Does not require respiratory isolation	May require respiratory isolation
Not a TB case	A TB case

Most Susceptible:

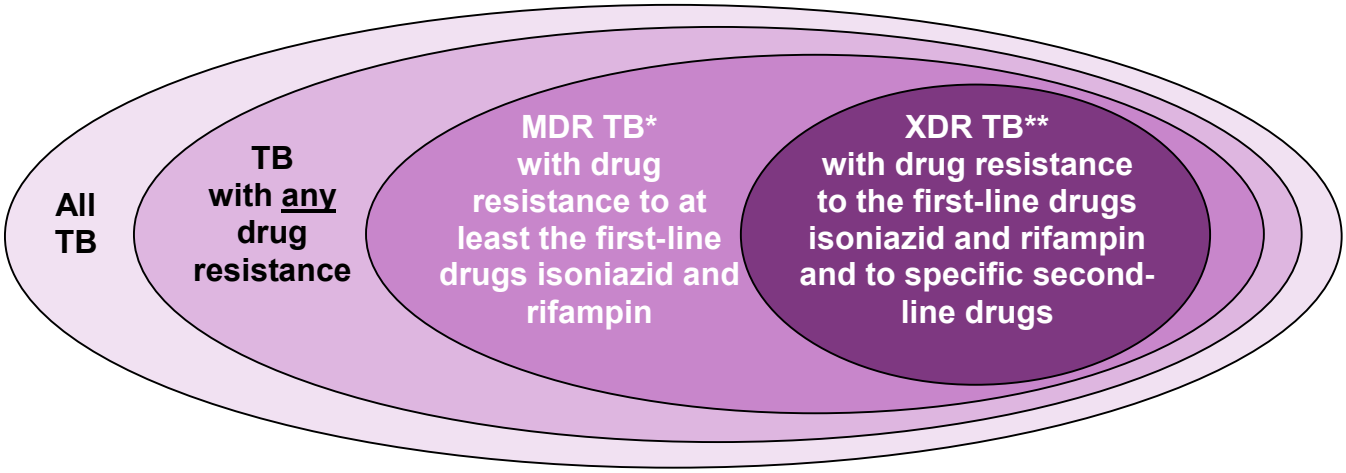
- **People at higher risk of TB infection**
  - **Close contacts with people with infectious TB**
  - **People born in areas where TB is common**
  - **People with poor access to health care**
  - **People who inject illicit drugs**
  - **People who live or work in residential facilities**
  - **Health care professionals**
  - **The elderly**
  - **Persons who visit TB-Prevalent countries**
  - **Smoking increases the risk of TB**
  - **Cytotoxic medications, high doses of steroids and TNF therapy are associated with TB**
  - **Malignancies increases the risk (Especially lymphomas and leukemias) are associated with TB**
  - **Recent measles in children is associated with the disease**
  - **Vitamin D or A deficiency is associated with TB**
  - **Chronic kidney disease is associated with TB**
- **People at higher risk of active TB disease**
  - **People with weak immune systems (especially those with HIV or AIDS)**
  - **People with diabetes or silicosis**
  - **People infected within the last 2 years**
  - **People with chest x-rays that show previous TB disease**
  - **Illicit drug and alcohol abusers**
- **Check Davidson p.690 Box 19.52 for patient related factors and associated factors.**

Drug-Resistant TB:

- **Caused by organisms resistant to one or more TB drugs**
- **Transmitted same way as drug-susceptible TB, and no more infectious**
- **Delay in detecting drug resistance may prolong period of infectiousness because of delay in starting correct treatment**

Multidrug-Resistant (MDR) and Extensively Drug-Resistant (XDR) TB:

- **MDR TB caused by bacteria resistant to best TB drugs, isoniazid and rifampin**
- **XDR TB caused by organisms resistant to isoniazid and rifampin, plus fluoroquinolones and ≥1 of the 3 injectable second-line drugs**



***Often resistant to additional drugs**

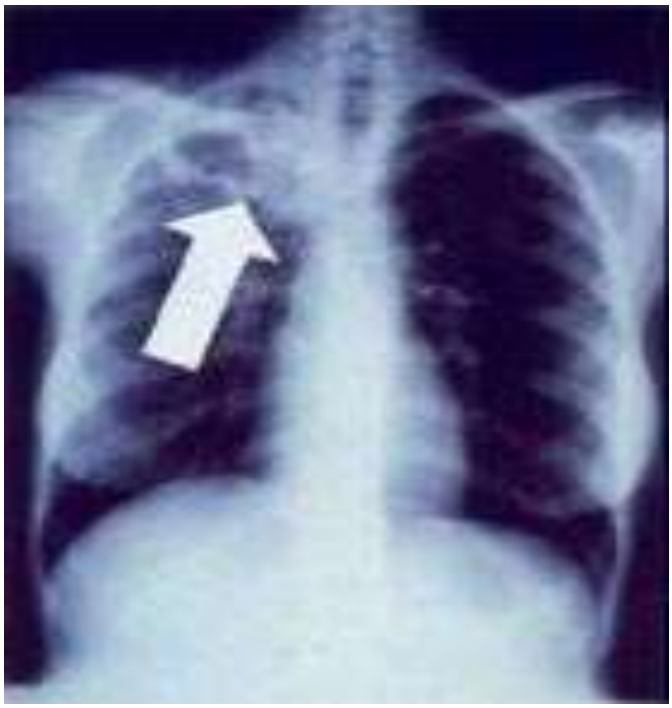
****Resistant to any fluoroquinolone and at least one of three injectable second-line drugs (i.e., amikacin, kanamycin, or capreomycin)**

Diagnosis:

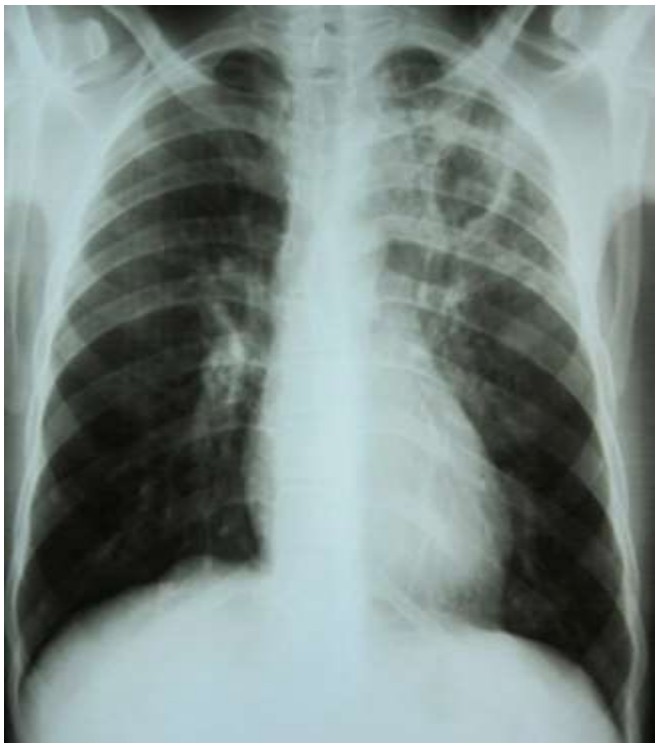
Medical Evaluation for TB

- ❑ **Medical history**
- ❑ **Physical examination**
- ❑ **Test for TB infection**
- ❑ **Chest radiograph**
- ❑ **Bacteriologic examination**

- **Medical History**
- **Symptoms of pulmonary TB:**
  - **Prolonged cough (3 weeks or longer), hemoptysis**
  - **Chest pain**
  - **Loss of appetite, unexplained weight loss**
  - **Night sweats, fever**
  - **Fatigue**



- **For any respiratory symptoms:**
- **Do chest x-ray if abnormal**
  - **Sputum for:**
    - **Zn stain**
    - **Culture definite diagnosis**
  - **Use low enstein-jansen media for culture or Middlebrook.**
- **Slow growth 3 - 6 weeks**
- **Bactic liquid media or MGIT can be used for culture to get the results out faster.**



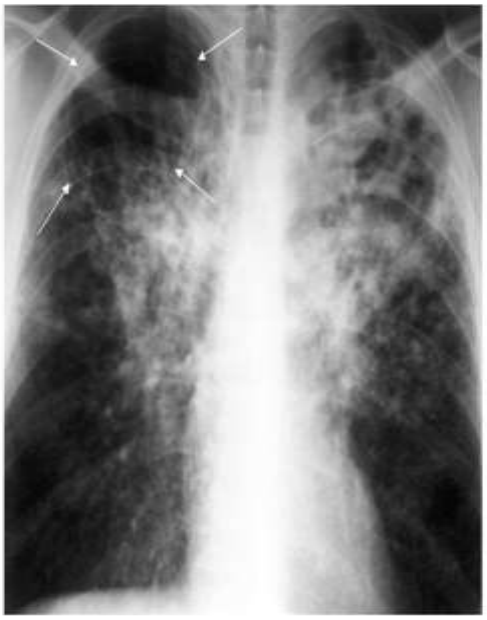
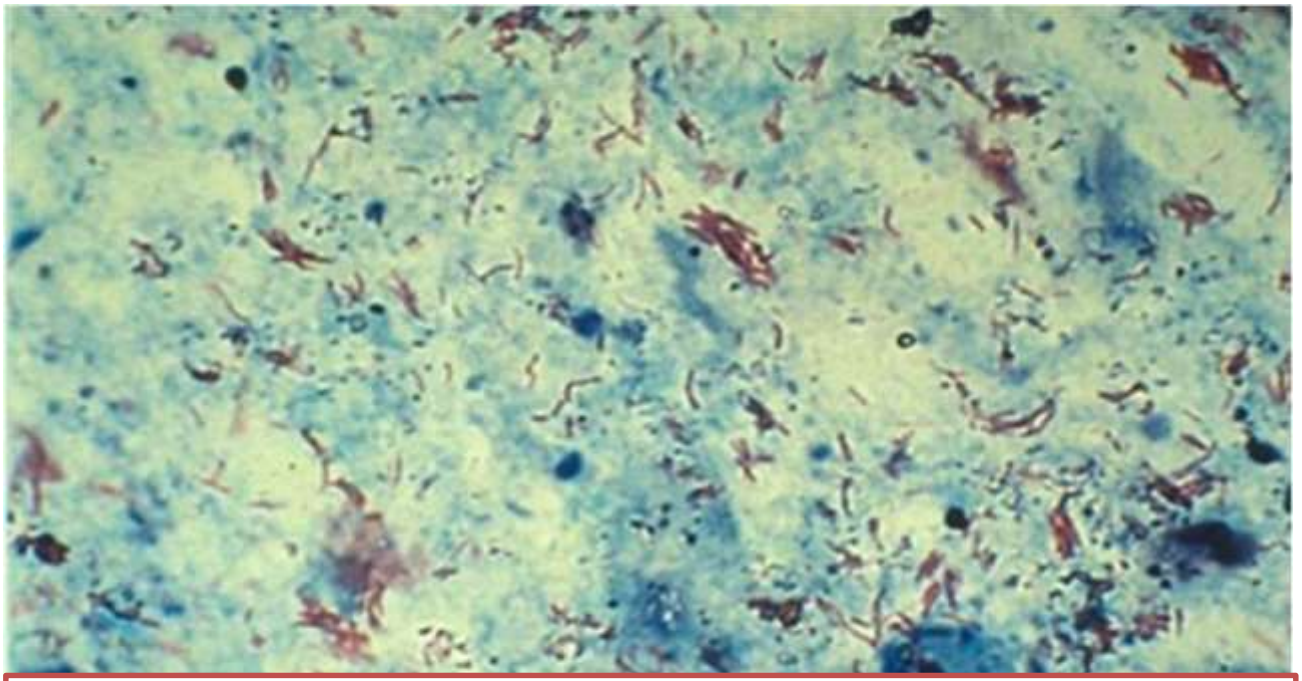


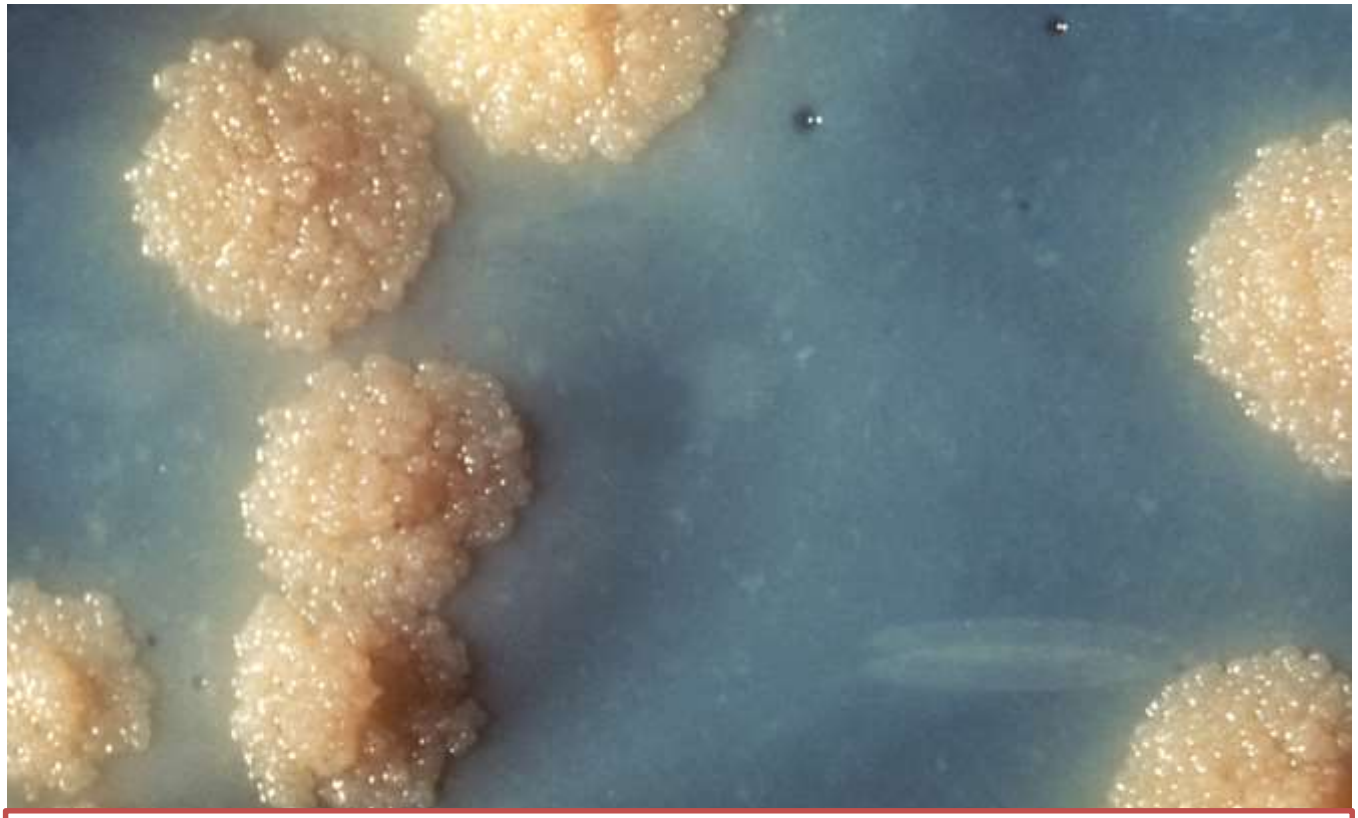
Figure 8. Chest x-ray with bilateral upper lobe opacities (white areas) with multiple cavities including a very large cavity in the right upper lobe (arrows).



AFB Smear

AFB (shown in red) are tubercle bacilli

- **Culture**
  - **Remains gold standard for confirming diagnosis of TB**
  - **Culture all specimens, even if smear or NAA negative**
  - **Results in 4–14 days when liquid medium systems used**
  - **Culture monthly until conversion, i.e., 2 consecutive negative cultures**

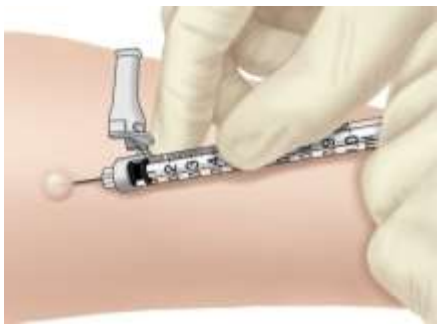


Colonies of M. tuberculosis growing on Media

Diagnosis (cont.):

- **PPD intradermal**
- **5 unit in o.1 ml**
- **10 mm: 90 % infected**
- **More than 15 mm: 100% infected**
- **BCG and positive PPD:**
- **Unless very recent: positive PPD of more than 10mm should not be due to BCG**

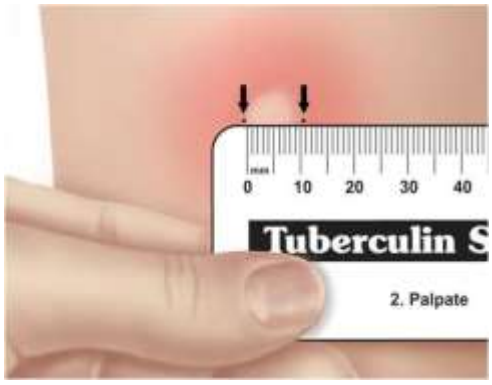
Administering the TST

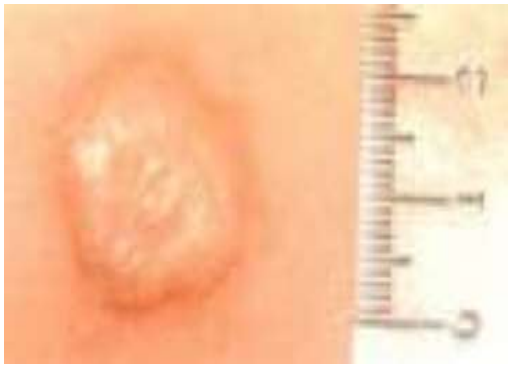


- ❑ **Inject 0.1 ml of PPD (5 tuberculin units) into forearm between skin layers**
- ❑ **Produce wheal (raised area) 6–10 mm in diameter**
- ❑ **Follow universal precautions for infection control**

Reading the TST

- ❑ Trained health care worker assesses reaction 48–72 hours after injection
- ❑ Palpate (feel) injection site to find raised area
- ❑ Measure diameter of induration across forearm; only measure induration, not redness
- ❑ Record size of induration in millimeters; record "0" if no induration found





Mantoux Tuberculin Skin Test (TST):

- Purified protein derivative (PPD), derived from tuberculin, is injected between skin layers using the Mantoux technique
- Infected person's immune cells recognize TB proteins in PPD, respond to site, causing wheal to rise
- Takes 2-8 weeks after exposure and infection for the immune system to react to PPD
- Reading and interpretation of TST reaction must be done within 48–72 hours

Diagnosis (cont.):

- False negative TST:
- 20 % of active disease
- Malnutrition
- Sarcoid
- Lymphoproliferative dis.(lymphoma)
- Viral infection
- Steroid
- PPD: is of limited value because of

- **Low sensitivity and specificity**

Type of Reaction	Possible Cause
False-positive	• Nontuberculous mycobacteria • BCG vaccination • Problems with TST administration
False-negative	• Anergy • Viral, bacterial, fungal coinfection • Recent TB infection • Very young age; advanced age • Live-virus vaccination • Overwhelming TB disease • Renal failure/disease • Lymphoid disease • Low protein states • Immunosuppressive drugs • Problems with TST administration

Interferon Gamma Release Assays (IGRAs):

- **IGRAs detect *M. tb* infection by measuring immune response in blood**
- **Cannot differentiate between TB and LTBI; other tests needed**
- **May be used for surveillance/screening, or to find those who will benefit from treatment**
- **FDA-approved IGRAs are QFT Gold In-Tube and T-Spot.*TB* test**

BCG Vaccination:

- ❑ **Vaccine made from live, attenuated (weakened) strain of *M. bovis***
- ❑ **Early version first given to humans in 1921**
- ❑ **Many TB-prevalent countries vaccinate infants to prevent severe TB disease**

BCG Contraindications :

- Contraindicated in persons with impaired immune response from
  - HIV infection, congenital immunodeficiency
  - Leukemia, lymphoma, generalized malignancy
  - High-dose steroid therapy
  - Alkylating agents
  - Antimetabolites
  - Radiation therapy
- BCG vaccination should not be given to pregnant women

General Recommendations for Using IGRAs:

- May be used in place of, but not in addition to, TST
- Preferred when testing persons
  - Who might not return for TST reading
  - Who have received BCG vaccination
- Generally should not be used to test children <5 years of age, unless used in conjunction with TS

Diagnosis (cont.):

- Symptoms of possible extrapulmonary TB:
  - Blood in the urine (TB of the kidney)
  - Headache/confusion (TB meningitis)
  - Back pain (TB of the spine)
  - Hoarseness (TB of the larynx)
  - Loss of appetite, unexplained weight loss
  - Night sweats, fever
  - Fatigue

Direct Detection Using Nucleic Acid Amplification (NAA):

- **NAA tests rapidly identify a specimen via DNA and RNA amplification**
- **Benefits may include**
  - **Earlier lab confirmation of TB disease**
  - **Earlier respiratory isolation and treatment initiation**
  - **Improved patient outcomes; interruption of transmission**
- **Perform at least 1 NAA test on each pulmonary TB suspect**
- **A single negative NAA test does not exclude TB**
- **PCR is like stain Can't**

Treatment:

Treatment for Latent TB Infection (LTBI)

- ❑ **Treatment of LTBI essential to controlling and eliminating TB disease**
- ❑ **Reduces risk of LTBI to TB disease progression**
- ❑ **Use targeted testing to find persons at high risk for TB who would benefit from LTBI treatment**
- ❑ **Several treatment regimens available**

Candidates for Treatment of LTBI (cont.)

High-risk persons with positive IGRA test or TST reaction of ≥10 mm (cont.):

- ❑ **Persons with conditions that increase risk for TB:**
  - **Silicosis**
  - **Diabetes mellitus**
  - **Chronic renal failure**
  - **Certain cancers (e.g., leukemia and lymphomas, or cancer of the head, neck, or lung)**
  - **Gastrectomy or jejunoileal bypass**

- **Children <4 yrs of age; children/adolescents exposed to adults in**
- **Weight loss of at least 10% below ideal body weight**

Major Goals of TB Treatment:

- ❑ **Cure patient, minimize risk of death/disability, prevent transmission to others**
- ❑ **Provide safest, most effective therapy in shortest time**
- ❑ **Prescribe multiple drugs to which the organisms are susceptible**
- ❑ **Never treat with a single drug or add single drug to failing regimen**
- ❑ **Ensure adherence and completion of therapy**

Current Anti-TB Drugs:

10 drugs FDA-approved for treatment of TB

First Line

- **Isoniazid (INH)**
- **Rifampin (RIF)**
- **Pyrazinamide (PZA)**
- **Ethambutol (EMB)**
- **Rifapentine (RPT)**

Second Line

- **Streptomycin (SM) (IM)**
- **Cycloserine**
- **Capreomycin**
- ***ρ*-Aminosalicylic acid**

-First line medications should be used wisely:

1- To prevent resistance e.g. Rifampin is a good medication to treat brucella infection in the west but not here in Saudi. Rifampin in not used in the treatment of brucella in Saudi except in 3 cases (Pregnant woman, neuro-brucellosis and brucella endocarditis).

2- Second line medications are more expensive and with more side effects For example, Cycloserine can cause psychiatric complications.

Treatment (cont.):

- **Chemotherapy: cure**
- **Isonised**
- **Rifampicin**
- **Pyrazinamide**
- **Ethambutol/streotomycin**
  - **rapidly reduce the number of viable organism**
  - **kill the bacilli**
  - **slow rate of induction of drug resistance**

Regimen 1 for Treatment of Pulmonary, Drug-Susceptible TB 6-Month Standard Regimen for Most Patients

Initial phase

INH, RIF, PZA, EMB daily (7 or 5 days/week) for 8 weeks

4-month continuation phase options

1) INH, RIF daily (7 or 5 days/week) for 18 weeks.

2) INH, RIF intermittently (2 days/week or 1 day/week for INH, rifapentine) for 18 weeks.

- **Drug failure**
  - **None compliance (Major cause of drug failure)**
  - **Inappropriate drug**
  - **Drug resistance**

Infection Control:

- **Active pulmonary tuberculosis:**
  - **Isolation of the patient (2wks)**
  - **Isolation room should be negative pressure**
  - **Patient remain until 3 negative smears and there is clinical improvement**

TB Infection Control Measures

- ❑ **TB infection control (IC) measures should be based on TB risk assessment for the setting.**
- ❑ **The goals of IC programs are**
  - **Detect TB disease early and promptly**
  - **Isolate persons with known/suspected TB**
  - **Start treatment in persons with known/suspected TB**

SUMMARY

1. **Bacterial infection.**
2. **Caused by Mycobacterium tuberculosis.**
3. **Spreads through the air when a person with active TB: Coughs/ Speaks/ Laughs/ Sneezes/ Sings.**
4. **Culture is the gold standard for diagnosing TB**
5. **Anti TB drugs include: Isoniazid (INH) Rifampin (RIF) Pyrazinamide (PZA) Ethambutol (EMB) Rifapentine (RPT).**
6. **Remember that TB pleura is not the same as Pulmonary TB.**
7. **TB likes bone mainly vertebrae, so if vertebral bone was involved biopsy must be taken.**
8. **You still have to treat the patient if the clinical presentation was highly suggestive of TB but all results are negative. (The patient could be HIV positive)**
9. **Sinus of infected lymph nodes can occur in TB and with actinomycosis as well.**
10. **Most common cause of false negative PPD test is wrong technique, usually it's painful and no blood should come out.**
11. **BCG vaccine is live attenuated and should not be given to any immune-compromised patient.**
12. **BCG is not for life.**
13. **Start treating the patient empirically when stain is positive and don't wait until culture comes out.**
14. **In pulmonary TB or Pleura TB you have to treat the patient promptly but in lymphadenitis TB you don't need to because it's not an emergency.**
15. **INH is used in prophylaxis.**
16. **Most important initial step is direct microscopy of sputum. If a patient had a dry cough sputum induction will be done by giving the patient hypertonic saline to inhale in order to get mucus out of his lungs.**
17. **If a patient was positive for both TB and HIV give anti-TB medications first then anti-HIV to prevent reduction of immunity and to enhance treatment effect.**
18. **Typical regimen is for 6 months but may extend to 12 months in meningeal or spinal TB.**
19. **All types of TB have the same treatment regimen but the duration of treatment depends on the site of infection.**

IMPORTANT NOTES FROM EXTERNAL RESOURCES

Notes

Name of 1st book	Davidson 22nd Edition

Questions

1) A 23-year-old man presented with a 4-week history of coughing, breathlessness and malaise. He had lost 4kg in weight, but had no history of night sweats or hemoptysis. He had returned from holiday in Pakistan 2 months earlier. On examination, he had mild pyrexia (37.8°C) but had no evidence of anemia or clubbing. Crepitations were audible over the lung apices; there were no other physical signs. His hemoglobin and white cell count were normal but the CRP was 231 mg/l. The chest X-ray showed bilateral upper- and middle-lobe shadowing but no hilar enlargement. Sputum was found to contain acid-fast bacilli and Mycobacterium tuberculosis was subsequently cultured. A Mantoux test was strongly positive..
What is your diagnosis?
a. CHF
b. Pneumoconiosis
c. pneumothorax
d. TB

2) Initially you should treat the patient with INH, RIF, PZA, EMB daily for a period of?
a. 1 year
b. 1 weak
c. 8 weeks
d. 7 days

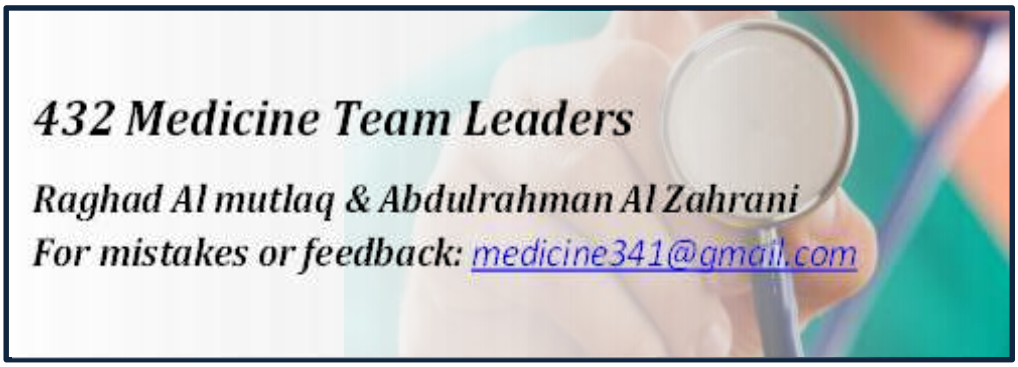
3) A 70-year-old man is evaluated for placement in an extended care facility. Other than dementia, the patient has no medical problems, including fever, cough, or recent weight loss. He is a retired army officer who served in logistics and supply. He has no history of previous tuberculosis infection or exposure to persons with tuberculosis. He does not smoke cigarettes, drink alcohol, or use illicit drugs. His only medication is donepezil. On examination, vital signs are normal. His score on the Mini–Mental State Examination is 23. A tuberculin skin test is applied and shows 8 mm of induration 48 hours later.
Which of the following is the most appropriate management?
a. Chest radiograph
b. Solation
c. Treatment with isoniazid for 9 months
d. No further evaluation or therapy

4) A 55-year-old man is screened for tuberculosis with a tuberculin skin test during a preemployment physical examination. Forty-eight hours later, he has 16 mm of induration at the site of the injection. He has never had a reactive tuberculin skin test and has no known exposure to tuberculosis. History shows no risk factors for tuberculosis. He has no other medical problems and takes no medications. Findings on physical examination and review of systems are normal.
Results of blood tests, including HIV and aminotransferase levels, are normal, as are the results of chest radiography.
Which of the following is the most appropriate management for this patient?

a. Administration of bacillus Calmette-Guérin vaccination
b. Testing with interferon-γ-releasing assay
c. Treatment with isoniazid for 9 months
d. Treatment with isoniazid, rifampin, pyrazinamide, and ethambutol for 9 months
e. Observation

5) A 35-year-old man is evaluated in the emergency department because of a 1-month history of chronic cough that produces blood-tinged sputum. He has no significant medical history. He works as a merchant mariner and travels frequently to Russia, India, and Southeast Asia.
On physical examination, the patient appears thin and ill. Temperature is 38.8°C (100.9°F), blood pressure is 125/75 mm Hg, pulse rate is 95/min, and respiration rate is 30/min. Crackles are heard over the upper lung fields. The remainder of the findings on examination are unremarkable.
Chest radiograph shows bilateral upper lobe cavitary lesions. Acid-fast bacillus is found on direct sputum smear.
Which of the following is the most appropriate therapy for this patient?

a. Ciprofloxacin, pyrazinamide, and ethambutol
b. Isoniazid and rifampin
c. Isoniazid
d. Isoniazid, rifampin, pyrazinamide, and ethambutol



1st Question: D

2nd Question: C

3rd Question: D

4th Question: C

5th Question: D