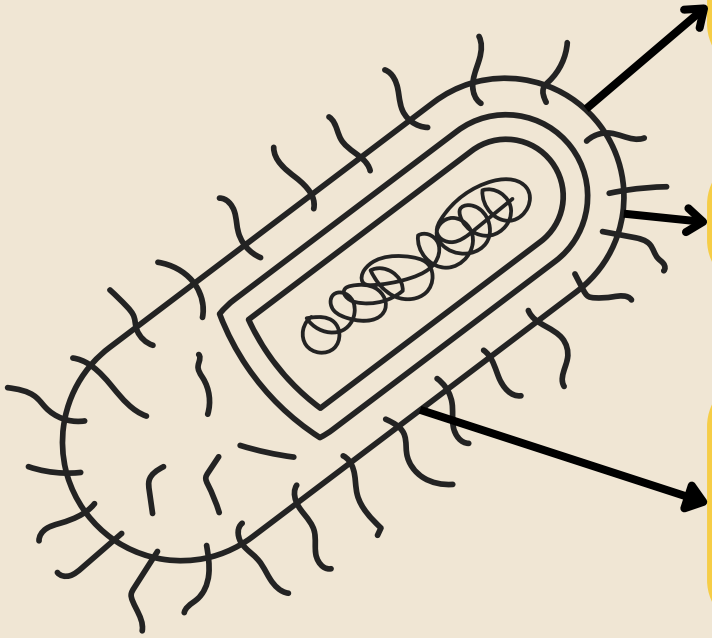
What is Tuberculosis

Notifiable Disease!

CHRONIC GRANULOMATOUS DISEASE CAUSED BY:	
Mycobacterium Tuberculosis	Inhalation of aerosol droplets containing bacterium
Mycobacterium Bovis	Drinking non-sterilised milk obtained from infected cows

More common

CHARACTERISTIC OF MYCOBACTERIUM TUBERCULOSIS



Rod shaped

Strict aerobes

Waxy cell wall
Contains mycolic acid

- Barrier against antibiotics
- Provides acid fast staining characteristics

Ziehl-Neelsen stain

TB - A SPECTRUM

LATENT TB

A state of persistent immune response to stimulation of *M. tb* antigen without clinical evidence of active TB

90-95%

- Asymptomatic
- Not infectious

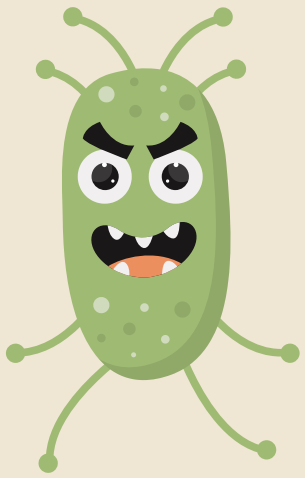
5-10%

PRIMARY TB

The form of disease that develops in a previously unexposed patient
In majority of healthy individuals

- Asymptomatic or self-limiting febrile illness

- Infectious



SECONDARY TB

Active infection caused by reactivation of latent disease OR reinfection

- Chronic cough, hemoptysis
- Fever
- Night sweats
- LOW, LOA
- Malaise

- Infectious

5%

PROGRESSIVE PRIMARY TB

Inability to mount an effective T-cell immune response to contain the primary focus
Usually in immunocompromised

MILIARY TB

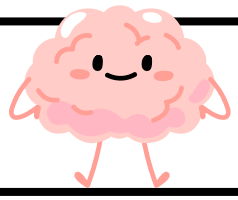
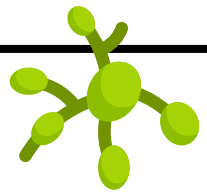
Swipe to read about miliary TB!

Milliary TB

CLINICAL DISEASE RESULTING FROM HEMATOGENOUS DISSEMINATION OF MYCOBACTERIUM TUBERCULOSIS

Pathogenesis

- Result of progressive primary infection *or*
- Reactivation of a latent focus with subsequent spread via the bloodstream

Extrapulmonary TB	Clinical Features
CNS 	• Meningitis • Tuberculoma
Lymphatics 	• Lymphadenitis (matted lymph nodes)
Gastrointestinal 	• Ileocaecal disease • Acute abdomen • Tuberculous peritonitis 
Bones and joints 	• Psoas abscess (large cold abscess) • Pott's disease (bone destruction → kyphosis) • Paravertebral abscess • Poncet's arthropathy (frequently affect knee / hip) 
Genitourinary 	• Hematuria • Frequency • Dysuria • ♀ Endometriosis, salpingitis, tubo-ovarian abscess • ♂ Epididymitis or prostatitis

Investigations for Tuberculosis

ACTIVE TB

Sputum sample

Smear microscopy Ziehl-Neelsen stain for acid-fast bacili

Initial investigation

Culture & susceptibility testing

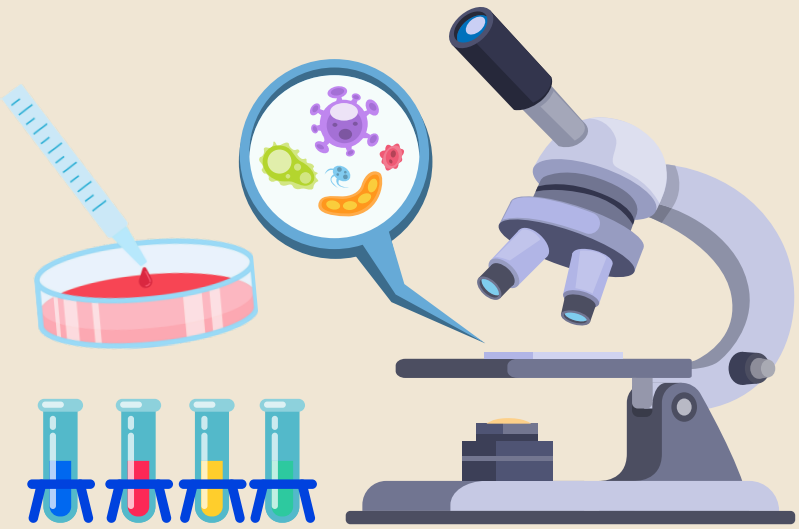
Gold standard for diagnosis

Nucleic acid amplification tests (PCR)

To detect rifampicin resistance if there is risk of multi-drug resistant TB

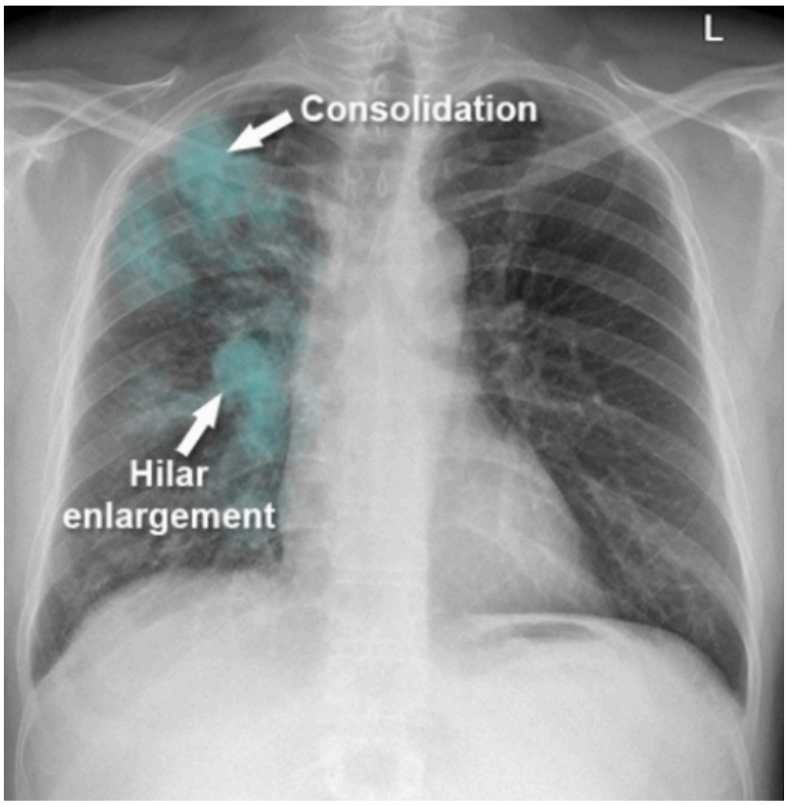
Chest X-ray

To aid in diagnosis and management



Swipe to find out CXR findings for TB!

CXR findings of TB



PRIMARY TB

Ghon focus

Peripheral consolidation, represents tuberculous caseating granuloma

Ipsilateral hilar enlargement

Tubercle bacili travel to regional lymph nodes causing lymphadenopathy

Ghon complex

Ghon focus + hilar enlargement

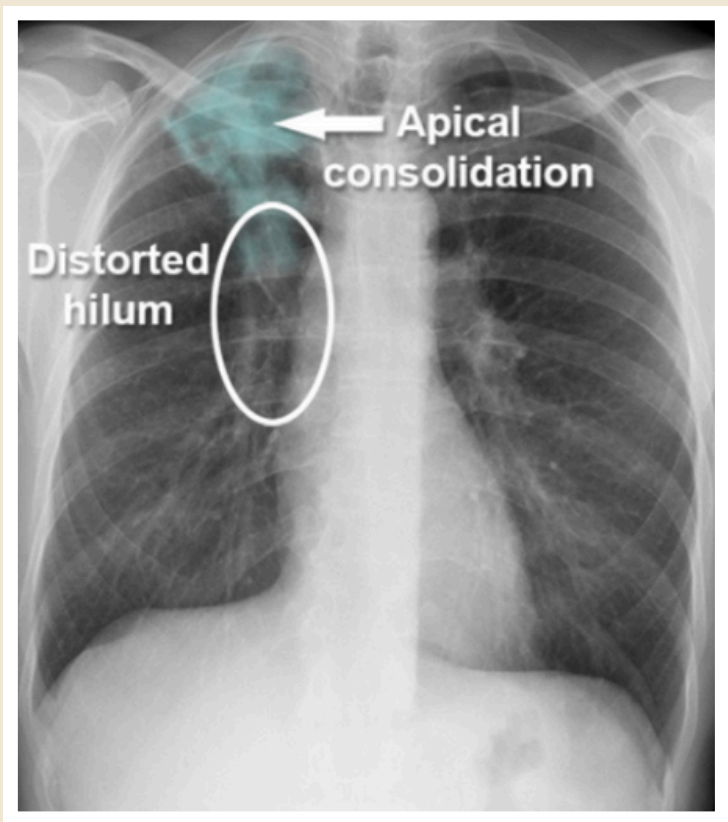
SECONDARY TB

Classically localised to the apex of upper lobes

Consolidation

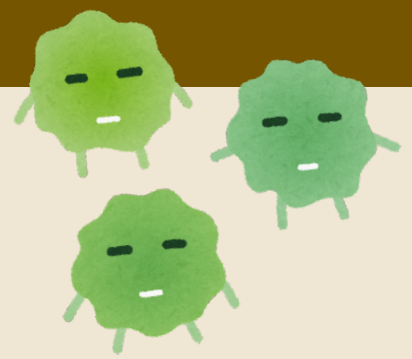
Cavitation

Cavities left by TB provide favourable conditions for inhaled Aspergillus, leading to **chronic pulmonary aspergillosis**



Investigations for Tuberculosis

LATENT TB

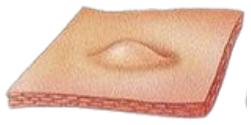
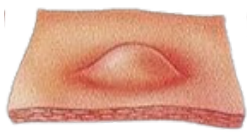


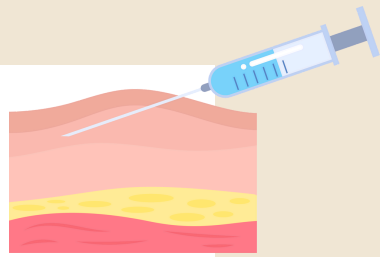
Criteria for diagnosing latent TB

✓ No clinical features suggesting active TB
✓ Normal / static CXR findings
✓ A positive TST / IGRA

Tuberculin skin test / Mantoux test

Intradermal injection of purified-protein derivative on forearm, test read 48-72 hrs later

Positive TST reaction		At risk groups
	⩾ 5 mm	• PLHIV • Organ tranplant recipients • Immunosuppressed persons
	⩾ 10 mm	• All other high risk patients including healthcare workers and children
	⩾ 15 mm	• Individuals from countries with low incidence of TB

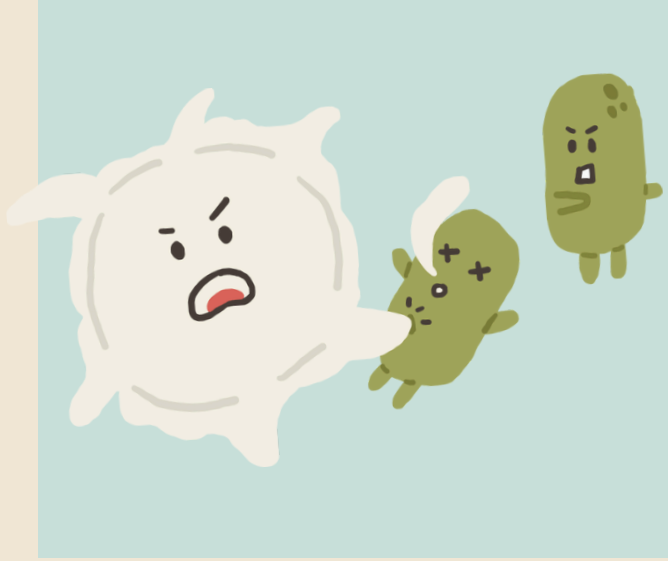
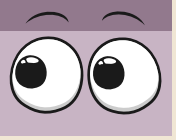


Interferon Gamma Release Assay - Quantiferon Gold Plus

Measures T-cell release of interferon gamma following stimulation by M. TB protein antigens

Management of TB

ANTI-TB REGIMEN: 2EHRZ/4HR

	INTENSIVE PHASE (2 MONTHS)	CONTINUATION PHASE (4 MONTHS)	SIDE EFFECTS
R	Rifampicin (R)	Rifampicin (R)	• Orange/red urine • Hepatitis
I	Isoniazid (H)	Isoniazid (H)	• Peripheral neuropathy • Hepatitis
P	Pyrazinamide (Z)		• Hyperuricemia (gout) • Hepatitis
E	Ethambutol (E) 		• Visual impairment • Optic neuritis • Reduced visual acuity • Colour blindness

DIRECTLY OBSERVED THERAPY (DOT)

Trained healthcare professionals supervise administration of TB medication

PYRIDOXINE (VITAMIN B6)

For isoniazid-induced neuropathy

TEST YOUR KNOWLEDGE!

A 57 year old man presents to the Emergency Department after suffering from 10 days of **fevers, sweats and productive cough** despite a course of oral antibiotics from his GP. He has **recently travelled to Vietnam** for a month to visit his family. He looks unwell. On further questioning, he describes 7kg of **recent weight loss and blood-stained sputum production.**

Choose the MOST LIKELY diagnosis from the options below

A. Pulmonary embolism

B. Tuberculosis

C. Horner's syndrome

D. Pleural effusion

REFERENCES

1. CPG Management of Tuberculosis (Fourth Edition)
2. Robbin's Pathologic basis of disease (9th edition)
3. Davidson's Principles and Practice of Medicine 22nd.
4. https://www.uptodate.com/contents/pulmonary-tuberculosis-clinical-manifestations-and-complications
5. https://www.uptodate.com/contents/tuberculosis-microbiology-pathogenesis-and-immunology
6. https://www.who.int/news-room/fact-sheets/detail/tuberculosis
7. https://www.cdc.gov/tb/topic/basics/signsandsymptoms.htm
8. https://www.radiologymasterclass.co.uk/gallery/chest/pulmonary-disease/tuberculosis_tb
9. https://www.baronerocks.com/~tocchet44/index.php/mnemonics/mnemonics-pharmacology/131-baronemnemonic-tb-drug-side-effects
10. https://www.radiologymasterclass.co.uk/gallery/chest/pulmonary-disease/tuberculosis_tb
11. https://www.jotscroll.com/forums/11/posts/160/different-forms-types-of-tuberculosis-tb-disease-and-their-symptoms.html
12. https://www.cdc.gov/tb/topic/testing/tbtesttypes.htm