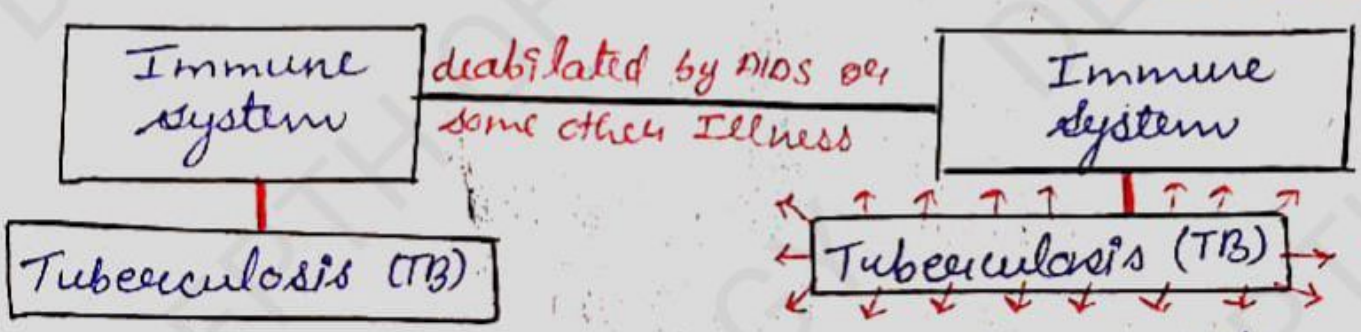
Tuberculosis

world wide 2 billion are affected with Mycobacterium Tuberculosis (TB)

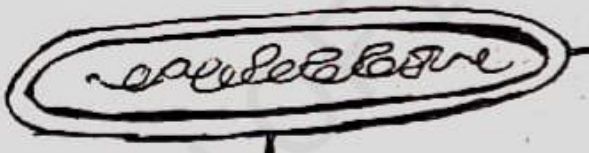
* 90-95% are not aware that they are Infected.



Latent Infection

Active Infection

Mycobacterium Tuberculosis (TB) →



→ Rod shaped
→ Need O_2 to survive (strictly aerobic)
→ waxy cell wall (Mycolic Acid)

wall is hard → resist weak disinfectant
→ survive on dry surface

This Myco. Tub. transmitted via Inhalation

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enters into lungs

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TB can avoid and crass the mucus trap.

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& goes in Alveoli

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with TB. they recognize foreign proteins on their cell surface and phagocytize them are essentially package

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them into a space called a Phagosome

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Most cases Alveoli macrophage fuses the phagosome with a lysosome which has hydrolytic enzyme that can breakdown any biochemical molecule. [DEPTH OF BIOLOGY]

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Tb's is tricky though once inside the macrophage they produce a protein that inhibits this fusion which allows the mycobacterium to survive it doesn't just though it proliferates and creates a localised infection

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At this point person has developed Primary Tuberculosis.

Sign of Infection after exposure

At this stage most are asymptomatic or may be have amid flu-like Illness.

* About 3 weeks after Initial infection cell mediated Immunity kicks in [DEPTH OF BIOLOGY]

& Immune cells surrounds the site of TB infection creating a granuloma (attempt to wall of the of the Bacteria and prevent it from spreading).

→ The tissue inside the middle dies as a result a process refered to as Caseous Necrosis (Means cheese like necrosis (since the tissue (dead) is soft, white and a bit looks like cheese) [DEPTH OF BIOLOGY]

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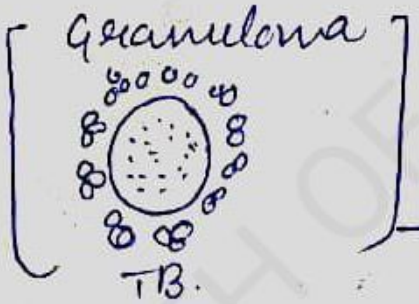

This area is Ghon focus.

→ TB also get nearby lymph Node by direct expansion of ghon focus infection

Ghon focus + lymph Nodes → Ghon complex.

→ Ghon complex → Sub pleural
→ occur in lower lobes of the lung.

→ The tissue which encapsulated by the granuloma undergoes fibrosis and calcification.

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producing scar tissue that can be seen on x-rays.

→ This calcified Ghon complex is called a ranke complex.

→ In some cases scar tissue remain left even mycobacterium dies by Immune System.

Other Cases

→ TB remain viable (& still alive) but they are just Dormant

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If person's immune system is weak by some bacterial or viral attack like AIDS or with Aging

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Ghon focus can become reactivated and spread to one or both upper lobes of the lungs.

∴ Oxygenation is greatest in these areas.

Now our T-cells Immediately (sec. Immune response) release cytokines to try and control new outbreak which form more areas of Caseous Necrosis.

This time it form cavities which can allow the bacteria to disseminate.

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Or spread through the airways and lymphatic channels to other parts of the lungs which lead to Bronchopneumonia.

→ But it can also spread via the Vascular system and infact almost every other tissue in the body called Systemic miliary T.B.

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When TB spreads to the other tissue it causes complication related to organ affected

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* Kidney are commonly affected (High levels of WBC in urine)
* Meninges in Brain can suffer Meningitis
* Lumbar vertebrae can have Pott's Disease
* Adrenal Gland ⟶ Addison disease
* Liver ⟶ Hepatitis
* Cervical Lymph Node ⟶ Lymphadenitis in Neck

Diagnostic Evaluation

① Purified Protein derivative (PPD)

- Intradermal skin test, Tuberculin test, TB test)

Positive = exposed at some point

② Interferon Gamma release Assay (IGRA)

(looks for evidence in blood.

→ If ① and ② Both are +ve or any one is +ve

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Then we go for

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Chest X-Ray (To look for Signs of Active TB)

Symptoms

① Fever
② Night sweats
③ Cough with Blood ⟶ Hemoptysis
④ Weight loss.

* It is important to collect sample by Sputum or Bronchoalveolar lavage

→ In this Bronchoscope is Inserted through the mouth or nose into the lungs and collect sample

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This sample can sent to lab for staining culture and PCR to look evidence of Mycobacterium tuberculosis.

Treatment :-

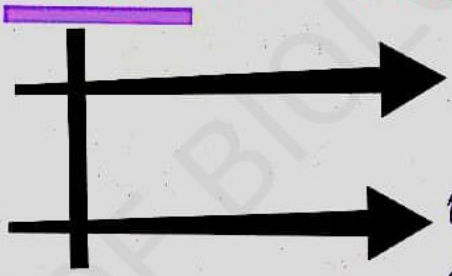
① Latent Infection ⟶ Single drug for long time eg → Isoniazid for 9 months

② Active Infection ⟶ Combination of Antibiotics

*Kept on medication for many months.

- Patient non-infectious within weeks

*Adult with reactivated TB Host Infections.



kept in negative pressure rooms

use N95 masks → do not allow aerosol to pass.

Drug Resistant TB (DRTB)

- MDRTB ⟶ Multi drug resistant TB
- XDRTB ⟶ extremely drug resistant TB.

These are harder to treat since they (infection) do not die by Antibiotics.