

خفيفة لطيفة !!! الله يرحمها نادية مرتة لآبو عصام كان عندها السل ...



Ghada Alzoubi

Mycobacteria

✓ **In general :**

- rod-shaped, obligate aerobe, facultative intracellular bacteria that do not form spores.
 - Non motile , not capsulated
 - 3 types of species that cause diseases in humans:
 1. Mycobacterium tuberculosis complex→11 members
 2. Mycobacterium leprae →a causative agent of leprosy
 3. Non-Tuberculous (NTM) Mycobacteria →environmental mycobacterium
-
-

Mycobacterium tuberculosis

✓ **General information :**

- Called →White plaque , consumption [weight loss]

✓ **Includes :**

M. tuberculosis (principle) , M. africanum (Africa) , M. microti (micrometer) , M. pinnipedii (انناس) , M. suricate (as a top secret) , M. mung(mango) , M. oryx (larynx) , M. canetti (قناتي، ههاي بمزح بس احفظوها) , M. caprae (red carpet) , Mycobacterium bovis , Mycobacterium dassie (الديسي سهلة) .

✓ **Morphology** →Acid fast bacilli , The growth rate is much slower than that of most bacteria.

✓ **Transmission** →airborne infectious disease

✓ **Diagnosis** →The Gold standard diagnosis is culture

- not definitive : CBC (Rise on WBCs) , X-ray (You can see the Ghori complex Hilar lymph node)
- Definitive : culture
- We can also Tuberculin skin test [purified protein derivative, Type 4 hypersensitivity reaction]+Interferon-gamma release assays [Positive IGRA test : >25]

✓ **Treatment** →

- depends on whether the individual is in the latent or active stage
- This treatment is given for about (6-12) months
- a mixture of multiple drugs, with an intensive initial 2-month phase followed by a slower 4 to 6 months continuation phase
- anti-tuberculosis drugs :
Isoniazid , rifampin, pyrazinamide , (either ethambutol or streptomycin)

✓ **Prevention** →BCG vaccination

✓ **Clinical manifestation**→weight loss , haemoptysis , dyspnea

→Primary(active) happens in the middle and lower lobes while Reactivation happens in the apex of the lobe

→We have Ghon focus and Ghon complex

• granuloma formation occurs in the node

•If calcification happens then we called it Ghon focus

•if Ghon focus affect drainage lymphnode we called it Ghon complex

→If the patient has a resistance for isoniazid and rifampin, we call this case a multi-drug resistance.

→Isoniazid preventive therapy(IPT) is the recommended treatment for latent TB

Culture	Pathogenesis	Cell wall	Virulence factors	Epidemiology
<p>3 types:</p> <p>-Semisynthetic agar media: Middlebrook 7H10 and 7H11 (Selective medium- colonies that are white, creamy, fuzzy)</p> <p>-Inspissated egg media: Löwenstein-Jensen (Inspissated egg media and malachite green dye is added- which inhibits the growth of most contaminants but permit only Mtb.)</p> <p>-Broth media: Middlebrook 7H9 and 7H12</p> <hr/> <p>-A typical mycobacterium colony, its unique in a way. It's described as raised, rough and CLUMPED</p>	<p>-Mycobacteria are in droplets when infected persons cough, sneeze, or speak.</p> <p>-Inside the alveoli, the host's immune system responds by release of cytokines and lymphokines that stimulate monocytes and macrophages.</p> <p>-Mycobacteria begin to multiply within macrophages</p> <p>-The cells form a barrier shell, called a granuloma</p>	<p>It has :</p> <p>-plasma membrane</p> <p>- 2 layers: An inner layer composed of PG+AG+MA (covalently linked together) And outer layer</p>	<p>-Lipoarabinomannan -Secretion system -sulfatides -trehalose dimycolates (Mycolic acids) → Cord Factor</p>	<p>- Latent TB : (Living dormant) doesn't show symptoms and signs , , reactivate and cause the disease.</p> <p>- ACTIVE TB: 1) primary active disease 2) secondary- from reactivation of latent TB</p> <p>→ Examples on countries with high rates : South Africa, Switserland and the Soviet Union countries. → Pulmonary TB is the most common. → Spread – Lymphatic vs hematogenous (Miliary).</p>

Additional information

- ✓ Side effects of these drugs [isoniazid, rifampin, pyrazinamide & ethambutol/ streptomycin] : Hepatotoxicity , nephrotoxicity , ototoxicity
- ✓ Primary Infection and Reactivation Types of Tuberculosis:
 - An acute exudative lesion develops and rapidly spreads to the lymphatics and regional lymph nodes. The exudative lesion in tissue often heals rapidly.
 - In primary infections, the involvement may be in any part of the lung but is most often at the base.
 - The reactivation type is usually caused by tubercle bacilli that have survived in the primary lesion
 - The reactivation type almost always begins at the apex of the lung, where the oxygen tension (PO₂) is highest.
 - Positive TB depending on the diameter of the induration:
 - If- induration size > 15 mm (normal healthy individual)
 - Induration size > 10 mm (intermediate risk group like health care providers)
 - Induration size > 5 mm (HIV patient) [which makes sense as we don't expect patient with HIV to have large induration due to compromised immunity].

nontuberculous mycobacteria

-The most common type of nonchromogens is mycobacterium tuberculosis

classified by two criteria:

1. according production of pigment: [produce in]
 - Photochromogens → in presence of light
 - Scotochromogens → either presence or absence of light
 - Nonchromogenic → neither in presence nor absence of light
2. according rate of growth
 - Rapidly growing
 - Slowly growing

EXAMPLE:

1. **M. ulcerans** → Photochromogens + Slowly growing (Cause skin and soft tissue infection)
2. **M. marinum** → Photochromogens + Slowly growing (Cause Aquatic Granuloma / In pateints who work with fish)
3. **M. kansasii** → Photochromogens + Slowly growing (Cause Pulmonary disease)
4. **M. scrofulaceum** → Scotochromogens + Slowly growing (cause lymph node inflammation Without lung infection)
5. **M. avium complex** → Nonchromogenic , Slowly growing (common in AIDS)
6. **M. chelonae-abscessus** → Rapidly growing (Causes skin infection)
7. **M. fortuitum Complex** → Rapidly growing (Causes Pulmonary infection)