

Lab/7

B/Gram + bacilli (Corynebacterium diphtheriae and mycobacterium tuberculosis)

Corynebacterium diphtheriae

Corynebacteria are small, slender, pleomorphic, gram-positive bacilli & Chinese letters. They are non motile, un encapsulated, and do not spore formation, catalase positive , oxidase negative containing chromatin granules called volutin granules or Babes- Ernest granules present in cytoplasm (staining by Albert stain).



The genus *corynebacterium* have many species represent normal flora of human skin and mucous membranes such as *C. hoffmanii*, *xerosis* and *diphtheriae*

corynebacterium diphtheriae is the principle human pathgen with its exotoxin which filtratation to circulation system and infected the heart muscles and produce diphtheria in human.

 pdfelement

C/Gram + bacilli spore forming

Bacillus anthracis

It is gram-positive rods, nonmotile, encapsulated, **spores forming**, and facultative aerobes.

Pathogenesis:

B. anthracis possesses a capsule that is antiphagocytic and is essential for full virulence. The organism also produces three exotoxins;


edema factor is responsible for the severe edema usually seen in *B. anthracis* infections;

lethal toxin is responsible for tissue necrosis;

protective antigen mediates cell entry of edema factor and lethal toxin


Laboratory identification:

B. anthracis is easily recovered from clinical materials. Microscopically, the organisms appear as blunt-ended bacilli that occur singly, in pairs, or frequently in long chains. They do not sporulate often in clinical samples, but do so in culture. The spores are oval and centrally located. On blood agar, the colonies are large, grayish, and nonhemolytic, with an irregular border.



Gram (+) rods

Bacillus species



Gram stain of *Bacillus anthracis* culture smear showing typical bacilli with highly refractile unstained spores.

● **Gram-positive**

- Blunt-ended bacilli that occur singly, in pairs, or frequently, in long chains
- Form endospores—oval and centrally located
- Non-motile; have capsule that is antiphagocytic
- Facultative or strictly aerobic organisms
- Culture on blood agar


Bacillus anthracis

- **Cutaneous anthrax**


Penicillins	1	Doxycycline
Tetracyclines	1	Erythromycin
Macrolides	1	Ciprofloxacin
Fluoroquinolones	1	

- **Pulmonary anthrax (wool sorter's disease)**

Multidrug therapy (ciprofloxacin plus rifampin plus vancomycin) is recommended.



Cutaneous anthrax



Chest radiograph of a patient with pulmonary anthrax, showing widening of the mediastinum.

Clinical significance

1. **Cutaneous anthrax:** About 95% of human cases of anthrax are cutaneous. Upon introduction of organisms or spores that germinate, a papule develops. It rapidly evolves into a painless, black, severely swollen malignant pustule, which eventually crusts over. The organisms may invade regional lymph nodes and then the general circulation, leading to fatal septicemia. Although some cases remain localized and heal, the overall mortality in untreated cutaneous anthrax is 20%.
2. **Pulmonary anthrax** (wool sorter's disease) is caused by inhalation of spores. It is characterized by progressive hemorrhagic lymphadenitis (inflammation of the lymph nodes), and has a mortality rate approaching 100 percent if left untreated.

***Mycobacterium tuberculosis* or tubercle bacillus (TB)**

TB is long, slender rods, aerobic that are non motile and do not spore formation. TB have thick cell walls, they are high lipid, (mycolic acids)

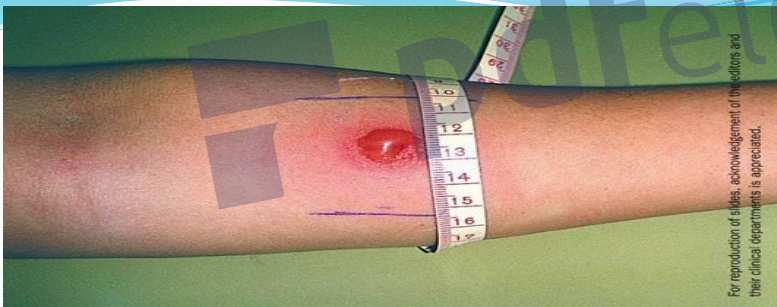
Mycobacterium tuberculosis causes tuberculosis

Mycobacterium leprae causes Leprosy

A microscopic search for acid-fast bacilli using the **Ziehl-Neelsen stain** is the most rapid test for mycobacteria.

Culture: Lowenstein-Jensen medium , appear white color with mucoid

Tuberculin test : In the routine procedure, a measured amount of PPD (purified protein derivative) is injected intr-dermally in the forearm. It is read 48 to 72 hours later for the presence and size of an area of induration (hardening) at the site of injection, which must be observed for the test to be positive.



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