

University of Anbar

College of Medicine

Microbiology Department

Bacillus anthracis

B. anthracis is an aerobic gram-positive rods shape singles or chains with central spores , capsulated , non-hemolytic, non-motile ,large, gray flat colonies with irregular margins (filamentous projections – Medusa head) on blood agar. ***B. anthracis*** causes anthrax in human.

Diagnosis of *Bacillus anthracis*

1-Specimen collection : specimens collection are CSF, lymph node biopsy, vesicular fluid, Blood cultures, pus, stool, rectal swab, and sputum.

2-Direct smear examination (Stained smear): by taken from local lesions or blood and examine under the microscope, chains of large gram positive rod shape are often seen. Anthrax can be identified in direct smears by immunofluorescence staining technique.

3-McFadyean's reaction is a special staining reaction, demonstrating a pink capsule around a blue cell, after staining with methylene blue, which is used as a presumptive diagnosis for anthrax in a blood smear

4-Culture: *Bacillus anthracis* grow on blood agar and incubated for 15-24 h at 35-37°C ,produce Non-hemolytic, non-pigmented, flat or slightly convex colonies, edge irregular with comma projections, “**Medusa Head**”.

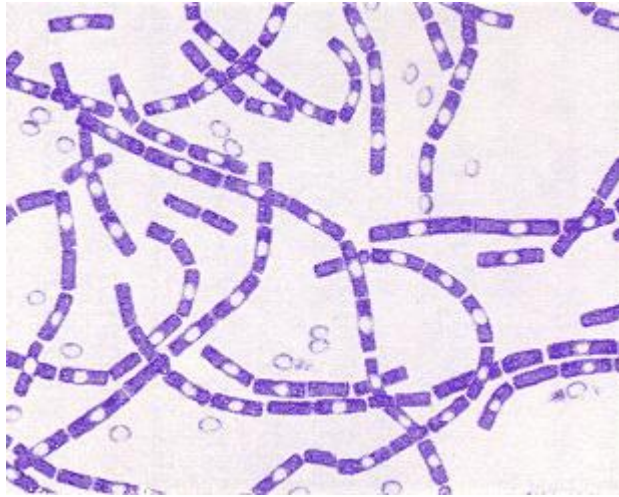
5-Gram stain: *Bacillus anthracis* is gram-positive rod shape.

6- Motility test: *Bacillus anthracis* is non-motile.

7-Ascoil test: means a precipitin test for anthrax using a tissue extract and anthrax antiserum.

8-Serological tests: ELISA ,hemagglutinating antibodies can be demonstrated in the serum of vaccinated or infected persons.

9-Molecular test:PCR



Bacillus anthracis: Gram-positive, spore-forming rods.



B. anthracis colony characteristics:

B. anthracis incubated at 35 °C overnight produce 2-5mm of colony without carbon dioxide

Non-hemolytic, non-pigmented, dry ground glass surface, edge irregular with comma projections, "**Medusa Head**".

Bacillus cereus

Bacillus cereus is Gram-positive, rod-shaped, motile, beta hemolytic bacterium. Some strains are harmful to humans and cause food poisoning .while other strains can be beneficial as probiotics for animals. *B. cereus* bacteria are facultative anaerobes can produce protective endospores.

Diagnosis of *Bacillus cereus*

1-Specimen collection: to diagnose food poisoning must culture suspected food not stool.

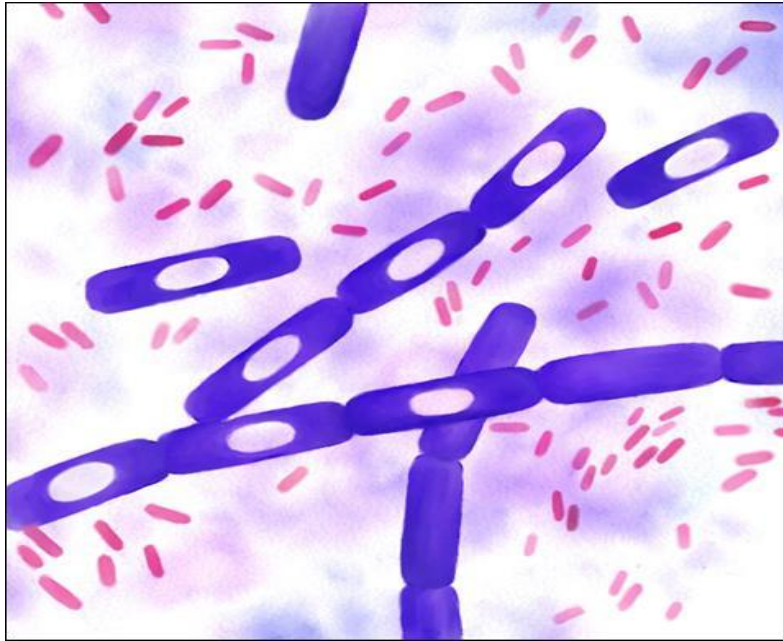
2- Gram stain : large, gram-positive rods with spores.

3-Colony morphology : beta-hemolytic; large, on blood agar .

4-Motility test : Motile

5- Catalase test :catalase-positive





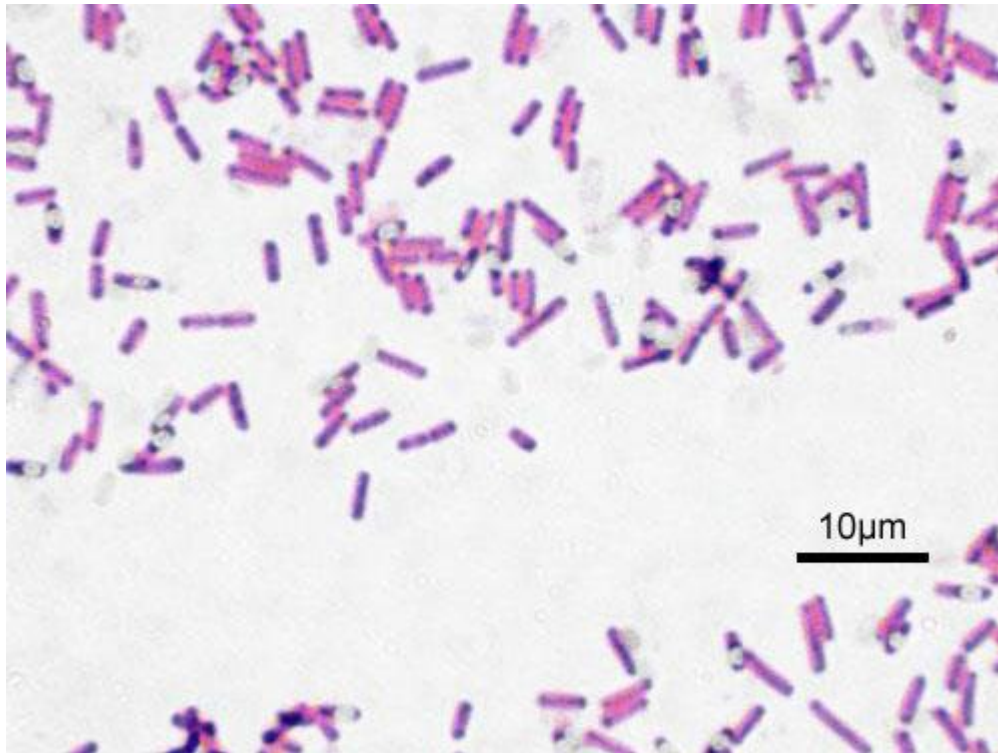
Bacillus cereus is gram-positive rod spore forming

The different between *Bacillus anthracis* and *Bacillus cereus*

Characteristic	<i>B. anthracis</i>	<i>B. cereus</i>
growth requirement for thiamin	+	-
hemolysis on blood agar	-	+
capsule	+	-
motility	-	+
M Fadyean's reaction	+	-

Bacillus subtilis

Bacillus subtilis is a Gram-positive bacterium, rod-shaped and catalase-positive, spore forming. *B. subtilis* is a facultative anaerobe^[7] and had been considered as an obligate aerobe and it is motile.



Bacillus subtilis is gram-positive rod spore forming