Spore forming-bacilli
Bacillus anthracis

• Gram-positive

• Large, Spore forming rods, in chains

• Human pathogen

• Zoonosis

• Other Bacillus spp. are ubiquitous, Soil, water, and airborne dust (anthracoids)

• Produce endospores
The Spore

- Sporulation requires
  - Poor nutrient conditions
  - Presence of oxygen
Bacillus anthracis

Pathogenicity

The Anthrax Cycle

- Cutaneous
- Biting Fly: From infected animal
- Inhalation
- Ingestion
- Vegetative Forms: Bacteria in animal waste and decomposition
- Exposure to oxygen

Anthrax Spores

- Cutaneous

Pathogenicity:

Virulence factors

Capsule (poly-D-glutamic acid)

- Plasmid-coded exotoxins:
  - Protective antigen
  - Oedema factor
  - Lethal factor
Anthrax clinical presentations

A. Cutaneous anthrax
   - blister (malignant pustule)
   - Fatal septicaemia and meningoencephalitis
   - Mortality rate is about 20%

B. Pulmonary anthrax (*wool-sorter’s disease*)
   - Hemorrhagic lymphadenitis
   - Hemorrhagic mediastinitis
Anthrax clinical presentations

C. Enteric anthrax
   • A severe form of gastroenteritis
   • High mortality

D. Meningoencephalitis
Diagnosis

• Precautions

  – *B. anthracis* is a high risk infectious pathogen

  – Sterilization
Diagnosis

• The capsule:
  – From clinical specimens
  – (McFedyean reaction)

• The spores:
  – *In vitro* aerobic cultures
Diagnosis

- Smears should be chemically fixed by potassium permanganate
- blunt-ended bacilli, singly; in pairs; or frequently in long chains
- Catalase test
- Blood agar
- Direct fluorescent antibody (DFA) test
- Gelatin stab culture
Anthrax vaccine

- Attenuated strain of *B. anthracis*
**Treatment**

- Multidrug therapy (ciprofloxacin + rifampin + vancomycin)

**Prevention**

- Post exposure prophylaxis with ciprofloxacin
- Autoclaving for decontamination
Bacillus cereus
• Large rods

• Heat resistant spores

• *Bacillus cereus* enterotoxins causes food poisoning

• Opportunistic infections
Food poisoning has two forms:

1. **Emetic form**
   - Incubation period
   - Lasts 8-10 hours

1. **Diarrheal form**
   - Incubation period
   - Lasts 20-36 hours
Diagnosis

• Blood agar

• Gelatin stab culture

• Spore stains
  – In the Malachite green stain
  – In the Nigrosine stain
Antibiotic sensitivity

- Gentamycin
- Erythromycin
- Vancomycin
- Clindamycin