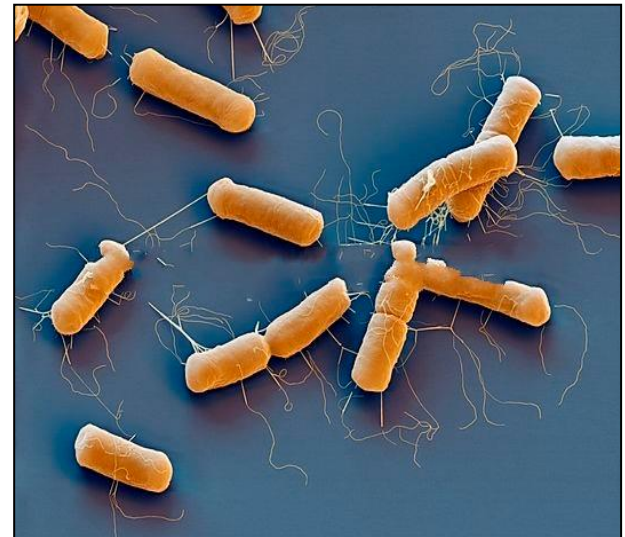
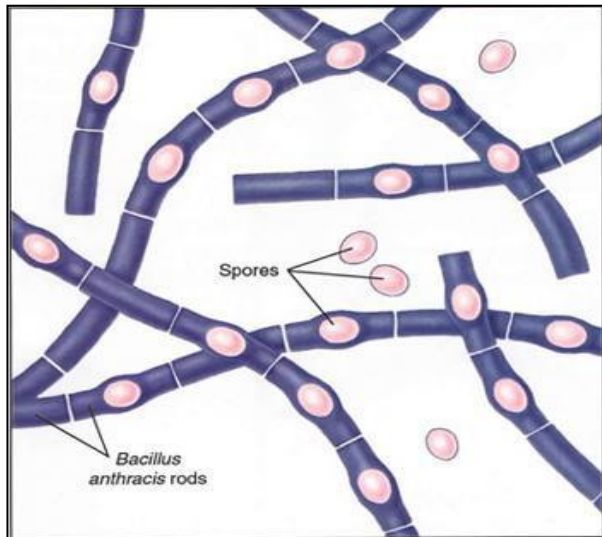


# Medical Bacteriology- Lecture7

## Spore- forming Gram Positive Rods Bacillus



# Bacillus

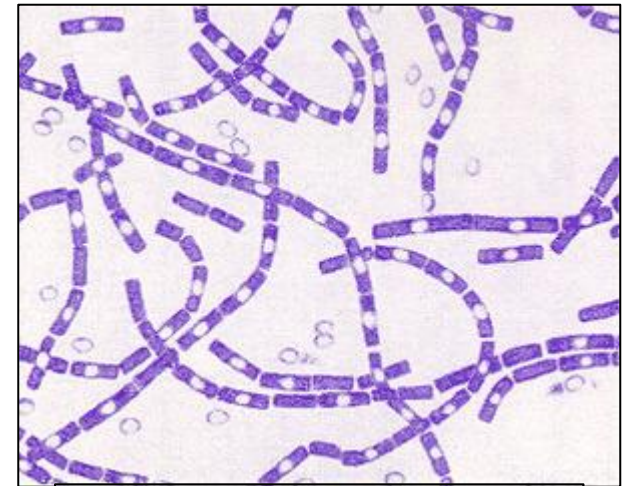
- **Characteristics**
- Gram positive
- Large rod.
- Long chain
- Spore forming
- Aerobic or facultative anaerobic
- Found in soil habitats
- Cultivated in ordinary nutrient medium (nonselective & selective media)

# *B. anthracis*

- Large, square- ended rods
- **Non motile**
- **Capsulated**
- **Non hemolytic on blood agar**



***B. anthracis* colonies on blood agar and on nutrient agar**



***B. anthracis* gram stain**

## *B. anthracis* disease ( Anthrax)

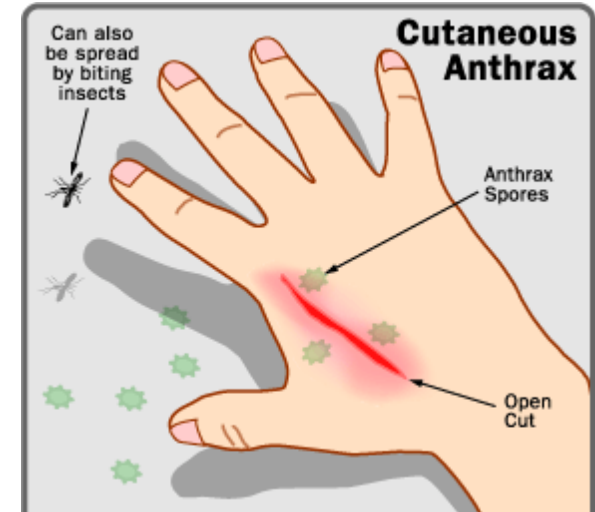
- Zoonotic (occupational ) disease
- Transmitted to human via contact with infected animal or their product.
- The most common forms of the disease in humans are;
- Cutaneous anthrax ( malignant pustule) ----- (Skin)
- Pulmonary anthrax ( Wool sorter's disease) ---- ( inhalation)
- Gastrointestinal anthrax ----- (contaminated food)

# Human Anthrax

## 1- Cutaneous anthrax

acquired via **injured skin**.

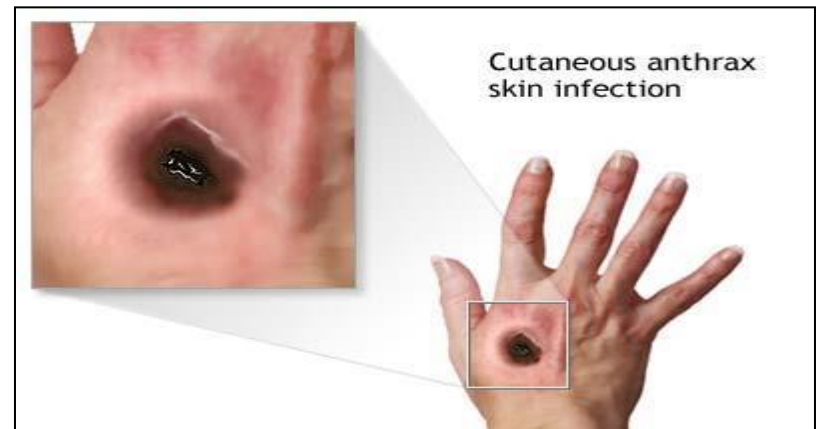
exposed area (face or neck or arm)



Spore → germinate → vegetative cells → multiply → **Gelatinous edema**



**Septicemia** ← **Necrotic ulcer** ← **Malignant pustule** ← **Vesicle** ← **Papule**



# Human Anthrax

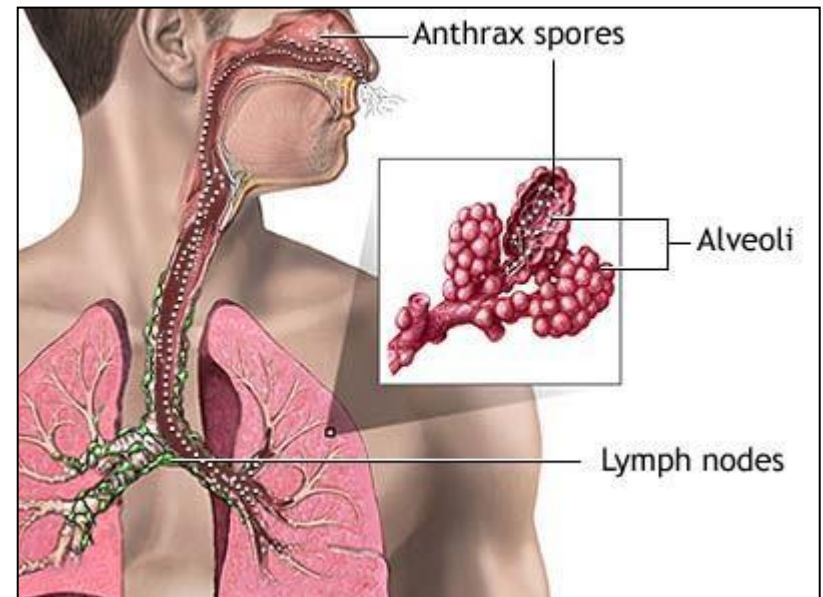
## 2- Inhalation anthrax (wool sorter's disease)

**inhalation** of spore-containing dust of animal hair.

The disease begins with high fever and chest pain.

It progresses rapidly to a systemic hemorrhagic pathology

- **Most contagious**
- High mortality rates

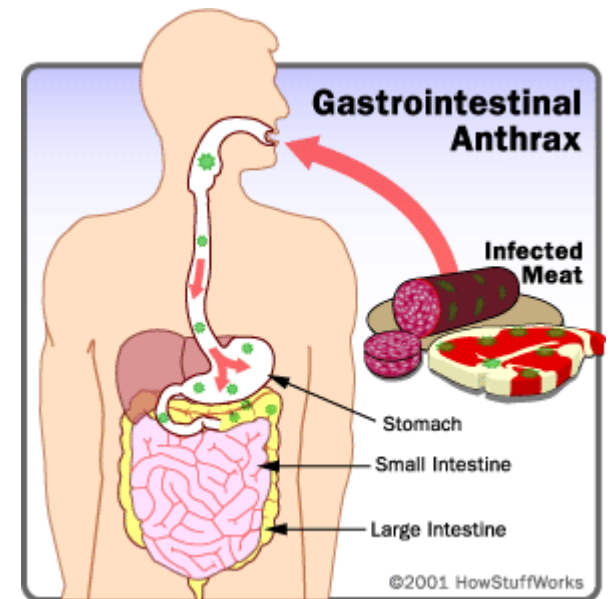


# Human Anthrax

## 3- Gastrointestinal anthrax

Results from the ingestion of poorly cooked meat from infected animals.

- Similar to cutaneous anthrax but occurs on the intestinal mucosa.
- **Very rare**



## *B. anthracis* Virulence factors

- 1- **Poly-D-glutamyl Capsule** ( major virulence factor)
- 2- **anthrax exotoxin** (Edema factor, Lethal factor, Protective factor.)



# Treatment and prevention

- **Treatment:**

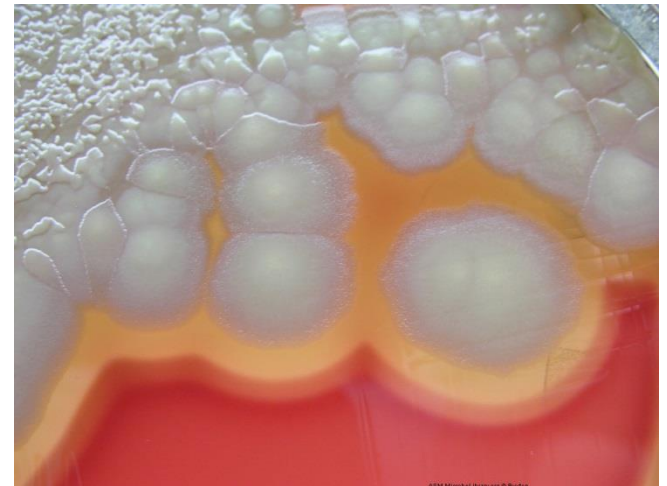
- Penicillin, ciprofloxacin
- 

- **Immunization**

- **Animal.....** live attenuated spores vaccine
- **Workers at risk of exposure.....**Anthrax vaccine absorbed

# *Bacillus cereus*

- It can be isolated from foods such as grains and spices
- **Causes food poisoning : two types**
- **Motile**
- **Beta hemolytic**
- **Non capsulated**



**Beta hemolytic colonies of *B .cereus***

## ***B. cereus* food poisoning types**

	<b>Short incubation (emetic form)</b>	<b>Long incubation ( Diarrheal form)</b>
<b>Clinical manifestation</b>	nausea, vomiting and abdominal cramps.	abdominal cramps and diarrhea
<b>Incubation periods</b>	1-6 hrs	8-16 hrs
<b>Similar with</b>	<i>S. aureus</i> food poisoning	<i>Clostridium perfringens</i> food poisoning
<b>Toxin mediated</b>	heat-stable emetic toxin	heat-labile diarrheagenic enterotoxin and/or hemolytic enterotoxin HBL

# Treatment

- Tetracycline, Erythromycin

# Differential Characteristics of *B. anthracis* & *B. cereus*

Characteristic	<i>B. anthracis</i>	<i>B. cereus</i>
Thiamine requirement for growth	+	-
Hemolysis on blood agar	Non-hemolytic	beta hemolytic
Capsule	+ (glutamyl polypeptide)	-
Motile	-	+
Produce enterotoxins	-	+
Gelatin hydrolysis	-	+