**Food borne intoxications: Bacillus**

Mainly two species of Bacillus are known to cause food intoxications: ***Bacillus anthrax*** and ***Bacillus cereus***. These are **Gram-positive spore-bearing rods** that are transmitted through spores which can survive for long period of time.

* ***Bacillus anthrax***: **Robert Koch** discovered the organism for the first time. The disease is mainly spread through **spores via contamination, inhalation or ingestion** and characterized as a zoonotic disease. The organism is non-motile and appears as sticks surrounded by capsule when seen under microscope. The toxins secreted by these organisms are made up of three proteins: **lethal factor, edema factor and protective factor** that exhibit high rate of fatality. The organism resides within the animals which act as the main source of transmission and infect the humans when they come in contact with them. The secretions from **mouth, nose and feces** of animals lead to production of spores in the soil which further produce toxins. **Gastrointestinal anthrax** occurs upon ingestion of uncooked food or the meat of animals dying due to anthrax.
* ***Bacillus cereus***: The organism mainly affects the starchy food and known to cause two types of illnesses owing to the production of distinct type of toxins: **emetic illness** characterized by nausea and vomiting caused due to the toxin, **cereulide** and **diarrheal type** which is attributed to the synthesis of three toxins: **hemolysin BL (Hbl)**, **nonhemolytic enterotoxin (Nhe)**, and **cytotoxin K (CytK)**. The **emetic type** is often associated with boiled or fried rice with an incubation time of **1 to 6 hours**, while the **diarrheal type** is associated with a wider range of foods with an incubation of **4 to 16 hours**.

**Transmission**: The micro organism enters the host cell and multiplies in the intestinal wall, enters the blood stream and spreads in the entire body which leads to septicemia followed by shock and coma which results in death in severe cases. Since the toxin once formed cannot be removed easily, patients with strong immune system can help to combat this disease which might take few days to several weeks to fully recover if proper care is taken. However, the number of microorganisms and their multiplication can be minimized to great extent if detected in initial stages by using various antibiotics (**Tetracycline, ciprofloxacin and erythromycin**).

**Prevention**:

* The live attenuated vaccine was prepared by **Pasteur in 1881** (by growing anthrax bacilli at 42-43°C).
* Later **Sterne** used anthrax bacilli’s spores for preparation of vaccine which proved to be effective in animals.
* In case of aerosol exposures (e.g. bioterrorism attack), post exposure prevention is mandatory by using antibiotics like **penicillin G, ciprofloxacin, levofloxacin and doxycycline** etc.
* Immunization with the **vaccination**
* **Health agencies** must be reported immediately for the proper treatment.
* Animals harboring the micro organism must be buried in such a way that **soil is not contaminated**