

### Spore-forming Bacilli Toxin (*Clostridium*)

#### ➤ Spore-forming Bacilli including *Bacillus* & *Clostridium*

#### *Clostridium*

- ❖ *Clostridium* Anaerobic spore forming Gram positive bacilli
- ❖ Spores are wider than the body giving **spindle shape**.
- ❖ Spores located terminally or sub terminally.
- ❖ Most clostridia are motile by peri-trichous flagella.
- ❖ Causes **diseases** such as gas gangrene, tetanus, pseudo- membranous colitis and botulism by producing toxins which attack the **neurons pathways**.

#### A- *Clostridium perfringens*

*C. perfringens* is Large Gram-positive bacilli with stubby ends and Capsulated. Non motile & Anaerobic and Grown quickly on selective media. Can be identified by **Nagler reaction**. *Cl. perfringens* destroyed by boiling. Including 8 types of toxin:

1. Alpha toxin (CPA)
2. Beta toxin 1& 2 (CPB) & (CPB2)
3. Epsilon toxin (ETX)
4. Iota toxin (ITX)
5. Enterotoxin (CPE)
6. Perfringolysin O toxin (PFO)
7. Lamba toxin
8. Delta toxin

#### B- *Clostridium botulinum*

*Cl. botulinum* produces (**A, B, C, D, E, and F**) dangerous toxins (botulinum toxins) under low-oxygen conditions. Botulinum toxins are one of the most lethal substances and **causes** block nerve functions lead to respiratory and muscular paralysis.

#### C- *Clostridium. tetani*

*C. tetani* produces two exotoxins, **tetanolysin** and **tetanospasmin**. Tetanospasmin is a neurotoxin and causes the clinical manifestations of tetanus. Tetanospasmin, referred to as **tetanus toxin**,

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Clostridia	Toxin	Disease
<b>A- Gastrointestinal tract</b>		
<i>C. perfringens</i>	Enterotoxin	Food intoxication, diarrhea, sudden infant death
	Beta toxin	Necrotic enteritis
<i>C. difficile</i>	Ted A + Ted B	diarrhea + colitis
<i>C. botulinum</i>	A, B, E	Human botulism
<b>B- Wound-related diseases</b>		
<i>C. perfringens</i>	Alfa toxin	Gangrene, sepsis
<i>C. tetani</i>	TeNT	Tetanus
<i>C. botulinum</i>	A + B	Wound botulism

**Laboratory diagnosis**

Clostridium Species	Spore	Motility	Lecithin C	Lipase hydrolysis	Proteolytic Activity	Ferment Lactose
<i>C.tetani</i>	<b>Round Terminal (drum stick)</b>	Motile	-Ve	-Ve	-Ve	-Ve
<i>C.perfringens (A-E types)</i>	Oval, sub-terminal	<b>Non-motile</b>	<b>+Ve</b>	-Ve	-Ve	<b>+Ve</b>
<i>C.botulinum (Type A, B, F)</i>	Oval, sub-terminal	Motile	-Ve	<b>+Ve</b>	<b>+Ve</b>	-Ve
<i>C.botulinum (Type C, D, E)</i>	Oval, sub-terminal	Motile	-Ve	<b>+Ve</b>	-Ve	-Ve
<i>C.difficile</i>	Oval, sub-terminal	Motile	-Ve	-Ve	-Ve	-Ve