Lec . 2 microbiology , By Ghada Alzoubi

Spore forming gram positive spp.

A) ***Bacillus Species***: aerobic

→**Bacillus cereus** causes food poisoning whereas **B. anthracis** causes anthrax

→Anthrax forms : cutaneous , inhalation anthrax " **woolstorter's disease** " , GI anthrax "rare"

→ **B. anthracis** :

1- non motile 2- no/ low lecithinase activity 3- no beta hemolysis

4- sensitive to penicillin and cephalosporines

→ **B. cereus :**

1- motile 2- high lecithnase activity 3- beta hemolysis 4- resistant to penicillin and cephalosporine

5-associated mainly with **food poisoning** 6-produce heat labile toxin "flash frying "

7-The heat-resistant spores of B. cereus are widespread and contaminate rice and other cereals

8-pathogenesis : Secreted toxins: hemolysins and enterotoxins: hemolysin BL (HBL), non-hemolytic enterotoxin (NHE), and cytotoxin K

9-Clinical finding : vomiting →Heat stable toxin(cerulide) , self limiting + The Diarrheal Type-Heat labile toxin"diarrheal type has longer incubation period "

10- Dx: mainly culture + gram stain → sheep blood agar plate

11- treatment :**diarrheal type** "fluid & electrolyte replacement" may dehudration end with acute renal failure + **Food-poisoning** is self-limiting

12-The natural environmental reservoir for B. cereus

B)Clostridium spp.: anaerobes , motile

→**Clostridium botulinum** : botulism, flaccid paralysis تذكروا حقن البوتوكس بتعمل شلل لعضلات الوجه

1-symmetrical, descending, flaccid paralysis 2- habitat : found in soil , so may contaminate vegetables

3- pathogenesis : Botulinum toxin , Highly toxic neurotoxin - coded for by a prophage.

4-we give patients Botulism Immune Globulin Intravenous (Human) (BIG-IV), that contains the three common serotypes (**trivalent**)

5- mechanism of action : toxin Absorbed by the gut , **Blocks release of acetylcholine** result in flaccid paralysis

6-clinical finding : nausea, vomiting, abdominal cramps or diarrhea, dry mouth , diplopia , inability to swallow, infants in the first months of life develop poor feeding " **floppy baby**"

7-Infant Botulism is the most common form of botulism

8-**adult botulism** :toxin preformed outside of the body

9-Dx: ELISAs and PCR , Mouse bioassay

10- treatment : trivalent " A + B + E" → ANTI TOXIN THERAPY

→**C. perfringen** : invasive disease

1-enterotoxin of C. perfringens is a common cause of food poisoning

2-invasive infections (including myonecrosis and gas gangrene)

3-Distinguishing Features: non-motile , double zone of hemolysis , coagulation of milk in litmus milk test, in addition to gas formation

4-Reservoir - soil and human colon. 5-Transmission - foodborne and traumatic implantation

6-pathogenesis : produce αlpha (lecithinase), the theta (necrotizing) and the epsilon (edematous) toxins +spores germinate at low oxidation reduction potential

7- clinical finding : contaminated wound" postpartum uterus" , Endometritis "inflammation of the inner lining of the uterus (endometrium) because it exists in the vagina of the female."

8- Dx: Gram-stained smears , culture "thioglycolate medium" ,

neutralization by specific antitoxin "Nagler test"

9-C. perfringens rarely produces spores when cultured on agar in the laboratory

10- treatment : surgical debridement and excision of all devitalized tissue ,give antimicrobial drugs ,Food poisoning caused by C. perfringens' enterotoxin usually requires symptomatic care only (Fluid & Electrolyte replacement)

→**Clostridium Difficile**:

1-The most common cause of nosocomial diarrhea

2-pathognesis : Produces two major toxins: Toxin A (enterotoxin) and Toxin B (cytotoxin)

3-Hypervirulent, hypertoxin producing strains are now recognised (e.g. **ribotype 027, 078**)

4-disease : Antibiotic associated diarrhea , Pseudomembranous colitis (PMC), fulminant colitis

5- Dx: diarrhea , toxin " detected in stool " ELISA/ PCR/Culture in selective agar ,

Pseudo membranes seen in the colon" endoscopy"

6- treatment : is the ***only medical indication for oral Vancomycin*** +Metronidazole (anti-parasitic)

Sometimes used →Fecal Transplantation.

→ **Clostridium Tetani** - tetanus, Rigid paralysis.