



# Microbiology

Subject :

Lec no : 16

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وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Medical Microbiology

## Gram-Positive Bacilli

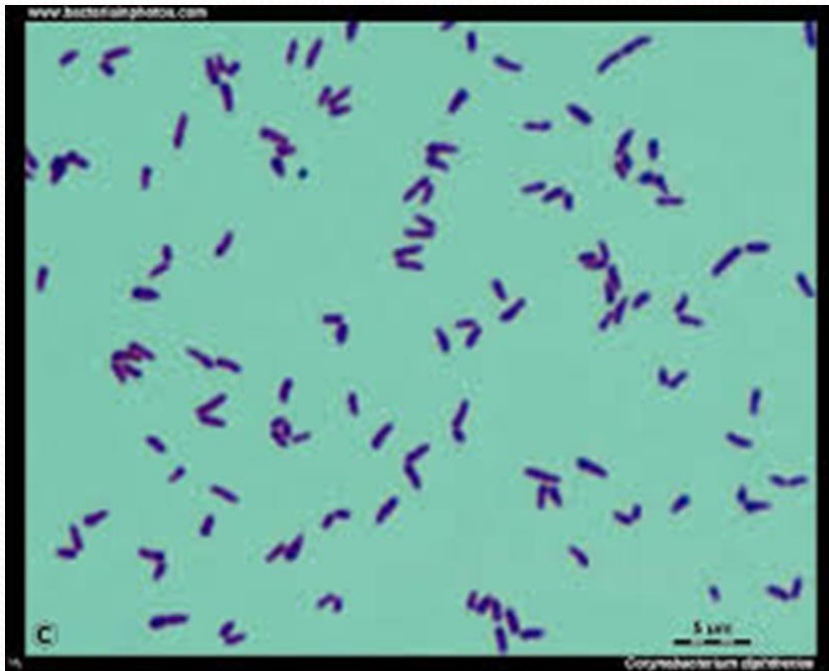
- 1- *Corynebacterium diphtheria*
- 2- *L. monocytogenes*: meningitis in newborn and immunocompromised
- 3- Spore Forming Bacilli

# Corynebacteria Group

- Pleomorphic Gram-positive Bacilli.
- Diphtheroides: Aerobic, Normal Flora - Respiratory-Urinary tract and Skin. Mostly Nonpathogenic.

● *Corynebacterium diphtheriae*: Type of Diphtheroids  
سبب المرض  
↓  
Severe  
Pathogens  
سبب الوحيدة

- Diphtheria is an acute, serious, highly infectious disease.
- Strains are facultative aerobes,
- Non-motile,
- Non-sporing pleomorphic
- Gram positive bacilli,



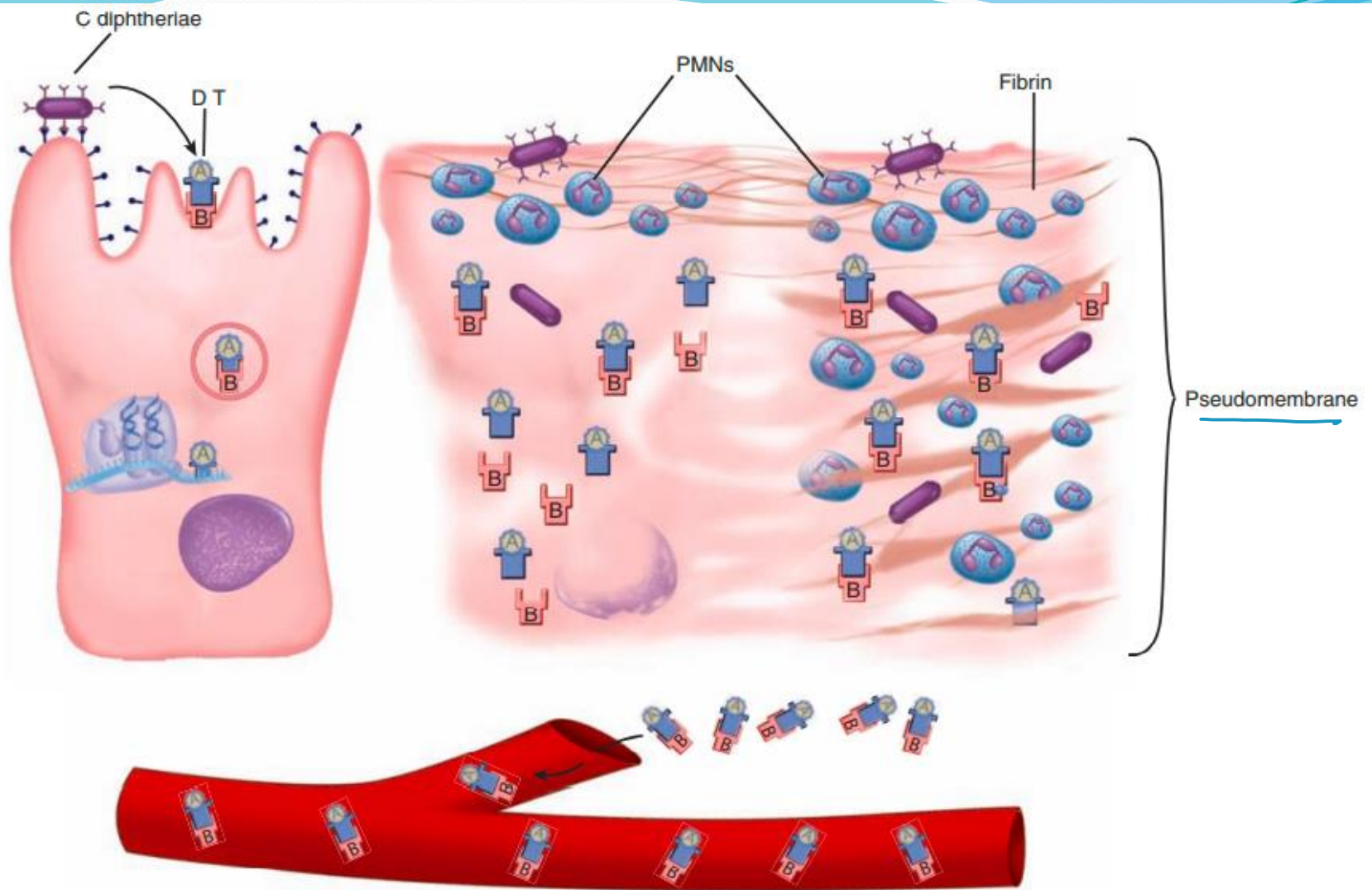
*Corynebacterium diphtheriae*

Producing Chinese-character arrangement (clubbed end to end, remain attached after division)

# Corynebacterium diphtheriae:

بتحب ال heart و respiratory ، skin ، nerve ← ال receptor تعلق هايه البكتيريا موجوده بهالكائن.

- Human Pathogen.
- Spreads by Droplets (larger than 5 microns in size)
- Clinical cases:
  - If toxogenic, Diphtheria (DT) (Lysogenic Strains) is released
  - DT: inhibit cytoplasmic protein synthesis irreversibly
  - Targeting elongation factor 2 (EF2)
    - ↑ inhibition لا (EF2) بوضوح يصير
    - inhibition to protein Synthesis وبقوت الخلية
  - Inflammation and **Necrosis** in the throat, pharynx and larynx (pseudomembranes).
    - || بتيجي WBCs وبتهاجم
    - بهاي المنطقه فيصير discharged
    - thick و fibrin وبعلاوا اسحب
    - بطلت عليه (pseudomembranes)
  - myocarditis, High Fatality.
    - ↓ (inflammation and Necrosis) يصير
    - redness
    - swelling



# Corynebacterium diphtheriae:

- 2-4 days incubation,
- Pharyngitis, tonsillitis
- Exudate or membrane <sup>tough, dry</sup>
- Gray-white pseudomembrane
- Cervical adenitis (bull neck)
- Comp: mechanical obstruction, myocarditis (2-3w), cardiac enlargement, arrhythmias, CHF

کونا- tough ای اشپی سبیلوا ممکن لیل بیاله ترف

هالرضه کان منتشر بس خف انتشاره کونا- علوا مطوم (vaccines)



*Corynebacterium diphtheriae*

- Diphtheria Toxoid (Triple Vaccine, DTP diphtheria, pertussis (whooping cough), and tetanus): given to children at 2, 4, and 6 months of age.
- Lab Diagnosis: Gram stain - Direct Smear and Throat culture on Blood Tellurite Medium غير مطلوبين x
- Treatment: Diphtheria antitoxic serum and antibiotics (Peni, cepha, ery, tetra). x





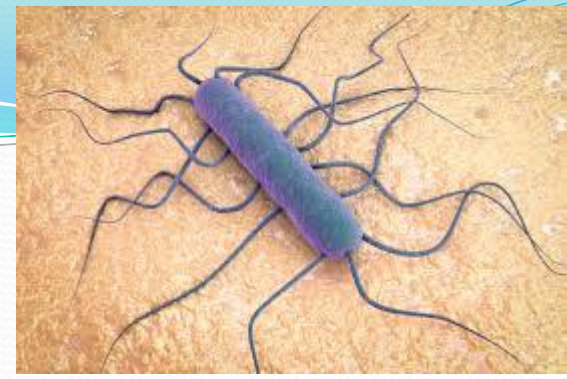
ماجاب  
سیرتلا  
ولا قرادہ  
حتن.



Albert stain is a type of differential stain used for staining the volutin granules also known as Metachromatic granules or food granules found in *Corynebacterium diphtheriae*.

*C. diphtheriae* produces large number of granules

## • *Listeria monocytogenes*:



- Gram<sup>+</sup>ve Small Bacilli, **flagellated**, **motile** at 37°C , but active tumbling motility at 25°C.
- Catalase positive (differ from strep)
- Grow slowly in cold even below zero
- Foodborn transmission

ممکن تقيش عند درجة حرارة هبسر

It causes Invasive Infection (listeriosis), Septicemia, Meningitis and Abortion.

مثلاً بدي احط الكمل بالتلاجة وكان فيها (10 bacteria E-coli) بظلوا 10 لثنا ال E coli ما بتنموا

بدرجة حرارة منخفضة اما مثلاً كان فيها 10 bacteria Listeria monocytogenes  
مع تمبير تنموا لانو بتنمو عند حرارة منخفضة

# • *Listeria monocytogenes*:

- Transmitted transplacentaly
- Infect placenta
- Intrauterine infection
- Still birth
- Tt: Ampicillin, TMP-SMX

خطورة لهاي البكتيريا تكمن با Pregnancy

بتنقل للجنين ويموت

بتروح البكتيريا لل placenta وبعدها بتروح عاك

الرحم وتنتقل للجنين

# Spore Forming Bacilli

- Gram<sub>+</sub>ve Spore-forming small/Large Bacilli,
- Survive for a long period in dryness.
- Common in Nature: Soil, Dust, water and air and on Vegetations.

ممکن شکلها  
یتغیر

موجوده بالکثر بالفزارع، الاراضي

## Spore Forming Bacilli

Bacillus (aerobic) and Clostridium species (anaerobic)

# Aerobic Spore Forming Bacilli

- *Bacillus cereus*
- *Bacillus subtilis*
- *Bacillus anthracis*

# Aerobic Spore Forming Bacilli

عاش كيش  
نهاتم فيهم

***Bacillus cereus:*** not serious infection

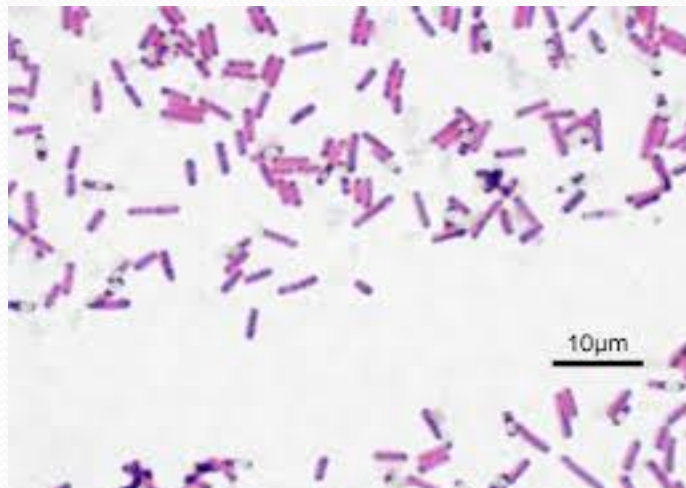
- food-poisoning
- Vomiting & Diarrhea.

Treatment: conservative, no need for antibiotics.

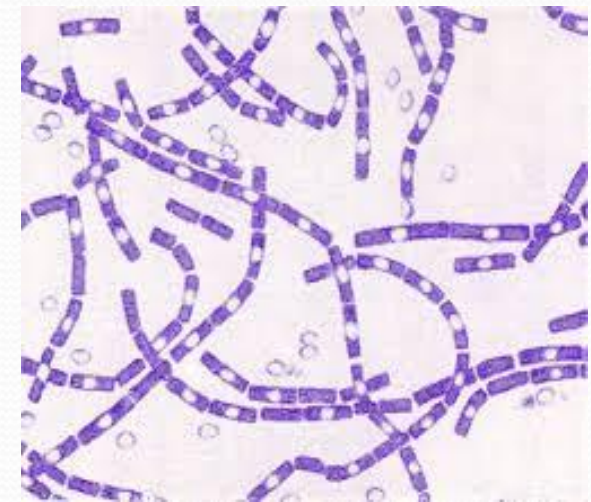
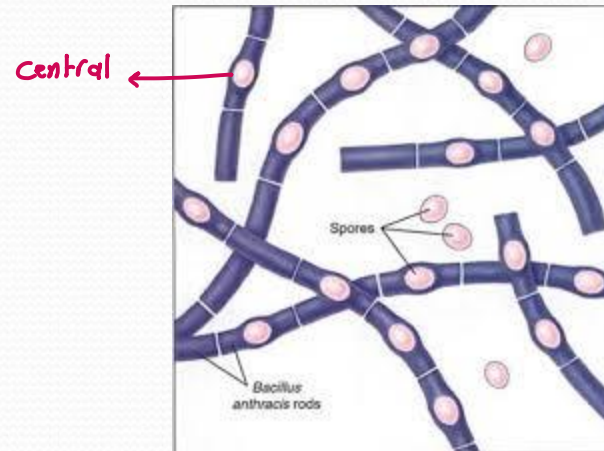
- *Bacillus subtilis*:

- Small, short, thin bacillus with rounded ends.
- Motile and non-capsulated.
- Opportunistic Pathogen, can cause wound infection and Sepsis in Infants and in Immunocompromised Patients.

شخص عند نقص المناعة



- ***Bacillus anthracis***: ( سلاح بيولوجي ) الحمرة الخبيثة ( محرم دوليًا )
- Gram-positive, انتشرت بفترة هجمات ارهابية عن طريق البريد مغلقات فيها بودرة لما تنفتح بتنفسها
- Large, non-motile, rectangular bacilli, arranged in chains. الشخص وبتأثر على ال Lung و سبب الوفاة شكلها زي المربعات
- Spores are oval and central.
- Aerobe and facultative anaerobe.
- Vegetative cells-readily destroyed by heat, Spores-highly resistant to heat.





موجودة بالطبيعة (العزائم) شخصي فزارع يتعامل  
مع النباتات والحيوانات ممكن تنقلوا هاجي البكتيريا على  
اليدين وبصره مرض جلدي Cutaneous Anthrax

- ***Bacillus anthracis***:

- Man is infected from animals and its products:

- Cutaneous Anthrax- Wound Infect,

بتعل necrosis 6 Pus 6 redness

- Hemorrhagic Pneumonia & Septicemia by  
Inhalation

خطورتها اذا دخلت على ال Lung بتقل نزف بال Lung ويؤدي الى الوفاة

- High Fatality. Biological War Agent.

# ● *Bacillus anthracis*:

- Polypeptide capsule
- Potent exotoxin complex
- Protein inactivation
- Tt: penicillin , doxy, Cipro

● **Cutaneous anthrax:** 2-5 day erythematous papule, 7-10 day ulcer(malignant pustule)

● **Pulmonary anthrax:** distress, cyanosis, 1-5 day, fever, cough, edema, hemorrhagic anthrax, meningitis

→ يتكون صدي بالبرايته  
اجرار، فيصا pus



→ هون يتكون صبار نيفصا  
necrosis



بهايي الحالة ما يتكون في الـ علاج

# Anaerobic Spore Forming Bacilli

## Clostridium

- C. botulinum
- C. tetani
- C. perfringens
- C. difficile

# C .botulinum:

- Food-borne botulism

بكتيريا تنحب تعيش بالمعلبات لأنها هيد Anerobic فلما الشحمن يوكله  
من هجايه المواد المعلبات ( يكون نفع فيصاهاي البكتيريا وكثرت الـ Toxin ) بتدخل ويتوهمل  
للـ GI والـ Toxin تاعها بروج على الدم ويشغل على Neuro muscular

- BT: resistance to GI enzyme

ويتقل block للـ Neurotransmitter فالشخمن يفقد الحركة  
(استيل كولين)

- No change in food

عن اقوى البكتيريا الي موجوده بالطبيعت

- Home canned, green bean, fish, mushroom

معلبات

- The most potent toxin in nature (a Heat-Stable Exotoxins-Protein (20min /100C))

Neuro muscular

- Metaloprotease act on NM junction

Neuro transmitter

- Block release of NTM Acetyhcoline at presynaptic membrane

- Flaccid paraysis of motor system

استرخاء

- *C .botulinum*:

Botulism: Clinical symptoms begin 18-36 hours after toxin ingestion with:

- weakness, dizziness, dryness mouth, Nausea, Neurologic features.. blurred vision, inability to swallow, difficulty in speech, weakness of skeletal muscles and Respiratory Paralysis
- .. Inhibition of the release of the neurotransmitter acetylcholine.. **No Fever.**
- Diagnosis: Clinical Features.. Rare Toxin Detection

- Infant botulism: honey → لدى أطفال (تسبب العسل)
- Tt: ABC, antitoxin
- Spore survive 121

# Clostridium tetani

الكزاز ← ما ينشوفه - حالياً لئلا - فيه مطعوم ضده (مطعوم الكزاز)

- Tetanus is a highly fatal disease with a High Mortality rate,
- Localized infection/Surface or Deep in Tissues,
- Wound: puncture wound with a splinter
- Unskilled abortion, female circumcision

inflammation لعل خضورتنا - اذا وصل الدم لئلا - بفضل ماشي ليوصل الى spinal cord

- Release potent neurotoxin (Tetanus toxin / tetanospasmin)  
produced when spores germinate and vegetative cells grow in necrotic tissues.
- The organism multiplies locally and symptoms appear remote from the infection site.

# Tetanus toxin

## Neurotransmitter

- NTM: glycine and gamma aminobutyric acid بتروح تاتثر على النيورونات الي بتوقف الحركة بالتالي الشخص رح يميل بحركة مستقره
- Effect inhibitory neuron
- Unopposed firing of active motor neuron
- Spasm, spasmatic paralysis (botulism: flaccid paralysis)
- Dx clinical
- Incubation 4 day
- 1st: **masseter muscle** : enable to open mouth (lock jaw) or trismus



- Death: exhaustion and resp failure

- Mortality 15-60% if not treated

- **Neonatal tetanus:**

Fatal.. Common in developing countries.. failure of aseptic technique during the delivery of babies.. Umbilical Stump.

# Clostridium perfringens

بِسْ نَخْرَفُ عَفْصًا اِنْهَا بِتَسْبِيبِ  
↓

1

## • Gas gangren:

- Traumatic wound and muscle damage
- Compound wound and bullet wound

2

## • Food poisoning (spore survival at 100) (Enterotoxin)

- Intense Watery diarrhea, but No Fever.



# *Clostridium difficile*

موجودة كـ (normal flora) // الخطورة اذا اخذ  
↓

- **Antibiotic Associated diarrhea (10 Days after anti-**

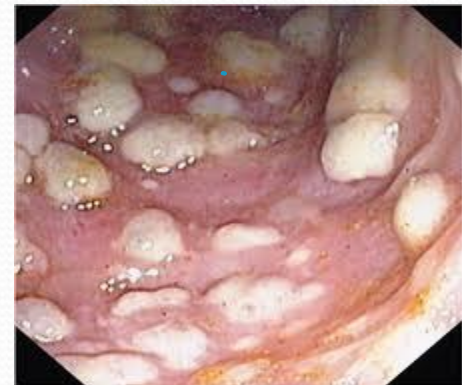
بشتغل على الـ normal flora وبخربها وبتصيرها البكتريا تنمو

**biotic) (Lincomycin-Clindymicin, Cephalosporines)**

خطورتها اذا وصلت لـ GI بتفتر سموم ويجعل damage mucuse of colon ويجعل

- Pseudomembraneuse Colitis..Bloody Diarrhea (lethal inflammation of colon, toxic megacolon)..

- Treatment: Stop Antibiotics, Give metronidazol  
Vancomycin.





وَتَدْعُوا أَنْ لَا يَكُونَ طَرِيقُكَ وَعِيراً لَتَنْجُوا،  
فِيَكُونُ وَعِيراً وَتَنْجُوا،  
لَتَعْلَمَ أَنَّ النِّجَاةَ مِنَ اللَّهِ لَا مِنَ الطَّرِيقِ

