Department of Anesthesia Techniques

Title of the lecture:- Bacteria

M.S.C Zainab ali mohsen

Microorganismis (Bacteria)

Microorganisms

- are group of microscopic life forms that include **bacteria**, **viruses** and **unicellular eukaryotes** like some fungi.
- are present in vast numbers everywhere on the bodies of animals and humans, on plant surfaces, in the **air**, **food**, **water**, **dust**, **soil**, and even inside the intestinal canal of all insects, birds, animals and human beings.
- are harmful include the agents of human infectious diseases: **bacteria, fungi, protozoa, helminthes, and viruses**. Others benefit by association with biological activity of the host.

Explanatory video

https://youtu.be/JZjzQhFG6Ec?si=5GqEuASBL96JtIGS

Why Study Microbiology?

- **Impact on Human Health**
- **Balance of Nature** - food source, play a role in decomposition, help other animals digest grass (cattle, sheep,termites).
- **Environmental** – provide safe drinking water, development of biodegradable products, use bacteria to clean up oil spills, etc. called bioremediation.
- **Industrial** – foodstuffs(cheese,bread),antibiotics,insulin,genetic engineering
- **Agricultural** - research has led to healthier livestock and disease-free crops.

Bacteria

are a large group of microscopic organism, occur almost everywhere. They have a simple internal structure, including capsule, cell wall, DNA, flagellum, pili, cytoplasm, and ribosomes.

Classification of Bacteria

Classification seeks to describe the diversity of bacterial species by naming and grouping organisms based on similarities. Bacteria can be classified on the basis of cell structure, cellular metabolism or on differences in cell components.

1-**Shape**: The bacteria can classify according to their shape

Cocci

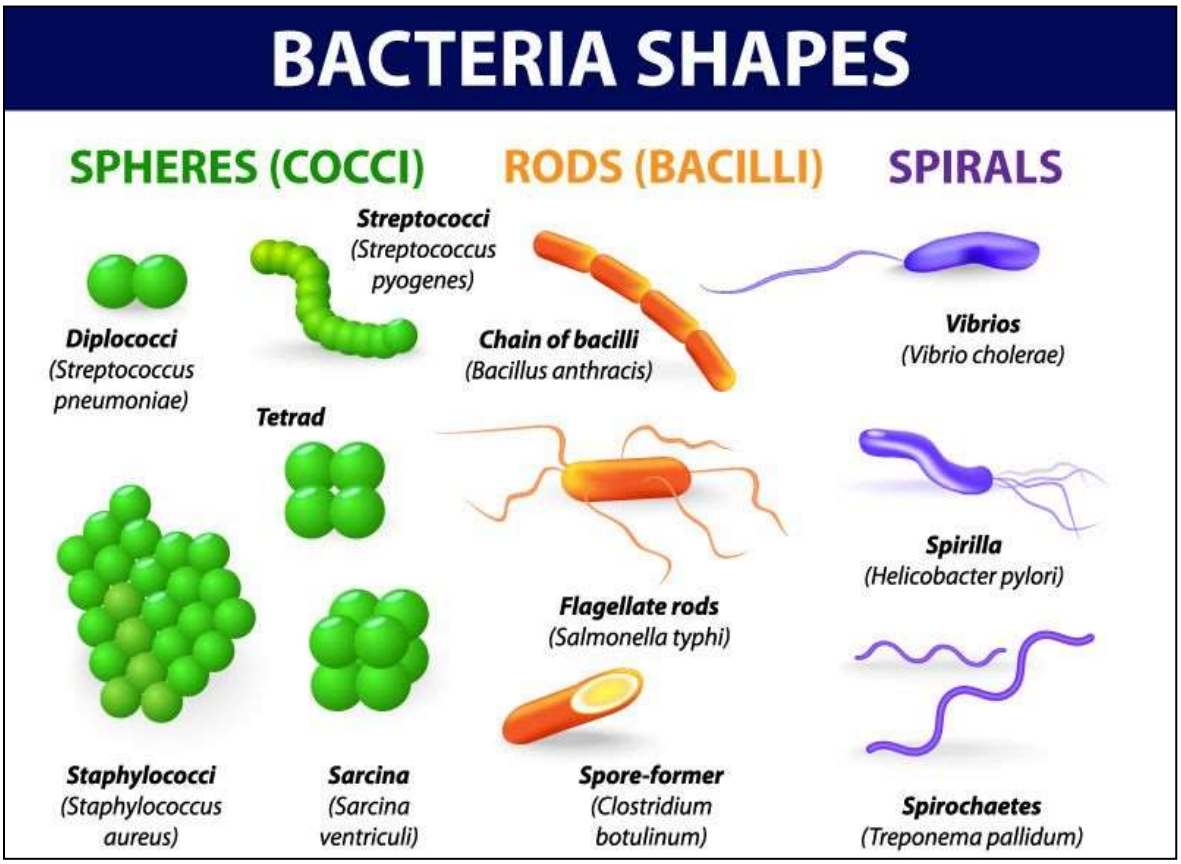
- **Diplococci** e.g.: Streptococcus pneumoniae
- **Chain (Cocci)** e.g.: Streptococcus pyogenes
- **Cluster or Grape** like shape e.g.: Staphylococcus aureus

Bacilli

- **Short Bacilli** e.g.: Bacillus subtilis.
- **Long Bacilli** e.g.: Lactobacillus. spp.
- **Coccobacilli** e.g.: Escherichia coli, Salmonella.

Spirals

- **comma shape**: e.g.: Vibrio cholera.
- **Spiral shape**: e.g.: Helicobacter pylori
- **Spirochaetes**

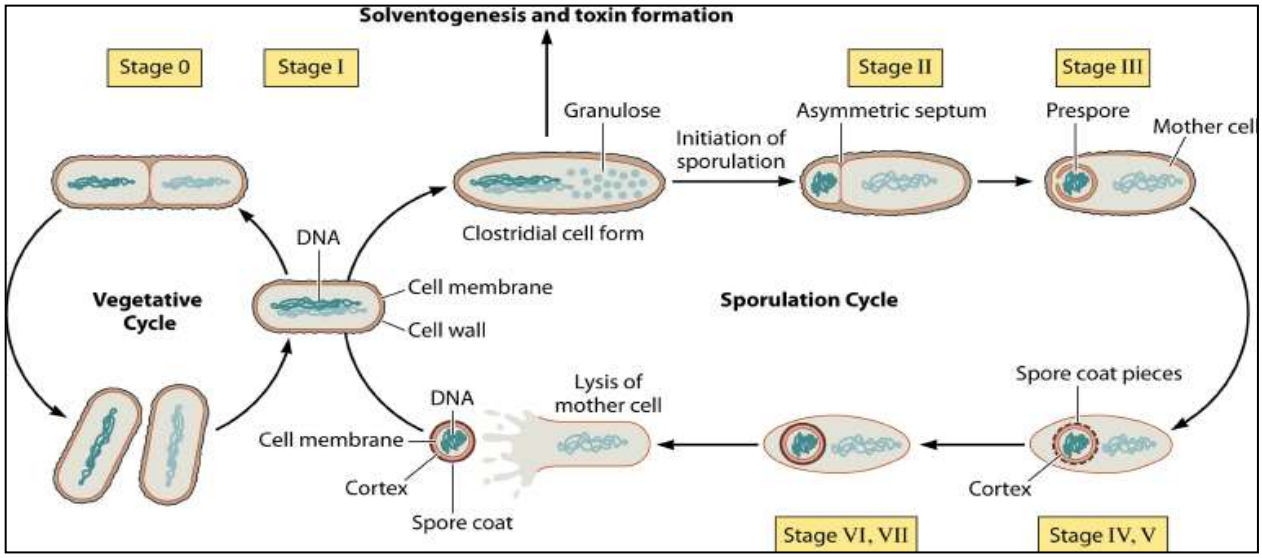


2- Ability to form spores:

The bacteria are divided to two groups according to their ability to

form spores.

- **Non-spore - former Bacteria: e.g. -** Escherichia coli, Streptococcus spp.
- **Spore - former Bacteria: e.g.:** Bacillus, Clostridium .
-



3- Oxygen requirements:

aerobes bacteria: e.g.: Bacillus, Pseudomonas.

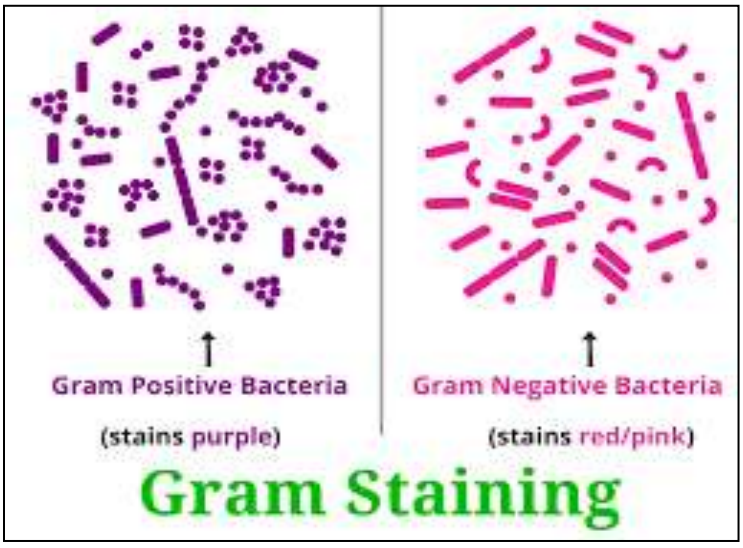
anaerobes bacteria: e.g.: Clostridium.

Facultative anaerobes e.g.: Enterobacteriaceae e.g.: Escherichia coli,

4-Reaction to the Gram stain: The Bacteria are divided in two groups according to the reaction with Gram stain.

• **Gram positive bacteria**. e.g.: Streptococcus, Staphylococcus.

•**Gram Negative Bacteria**. e.g. All the members of Enterobacteriaceae



5- Bacterial Nutrition

- **Autotrophic bacteria**: These bacteria synthesize all their food from inorganic substances (CO2 and hydrogen donor),
- **Heterotrophic bacteria**: The heterotrophic bacteria obtain their-ready made food from organic substances, living or dead.

6-Mode of energy production: (glycolysis, cellular respiration)

Structure of Bacteria:

1. **Dna („nucleoid"):** genetic instructions
2. **Surrounding membrane** :("cytoplasmic membrane") limits access to the cell‟s interior
3. **Cytoplasm**: between the dna and the membrane where all metabolic reactions occur especially protein synthesis, which occurs on the ribosomes.
4. **Cell wall:** resists osmotic pressure
5. **Flagella** :movement
6. **Pili** :attachment
7. **Capsule**: protection and biofilms