Oral bacteriology
Introduction, classification, structure, and growth

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- ✓ Oral bacteriology is the branch of microbiology that studies bacteria present in the oral cavity,

- ✓ The human mouth provides an ideal environment for bacterial growth due to **moisture, nutrients, suitable temperature**, and multiple **surfaces to attach**
- ✓ More than 700 bacterial species
  harmless or pathogenic

Classification

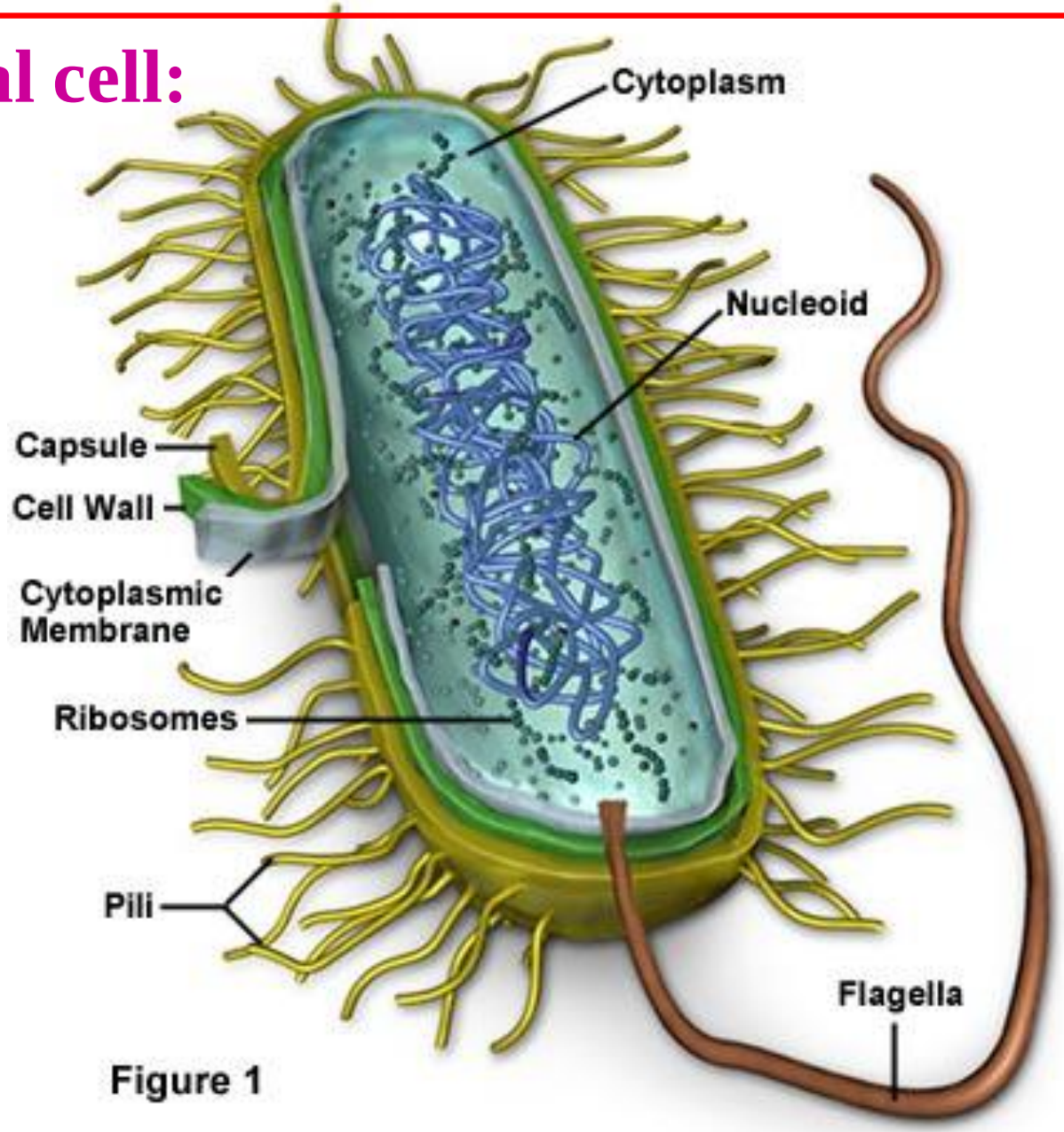
C. Based on Oxygen Requirement

1. Aerobic bacteria
2. Anaerobic bacteria (very common in periodontal pockets)
3. Facultative anaerobes

Cellular Structure

The main components of a bacterial cell:

1. Cell wall: Gram classification
2. Cell membrane: movement of substances
3. Cytoplasm
4. Nucleoid (DNA):not enclosed in a nucleus
5. Ribosomes: Protein synthesis
6. Capsule (in some bacteria)
7. Flagella and fimbriae



Cellular Structure

- ✓binary division
- ✓Number or size.
- ✓DNA replication
- ✓Cell elongation
- ✓Septum formation
- ✓two identical daughter cells.

Under ideal conditions, some bacteria can divide every 20–30 minutes.

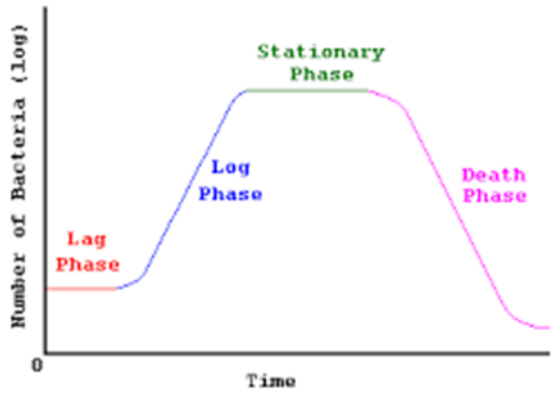
growth of Bacteria

Four Phases of the Growth Curve

- **Lag Phase:** Initially, cells adapt to a new environment, synthesizing enzymes and preparing for reproduction without increasing in number.
- **Log (Exponential) Phase:** Cells divide rapidly via binary fission, doubling at a constant rate, with the population increasing. This is the stage of highest metabolic activity. Bacteria in this phase most sensitive to antibiotics and disinfectants. So, clinically important phase in infection control
- **Stationary Phase:** Growth slows as nutrients are depleted and waste products accumulate, causing the rate of cell division to equal the rate of cell death. Total population remains constant. Some bacteria produce Spores.
- **Death (Decline) Phase:** Death rate exceeds growth rate so population decreases in number due to toxic waste buildup and lack of nutrients

Clinical and Laboratory Importance of these phases:

- Fresh dental impressions and prostheses can rapidly become contaminated
- Delayed disinfection allows bacteria to reach the **log phase**, increasing infection risk



Basic Requirements of Bacteria for Growth

Bacteria require suitable environmental and nutritional conditions for survival and multiplication, often summarized by the acronym FATTOM: Food, Acidity, Time, Temperature, Oxygen, and Moisture.

- Food/Nutrients: carbon (e.g., glucose) as a source of energy, and nitrogen for protein synthesis.
- Time: Sufficient time to reproduce via binary fission
- Temperature: Most bacteria thrive in warm conditions (20∘ -45∘C), with pathogenic types growing best at human body temperature (37∘C).
- Moisture: Water is essential for metabolic processes; drying is lethal to most bacteria.
- Oxygen: Requirements vary. Aerobes require oxygen for respiration, while anaerobes may be killed by it.
- pH (Acidity/Alkalinity): Most bacteria prefer a neutral pH around 7, though, oral bacteria tolerate slight acidity.

Other factors:

- Light: Many bacteria prefer dark conditions for growth.
- Time: Sufficient time is required for cell division
- Absence of Toxic Substances like Disinfectants, antibiotics.