جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قسم الادلة الجنائية

Lecture (2)

عنوان المحاضرة

Overview of Cell Structure & Types

المادة : علم الانسجة

المرحلة :الثانية

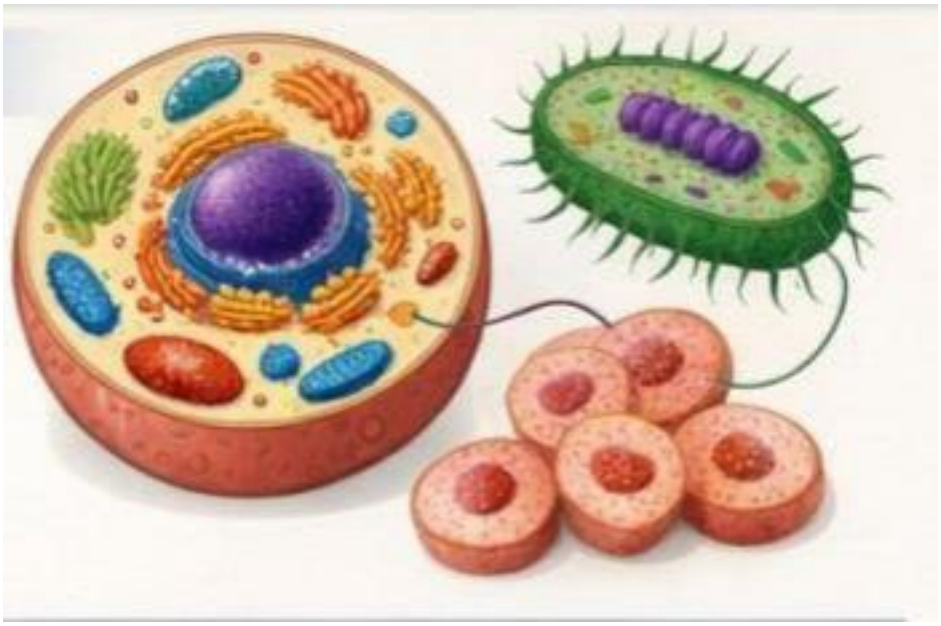
اسم الاستاذ: م.م هويدا نزال حسين

Overview of Cell Structure & Types

Learning Objectives

By the end of this lecture, students should be able to:

- Define the cell and explain cell theory
- Describe the basic structure of a cell
- Differentiate between prokaryotic and eukaryotic cells
- Identify major cell organelles and their functions
- Classify the main types of cells



1. Introduction to Cells

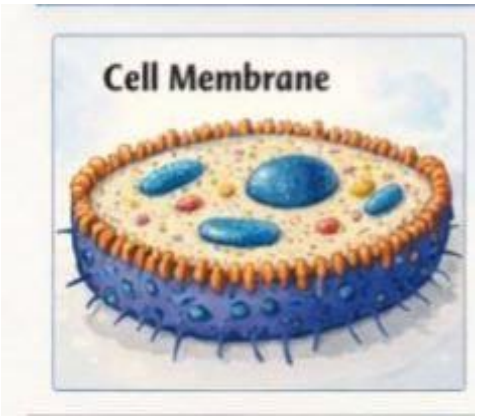
- The **cell** is the basic structural and functional unit of life.
- All living organisms are made of one or more cells.

Cell Theory

1. All living organisms are composed of cells.
2. The cell is the basic unit of structure and function in living organisms.
3. All cells arise from pre-existing cells.

2.Basic Cell Structure

Most cells share common components:



A. Cell Membrane (Plasma Membrane)

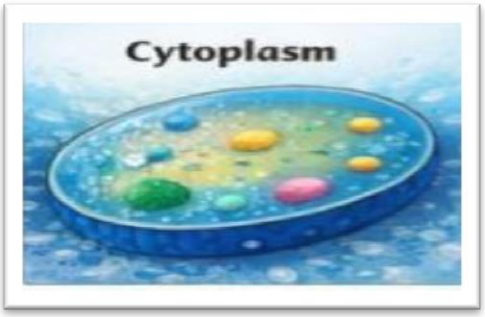
- Surrounds the cell
- Protects the cell
- Regulates the movement of substances in and out of the cell

Function:

- Allows nutrients and oxygen to enter
- Prevents harmful substances from entering

B. Cytoplasm

- Jelly-like substance inside the cell
- Contains organelles and is the site of many metabolic reactions

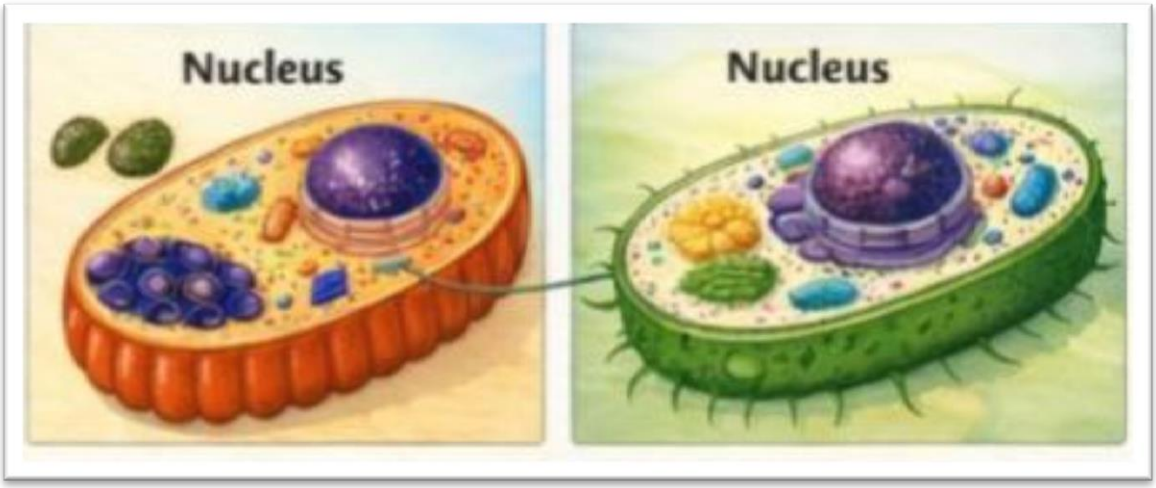


C. Nucleus (in eukaryotic cells)

- The control center of the cell
- Contains genetic material (DNA)

Functions:

- Controls cell division
- Regulates protein synthesis



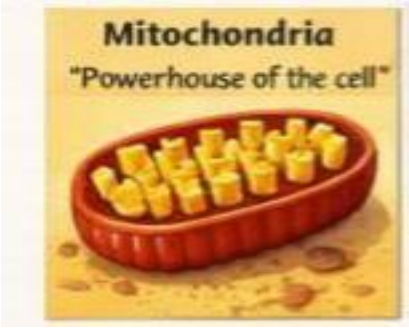
3. Cell Organelles and Their Functions

Mitochondria

- Known as the powerhouse of the cell

Function:

- Produce energy in the form of ATP



Ribosomes

- Responsible for protein synthesis
- Found free in cytoplasm or attached to rough endoplasmic reticulum

Endoplasmic Reticulum (ER)

- **Rough ER**: protein synthesis and transport
- **Smooth ER**: lipid synthesis and detoxification

Golgi Apparatus

- Modifies, packages, and transports proteins and lipids

Lysosomes

- Contain digestive enzymes
- Involved in intracellular digestion and waste removal

Centrioles (animal cells)

- Involved in cell division

Vacuoles

- Storage of water, food, and waste
- Large central vacuole present in plant cells

4. Types of Cells

A. Prokaryotic Cells

These are simple cells, and their main example is:

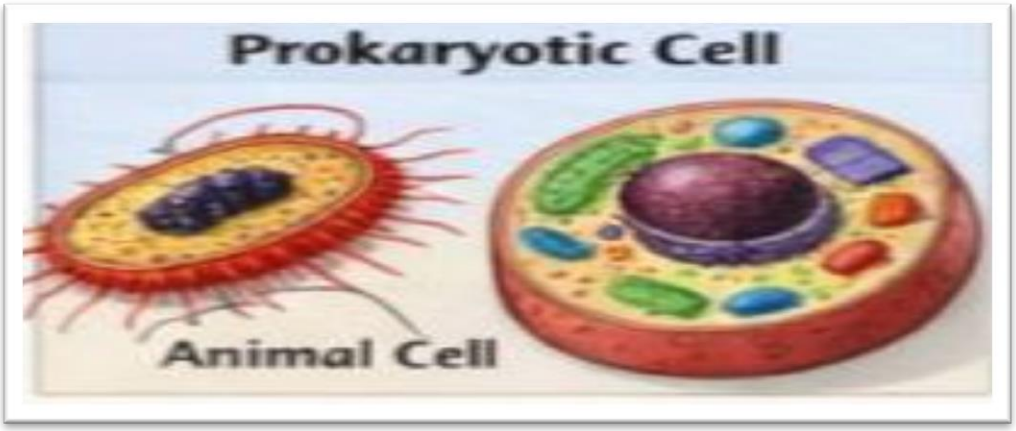
- Bacteria

Characteristics:

- No true nucleus
- Genetic material (DNA) is free in the cytoplasm
- Lack membrane-bound organelles
- Very small in size

Example:

- Bacterial cells



B. Eukaryotic Cells

These cells are more complex and include:

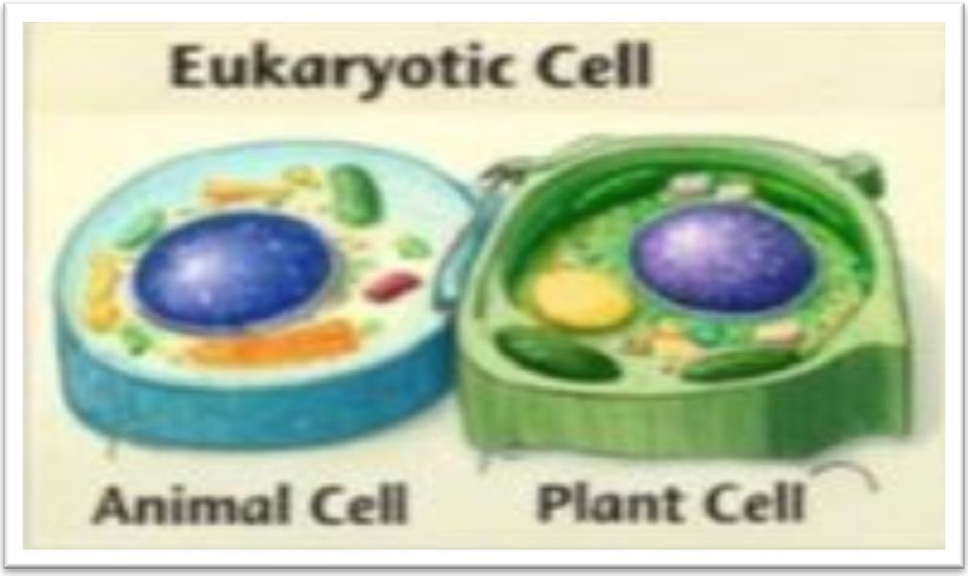
- Human cells
- Animal cells
- Plant cells

Characteristics:

- Have a true nucleus
- Contain membrane-bound organelles
- Larger than prokaryotic cells

Eukaryotic cells are divided into:

- Animal cells
- Plant cells

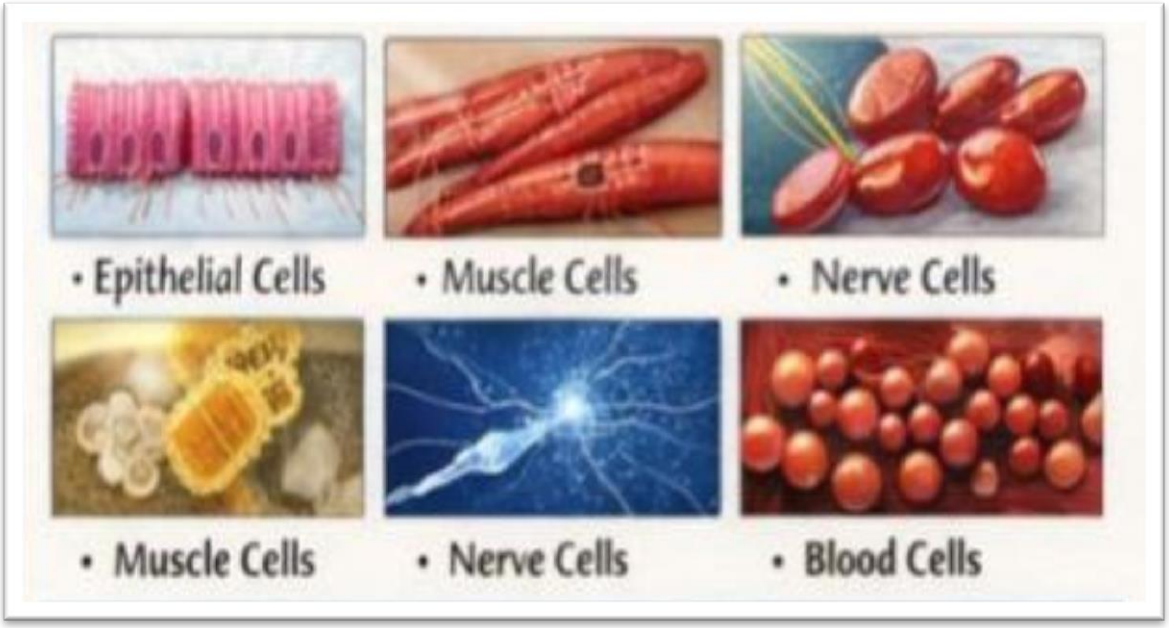


5. Differences Between Plant and Animal Cells

Feature	Plant Cell	Animal Cell
Cell wall	Present	Absent
Chloroplasts	Present	Absent
Vacuole	Large central	Small or absent
Shape	Usually regular	Usually irregular

6. Specialized Cell Types

- **Epithelial cells**: protection and absorption
- **Muscle cells**: contraction and movement
- **Nerve cells**: transmission of impulses
- **Blood cells**: transport and defense



7. Summary

- Cells are the basic units of life
- Cells are classified into prokaryotic and eukaryotic
- Organelles perform specific functions
- Different cell types are specialized for specific roles

Review Questions

1. What is the basic unit of life?
2. Name two differences between prokaryotic and eukaryotic cells.
3. What is the function of mitochondria?
4. Which organelle is responsible for protein synthesis?