

Introduction: The Cell

The basic unit of life is? The Cell

Cells are small, cannot be seen with the naked eye (with few exception e.g. Nerve cells)

Types of cells:

Prokaryotic = Before nucleus	Eukaryotic = True Nucleus
Unicellular, simple	Mostly multicellular, complex
Cell without Nucleus	Cell with Nucleus
DNA in the cytoplasm	DNA in the Nucleus
No membrane bound organelles	Has membrane bound organelles
All reactions happen in the cytoplasm	The intracellular compartments isolate different kinds of reactions
e.g. Bacteria	e.g. cells of plants, animals, fungi, Protista

Organisms can be:

1- Unicellular:

Organisms made of single cells that preform all life activity
e.g. Bacteria, Amoeba

2- Multicellular

Organisms made of many cells.
Most cells preform very different tasks
e.g. Humans

The Basics Of Cell Structure:

Very few cells look alike. Cells vary in:

- 1- Structure**
- 2- Function**

All Cells:

- 1- Have plasma membranes
- 2- Contain cytoplasm
- 3- Contain DNA

Cell Compartments The cell consists of two main compartments:

1- Nuclear Compartment (Nucleus):

Contains the genetic information that regulated the structure & function of the cell (control center)

2- Cytoplasmic Compartment:

Lies between the nucleus and the plasma membrane, contains **cytoplasm** which consists of:

- **Cytosol:** Fluid portion of the cytoplasm, mainly water.
- **Organelles**

Organelles:

Have specific functions inside a cell.

Types:

1- Membrane bound organelles (Membranous)

- **Double Membrane:**
e.g. Nucleus, mitochondria
- **Single Membrane:**
e.g. Endoplasmic Reticulum, Golgi Bodies, Lysosomes, Vesicles

2- Non membrane bound organelles (Non-Membranous)

e.g. Ribosomes, Centrioles, Nucleolus, Cytoskeleton

The Importance Of Compartilization?

To smooth the functioning of complex cells:

- Permits the cell to segregate many of its functions.
- Increases the efficiency of cells & helps complex organisms to perform many function simultaneously

1- The Plasma Membrane: Is the outer most part of the cell
Structure?

- 1- Lipids.
- 2- Proteins
- 3- Carbohydrates

2- The Nucleus: (Components are highlighted)

Houses DNA (which contains genetic material)

The nucleus is bounded by a double membrane.

The nucleus has a **Nuclear Envelope**

What does the Nuclear Envelope contain?

Nucleus Pores.

What is the function of the Nucleus Pores?

It allows many materials to pass freely between Nucleus & cytoplasm.

What is the Nucleoplasm? The semi-fluid part of the nucleus.

The nucleus contains **Chromatin**, which are threadlike fibers of DNA & protein that carry genetic information.

A strand of chromatin with its protein is: A **Chromosome**

Nucleolus: found in the nucleus

Nucleoli: regions of DNA engaged in production of RNA, which is involved in protein synthesis.

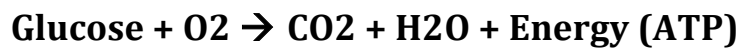
3- Ribosomes: Tiny non-membrane organelles.

- Made of **Protein & rRNA**
- Its synthesized in Nucleus & enters cytoplasm through nuclear pores
- It's found attached to the *rough endoplasmic reticulum* & free in cytoplasm
- Found in both prokaryotic & eukaryotic cells
- **Function:** Protein Synthesis

4- Mitochondria (Powerhouse of the cell)

- Is spherical or rod shaped
- Has its own DNA & some ribosomes
- Double membrane
 - Outer membrane: facing the cytoplasm
 - Inner membrane: enfolds to form *Cristae*.

Function: Site of cellular energy production



❖ The Cytomembrane System (Endomembrane system)

A system of membrane bound organelles

Components:

- 1- Endoplasmic Reticulum (E.R)
- 2- Golgi Complex
- 3- Lysosomes
- 4- Various Vesicles

Function: Make & modify new proteins, build lipids.

Package & transport the completed molecules (as in vesicles)

➤ Endoplasmic Reticulum (E.R) [fig. 3-20]

Is a network of membranous channels in the cytoplasm of a cell.

Types:

- 1- Rough endoplasmic reticulum (RER)
- 2- Smooth endoplasmic reticulum (SER)

RER	SER
Studded with ribosomes	Has no ribosomes
Production of Proteins	Production of phospholipids