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# Cell Biology

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**April 30, 2024**

## Introduction To Cells

Cells are the basic structural and functional units of all living organisms. They can perform all the necessary functions of life. Two main types: Prokaryotic (e.g., bacteria) and Eukaryotic (e.g., plants, animals).

## Prokaryotic Vs Eukaryotic Cells

|  |  |
| --- | --- |
| **PROKARYOTIC CELLS** | **EUKARYOTIC CELLS** |
| Smaller, simpler structure, no nucleus, DNA floats freely in the cell. | Larger, complex, contain a nucleus and other specialized structures called organelles. |

## Key Organelles and Their Functions

- **Nucleus**: Contains genetic material (DNA), controls cell activities.

- **Mitochondria**: Powerhouse of the cell, site of energy (ATP) production.

**- **Chloroplasts**: Present in green plants, site of photosynthesis.

- **Golgi Apparatus**: Modifies, sorts, and packages proteins and lipids for storage or transport out of the cell.

 - **Endoplasmic Reticulum (ER):**

 - *Rough ER*: Studded with ribosomes, site of protein synthesis.

 - *Smooth ER*: Involved in lipid synthesis and detoxification.

- **Lysosomes**: Contains digestive enzymes, breaks down waste materials and cellular debris.

## Cell Membrane and Transport

The cell membrane controls the movement of substances in and out of the cell. Transport mechanisms:

|  |  |
| --- | --- |
| **PASSIVE TRANSPORT** | **ACTIVE TRANSPORT** |
| No energy required.(e.g., diffusion, osmosis). | Energy required, against concentration gradient. (e.g., sodium-potassium pump). |

## *An organic corner shapeAn organic corner shape*Cell Cycle and Division

**Cell Cycle Phases:**

- Interphase: Cell grows, performs its normal functions, and prepares for division.

- Mitotic Phase: Cell divides through mitosis followed by cytokinesis.

**Mitosis Stages:**

## A diagram of a cellThe Eukaryotic Cell Structure

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*Image source:* [*Intro to eukaryotic cells (article) | Khan Academy*](https://www.khanacademy.org/science/ap-biology/cell-structure-and-function/cell-compartmentalization-and-its-origins/a/intro-to-eukaryotic-cells)