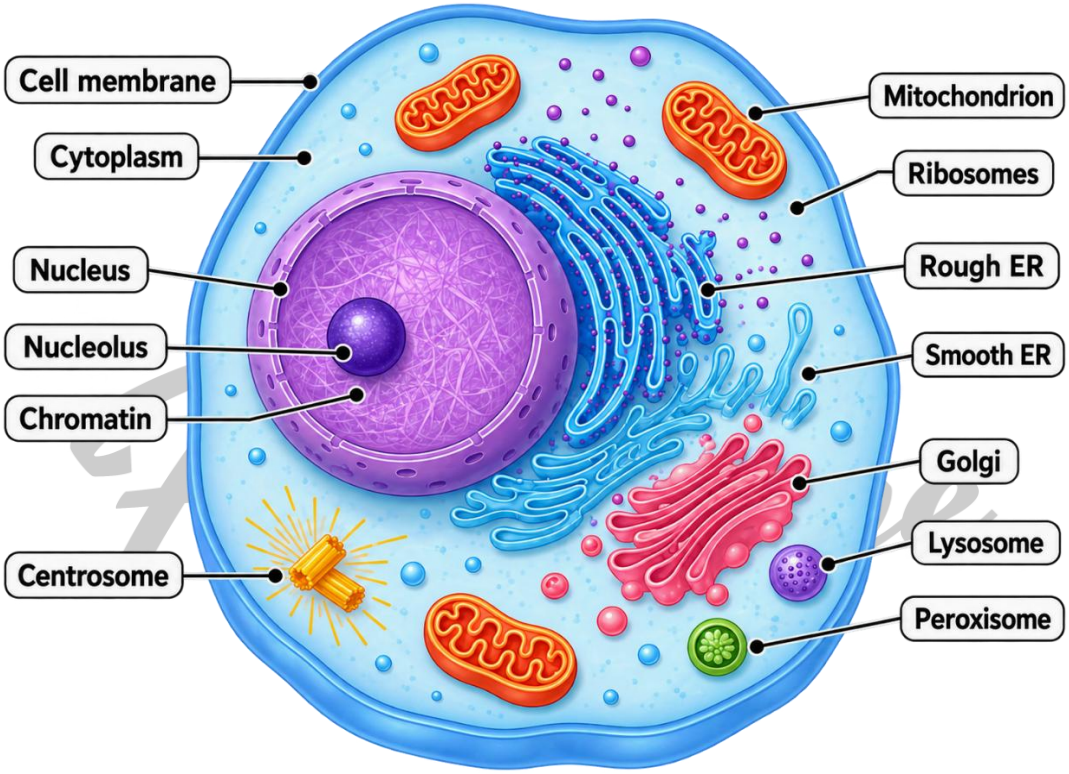
Cell Structure and Function

Cell Organelles

- A cell is the basic structural and functional unit of life.
- Inside the cell, organelles perform different jobs to help the cell survive and grow.
- Some organelles have membranes around them, while others do not.
- In eukaryotic cells, organelles are well organized and developed.

Main Cell Organelles



A. Cell Membrane (Plasma Membrane)

- The cell membrane is the outer covering of the cell.
- It separates the cell from its surroundings.
- It controls what enters and leaves the cell.
- It allows nutrients to enter and waste materials to leave.
- It also helps cells communicate with each other.

B. Cytoplasm

- Cytoplasm is the jelly-like substance inside the cell.
- It holds all the organelles in place.
- Many important chemical reactions happen in the cytoplasm.

C. Nucleus

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- The nucleus is the control center of the cell.
- It contains DNA, which controls growth, metabolism, and reproduction.
- It also controls protein synthesis.

Parts of the Nucleus

- The nuclear envelope surrounds the nucleus and has pores for movement of materials.
- The nucleoplasm is the fluid inside the nucleus.
- Chromatin contains DNA and forms chromosomes during cell division.
- The nucleolus produces ribosomes.

D. Mitochondria

- Mitochondria are called the powerhouse of the cell.
- They produce energy in the form of ATP through respiration.
- They also help with fat breakdown, calcium storage, and cell regulation.

E. Ribosomes

- Ribosomes make proteins for the cell.

Types of Ribosomes

- Free ribosomes make proteins inside the cell.
- Bound ribosomes make proteins for secretion and cell membranes.

F. Endoplasmic Reticulum (ER)

a) Rough ER

- Rough ER has ribosomes on its surface.
- It helps make, fold, and transport proteins.

b) Smooth ER

- Smooth ER has no ribosomes.
- It helps in lipid production, detoxification, and calcium storage.

G. Golgi Apparatus

- The Golgi apparatus modifies, packages, and transports proteins.
- It also helps form lysosomes.

H. Lysosomes

- Lysosomes contain enzymes that digest waste and damaged cell parts.
- They help in recycling materials and destroying harmful substances.

I. Peroxisomes

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- Peroxisomes help break down fats and harmful substances.
- They also break down hydrogen peroxide.

J. Centrosome and Centrioles

- The centrosome organizes microtubules in the cell.
- Centrioles help in cell division by forming spindle fibers.

Importance of Cell Organelles

- Organelles divide work inside the cell.
- They make cell functions efficient and organized.
- They help maintain all life processes.
- Damage to organelles can lead to diseases.

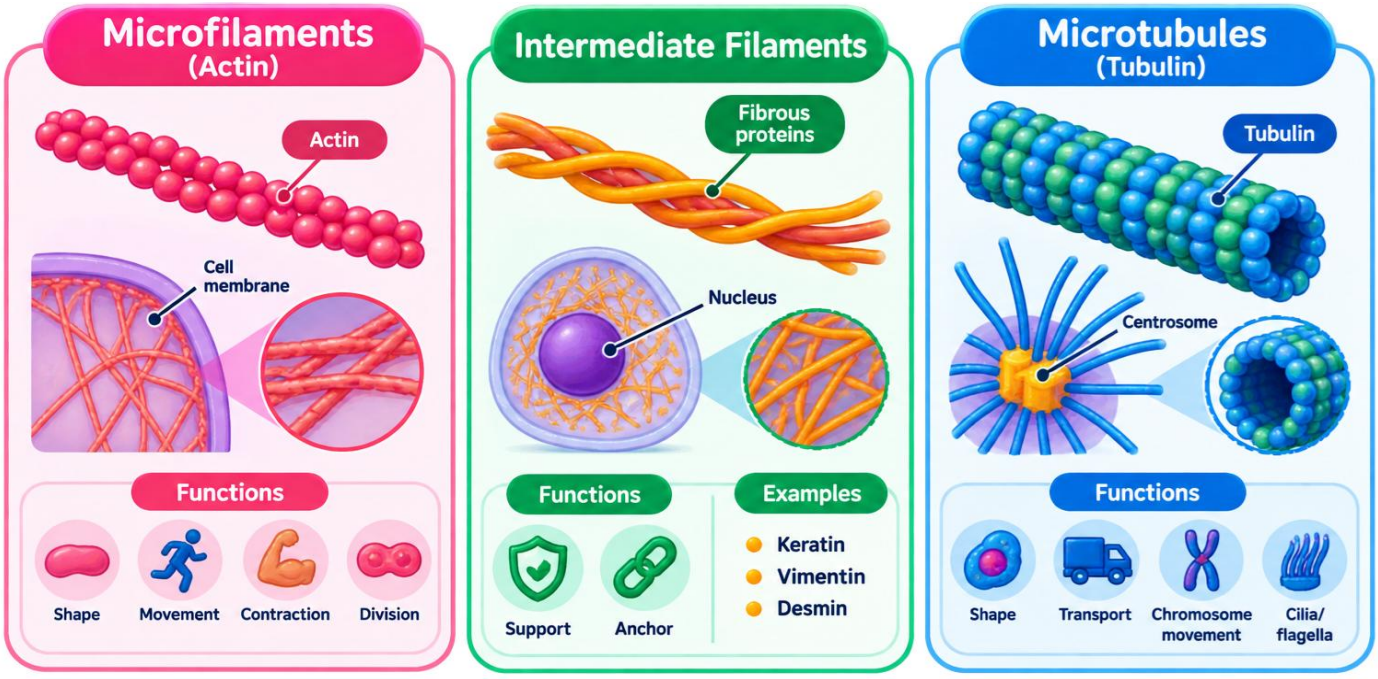
Cytoskeleton and Cell Movements

Introduction

- The cytoskeleton is a network of protein fibers inside the cell.
- It acts as the internal framework of the cell.
- It gives the cell shape, support, and helps in movement.
- It is dynamic and can change when needed.

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Components of Cytoskeleton



1. Microfilaments (Actin Filaments)

- Microfilaments are thin protein fibers made of actin.

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- They are mostly found near the cell membrane.

Functions

- They help maintain cell shape.
- They help in cell movement.
- They are involved in muscle contraction.
- They help in cytokinesis during cell division.
- They support microvilli.

2. Intermediate Filaments

- Intermediate filaments are strong fibers that provide support.
- They help keep the cell stable.

Functions

- They provide structural support.
- They anchor organelles in place.
- They form nuclear lamina.

Examples

- Keratin, Vimentin & Desmin

3. Microtubules

- Microtubules are hollow tubes made of tubulin protein.
- They are the largest fibers of the cytoskeleton.

Functions

- They help maintain cell shape.
- They transport materials inside the cell.
- They help move chromosomes during cell division.
- They form cilia and flagella.

Cell Movement

1. Amoeboid Movement

- In amoeboid movement, the cell forms pseudopodia and moves forward.
- **Examples**: Amoeba, White blood cells White blood cells move this way.
- **Functions:**
  - Cell migration.
  - Phagocytosis.

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2. Ciliary Movement

- Cilia are small hair-like structures that move materials.
- They beat in a rhythmic pattern.
- **Examples:**
  - Cilia in the respiratory tract moves mucus.
  - Cilia in the Fallopian tube moves the ovum.

3. Flagellar Movement

- Flagella are long whip-like structures that help the whole cell move.
- **Example:** Sperm movement

4. Muscle Contraction

- Muscle movement happens through the interaction of action and myosin.
- This causes muscle fibers to shorten.

Movement of Materials Inside Cells

Vesicle Transport

- Vesicles move inside the cell along microtubules.
- Motor proteins help carry these materials.

Motor Proteins

- Kinesin moves materials in one direction.
- Dynein moves materials in the opposite direction.

Cell Shape and Support

- The cytoskeleton prevents cells from collapsing.
- It helps cells change shape when needed.
- It supports specialized cell structures.

Role in Cell Division

- Microtubules form spindle fibers during cell division.
- They help separate chromosomes during mitosis.
- Actin helps split the cell during cytokinesis.

Importance of Cytoskeleton

- The cytoskeleton provides support and organization.
- It helps in movement and transport inside the cell.
- It is essential for cell division.

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