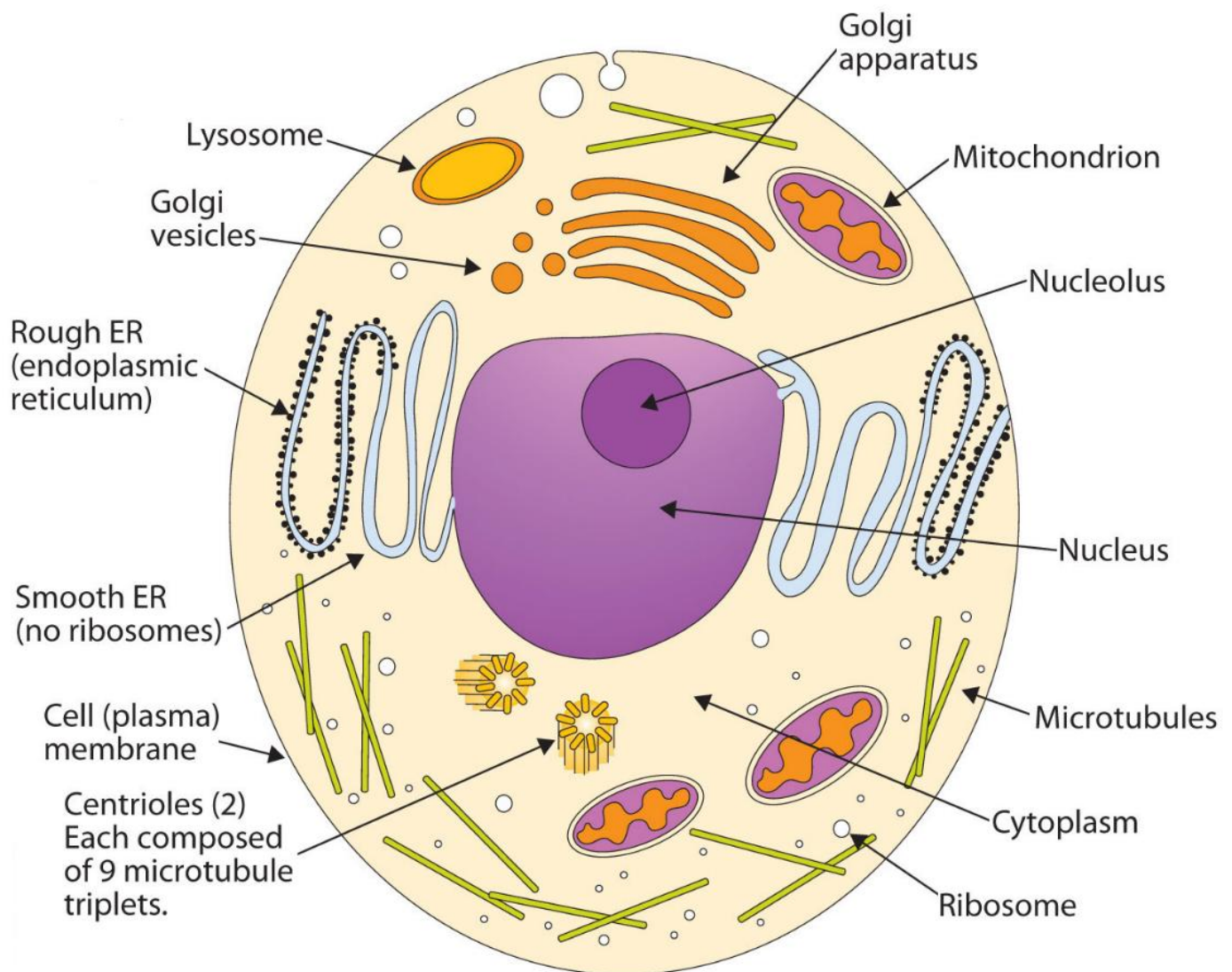


Structure of cell

Structure of cell – its components and their functions

- Cells are the basic structural and functional units of life.
- They can be classified into two main types:
 - **Prokaryotic cells:** Found in bacteria and archaea.
 - **Eukaryotic cells:** Found in plants, animals, fungi, and protists.
- Both cell types share some basic structures and functions, but eukaryotic cells are generally larger and more complex than prokaryotic cells.



Here are the main structures (organelles) and functions of a typical eukaryotic cell:

A. Cell membrane (plasma membrane):

- A selectively permeable barrier that surrounds the cell, controlling the passage of substances in and out of the cell.
- It is composed of a phospholipid bilayer with embedded proteins.

Function:

- Controls the movement of substances in and out of the cell, maintaining a balance of ions, nutrients, and waste products.
- It also mediates cell-to-cell communication and recognition.

B. Cytoplasm:

- The gel-like substance within the cell membrane that contains organelles, enzymes, and other molecules required for the cell's functions.
- It is the site of many cellular processes.

Function:

- Provides a medium for cellular processes to occur, suspending organelles and facilitating the transport of molecules throughout the cell.

C. Nucleus:

- The control center of the cell, which contains the cell's DNA, organized into chromosomes.
- The nucleus is surrounded by a double-layered nuclear membrane and contains a nucleolus, which is involved in ribosome synthesis.

Function:

- Contains genetic information (DNA) and regulates gene expression, controlling the synthesis of proteins required for cellular function, growth, and reproduction.
- It also houses the nucleolus, which produces ribosomes.

D. Endoplasmic reticulum (ER):

- A network of membranous tubules and sacs that play a crucial role in protein and lipid synthesis.
- The ER can be classified into two types:
 - I. Smooth ER (involved in lipid synthesis and detoxification)
 - II. Rough ER (studded with ribosomes and involved in protein synthesis).

Function:

- Involved in protein synthesis (rough ER) and lipid synthesis (smooth ER).
- The rough ER is studded with ribosomes and produces proteins destined for secretion or incorporation into the cell membrane.
- The smooth ER produces lipids and detoxifies harmful substances.

E. Ribosomes:

- Small structures made of protein and RNA that are responsible for protein synthesis.
- They can be found free-floating in the cytoplasm or attached to the rough ER.

Function:

- Small structures made of protein and RNA responsible for protein synthesis.
- They can be found free-floating in the cytoplasm or attached to the rough ER.

F. Golgi apparatus:

- A series of flattened, membrane-bound sacs that modify, package, and sort proteins and lipids for transport to their final destinations within or outside the cell.

Function:

- Modifies, packages, and sorts of proteins and lipids for transport to their final destinations within or outside the cell.

G. Mitochondria:

- The powerhouse of the cell, responsible for producing ATP (adenosine triphosphate), the cell's primary energy source, through cellular respiration.
- Mitochondria have their own DNA and are believed to have originated from an endosymbiotic relationship with bacteria.

Function:

- Produce ATP (adenosine triphosphate), the cell's primary energy source, through cellular respiration.

H. Lysosomes:

- Small, membrane-bound organelles containing hydrolytic enzymes that break down waste materials, cellular debris, and foreign substances.

Function:

- Contain hydrolytic enzymes that break down waste materials, cellular debris, and foreign substances.

I. Peroxisomes:

- Organelles that contain enzymes involved in various metabolic reactions, including the breakdown of fatty acids and the detoxification of harmful substances.

Function:

- Contain enzymes involved in various metabolic reactions, including the breakdown of fatty acids and the detoxification of harmful substances.

J. Cytoskeleton:

- A network of protein filaments that provides structural support, maintains cell shape, and aids in cell movement and division.
- The cytoskeleton consists of microtubules, microfilaments, and intermediate filaments.

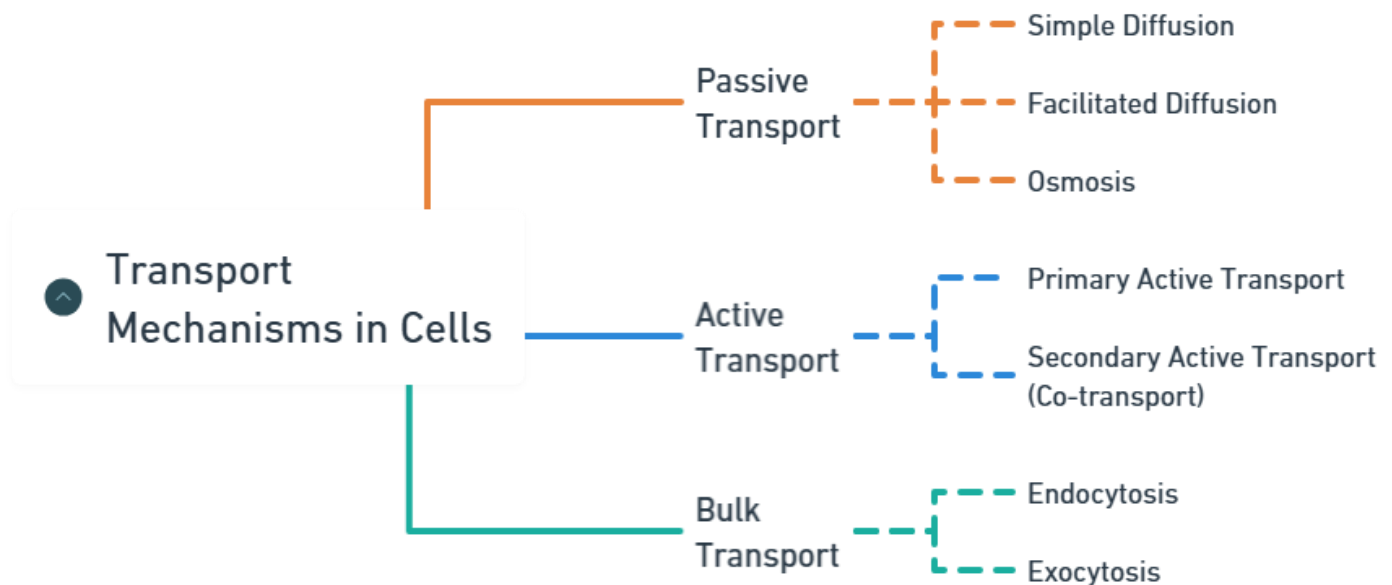
Function:

- A network of protein filaments that provide structural support, maintain cell shape, and aid in cell movement and division.
- The cytoskeleton consists of microtubules, microfilaments, and intermediate filaments.

Transport across cell membrane

- Transport across the cell membrane is essential for cells to exchange materials with their environment and maintain homeostasis.

Types of transport mechanisms



1. Passive Transport

- Passive transport does not require energy input from the cell, as it relies on the natural movement of molecules from an area of **higher concentration** to an area of **lower concentration** (down the concentration gradient).
- There are **three** types of passive transport:

A. Simple Diffusion

- Small, nonpolar molecules (such as oxygen and carbon dioxide) and lipid-soluble substances can pass directly through the phospholipid bilayer of the cell membrane.
- This process is driven by the concentration gradient until equilibrium is reached.

B. Facilitated Diffusion

- Some larger or polar molecules (such as glucose and amino acids) cannot pass through the cell membrane directly.



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