

## Cytoplasm

**cytoplasm**, the semifluid substance of a [cell](#) that is external to the nuclear [membrane](#) and internal to the cellular membrane, sometimes described as the nonnuclear content of [protoplasm](#). In [eukaryotes](#) (i.e., cells having a [nucleus](#)), the cytoplasm contains all of the [organelles](#).

The cytoplasm is a complex colloidal system. The cytoplasm of cell consists of:

- Organelles
- inclusions
- hyaloplasm

The structure of hyaloplasm includes water, proteins, nucleonic acids, different polysaccharides and lot of enzymes. The colloid system of hyaloplasm can be in a liquid or gel consistency.

In cell biology, the **cytoplasm** is all of the material within a eukaryotic cell, enclosed by the cell membrane, except for the cell nucleus. The material inside the nucleus and contained within the nuclear membrane is termed the nucleoplasm. The main components of the cytoplasm are cytosol (a gel-like substance), the organelles (the cell's internal sub-structures), and various cytoplasmic inclusions. The cytoplasm is about 80% water and is usually colorless.<sup>[1]</sup>

The submicroscopic ground cell substance or cytoplasmic matrix which remains after exclusion of the cell organelles and particles is groundplasm. It is the hyaloplasm of light microscopy, a highly complex, polyphasic system in which all resolvable cytoplasmic elements are suspended, including the larger organelles such as the ribosomes, mitochondria, the plant plastids, lipid droplets, and vacuoles.

Most cellular activities take place within the cytoplasm, such as many metabolic pathways including glycolysis, and processes such as cell division. The concentrated inner area is called the endoplasm and the outer layer is called the cell cortex or the ectoplasm.

Movement of calcium ions in and out of the cytoplasm is a signaling activity for metabolic processes.

## Cell membrane

The **cell membrane** (also known as the **plasma membrane (PM)** or **cytoplasmic membrane**, and historically referred to as the **plasmalemma**) is a biological membrane that separates and protects the interior of all cells from the outside environment (the extracellular space). The cell membrane consists of a lipid bilayer, made up of two layers of phospholipids with cholesterol (a lipid component) interspersed between them, maintaining appropriate membrane fluidity at various temperatures.

The membrane also contains membrane proteins, including integral proteins that span the membrane and serve as membrane transporters, and peripheral proteins that loosely attach to the outer (peripheral) side of the cell membrane, acting as enzymes to facilitate interaction with the cell's environment. Glycolipids embedded in the outer lipid layer serve a similar purpose.

The cell membrane controls the movement of substances in and out of cells and organelles, being selectively permeable to ions and organic molecules. In addition, cell membranes are involved in a variety of cellular processes such as cell adhesion, ion conductivity, and cell signalling and serve as the attachment surface for several extracellular structures, including the cell wall and the carbohydrate layer called the glycocalyx, as well as the intracellular network of protein fibers called the cytoskeleton. In the field of synthetic biology, cell membranes can be artificially reassembled.

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The plasmalemma includes  
3 layer:

- I. Glycocalyx (carbohydrates)
- II. Lipid bilayer (lipid molecule and proteins)
- III. Submembrane cordial layer (actin microfilaments and microtubules)

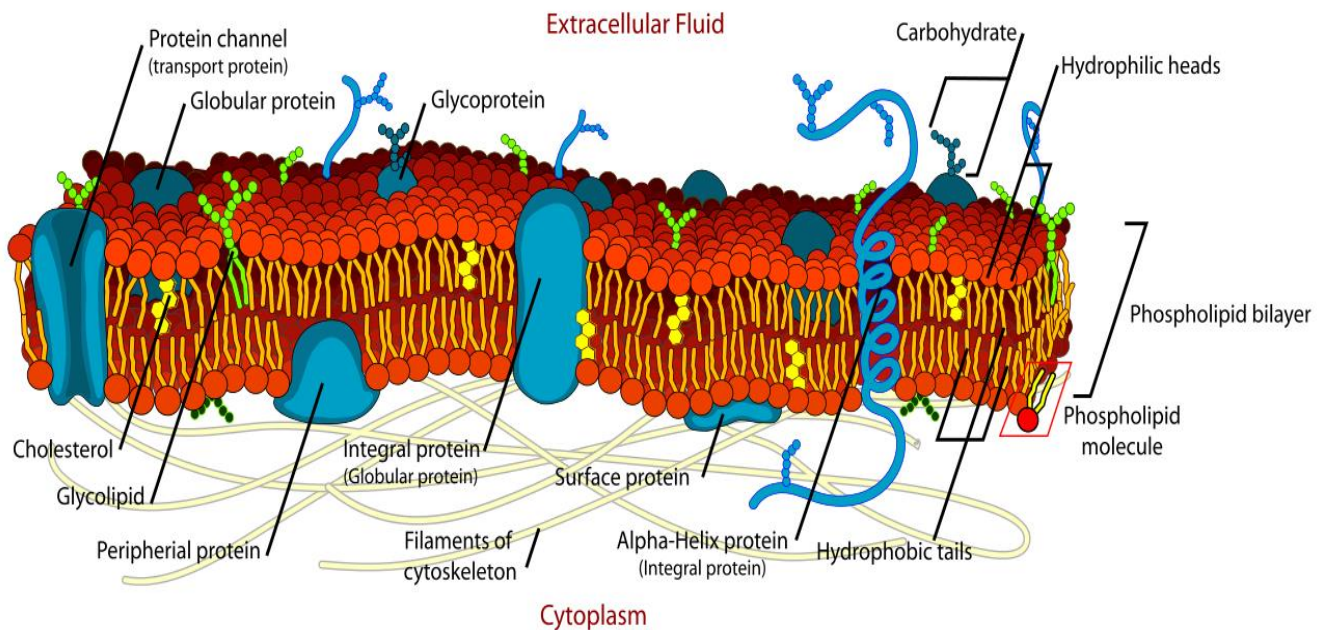
The structure each membrane includes :

- Proteins
- Lipids
- Carbohydrates

Proteins make 50.60% of is eight, adapids 30-40 % and carbohydrates 5-10%.

Most Mall membrane proteins of the following 3 groups:

- Integral.
- Transmembrane.
- Peripheral

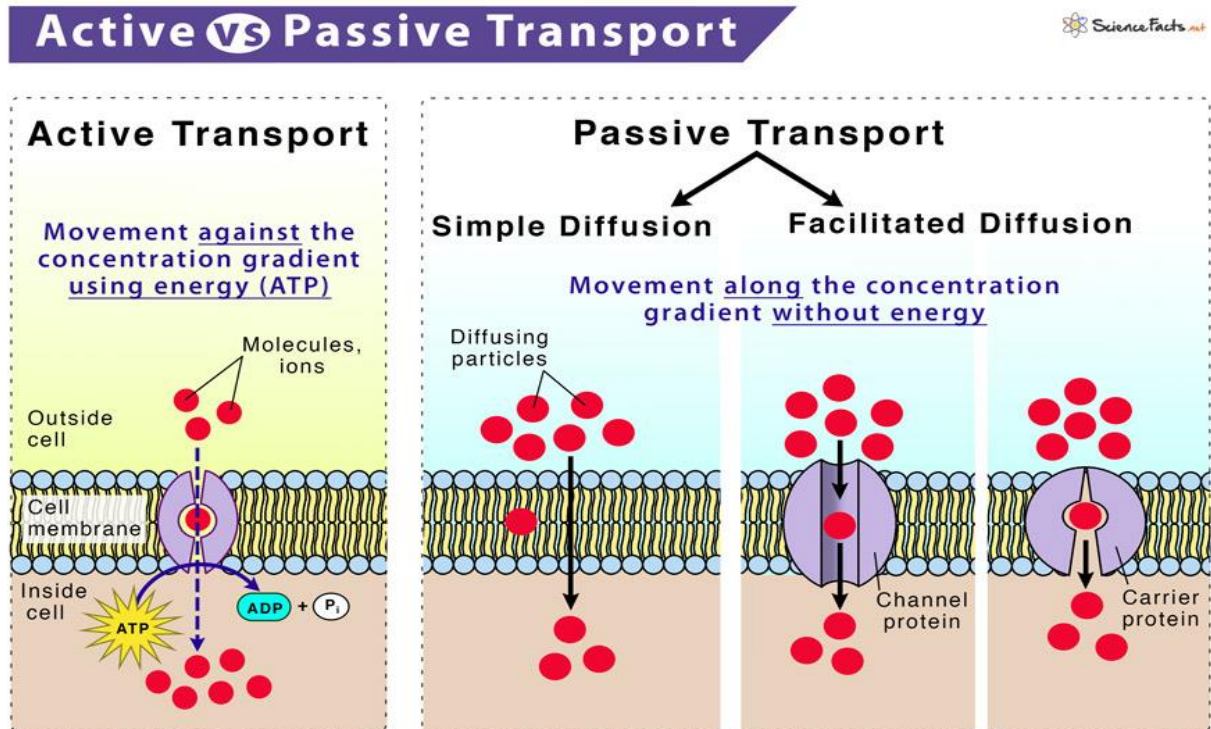


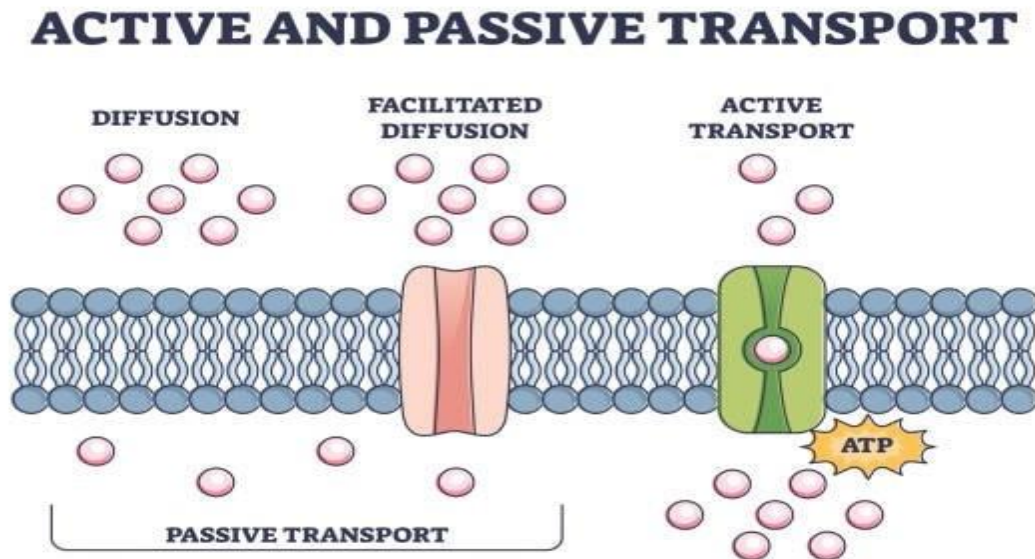
## The plasmalemma carry out some of the important functions:

- **Barrier** the plasmalemma separates a cell from an environment and other cells; the nucleus is separated from cytoplasm, membranes organelles from hyaloplasm.
- **Recetor** on a surface of plasmalemma. There are special structures-receptors due to which the cell finds out different chemical substances, physical factors, other cells, hormones and antigens.
- **Transport-through** a membrane of cell freely passers water, salts and substances with low molecular weight. Such transport is called **passive**.
- The transport against a gradient of concentration is called **active**.

Certain substances (e.g.water) can cross the membrane in either direction, following a concentration gradient.

**Passive diffusion:-** does not require energy expenditure

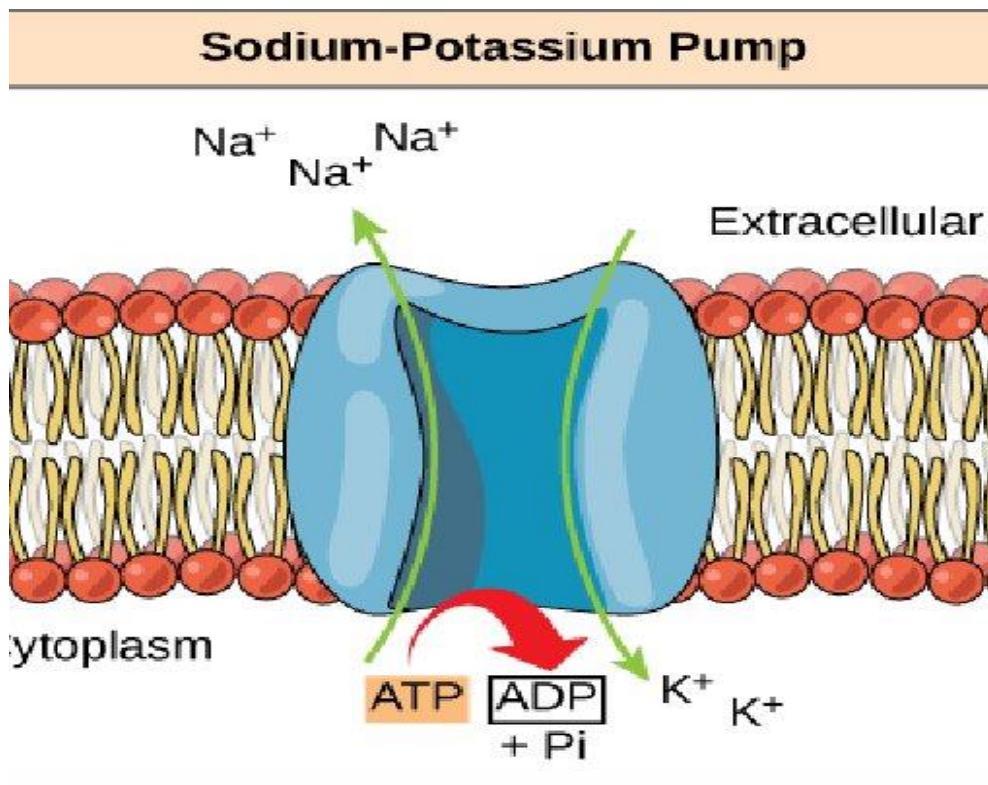




### Facilitated diffusion

Certain molecules (e.g, glucose) cannot freely diffuse across membranes but must be helped across by a membrane component. This facilitated-diffusion is often unidirectional, but it follows a concentration gradient and requires no energy.

Some nondiffusible molecules can move into or out of cell either along or against a concentration gradient. Such movement requires energy, usually as ATP. An example of this active transport is the sodium pump ( $\text{Na}^+\text{K}^+ - \text{ATPase}$ ), which can expel sodium ions from a cell even when the external sodium concentration is higher than the internal one.



**Endocytosis** cells engulf extracellular substances and bring them into the cytoplasm in membrane-limited vesicles by mechanisms described collectively as endocytosis.

**Exocytosis** removes substances from the cell, Cells use this process both for secretion and for excretion of undigested material.

A membrane-limited vesicle or secretory granule fuses with the plasma membrane and releases its contents into the extracellular space, Without disrupting the plasma membrane.

- **In phagocytosis** (“cell eating”), the cell engulfs insoluble extracellular substances, such as large macromolecules or entire bacteria. The vesicles formed are termed phagosomes.

- In **pinocytosis** (“cell drinking”), the cell engulfs small amounts of intercellular fluid, which may contain a variety of solutes. Pinocytotic vesicles are usually smaller than phagosomes.

