

## OVERVIEW OF PLASMA MEMBRANE FUNCTIONS

1. **Compartmentalization** - The plasma membrane encloses the contents of the entire cell. Membrane compartmentalization allows specialized biochemical pathways to proceed without external interference and enables cellular activities to be regulated independently of one another.
2. **Selectively permeable barrier** - Membranes prevent the unrestricted exchange of molecules from one side to the other. The plasma membrane, which encircles a cell, both serve as a general barrier for some, yet both have gated “bridges” to others that promote the movement of select elements into and out of the enclosed living space. For example, lipids/steroids move freely while proteins binds on surface receptors and ions utilize voltage or ligand gated channels,
3. **Transport of solutes** - The plasma membrane contains the machinery for physically transporting substances from one side of the membrane to another, often from a region where the solute is present at low concentration into a region where that solute is present at much higher concentration; **a phenomenon (energy consuming) known as Active transport or reverse (spontaneous process) known as passive transport**. The transport machinery allows a cell to accumulate substances, such as sugars and amino acids that are necessary to fuel its metabolism and build its macromolecules. The plasma membrane is also able to transport specific ions, thereby establishing ionic gradients across itself. This capability is especially critical for nerve and muscle cells.
4. **Responding to external signals**. The plasma membrane plays a critical role in the response of a cell to external stimuli, a process known as **signal transduction**. Membranes possess **receptors** that combine with specific molecules (or **ligands**) having a complementary structure. Different types of cells have membranes with different receptors and are, therefore, capable of recognizing and responding to different ligands in their environment. The interaction of a plasma membrane receptor with an external ligand may cause the membrane to generate a signal that stimulates or inhibits internal activities.
5. **Cell-cell interaction**. Situated at the outer edge of every living cell, the plasma membrane of multicellular organisms mediates the interactions between a cell and its neighbors. The plasma membrane allows cells to recognize a signal or ligand one another, through appropriate receptor-ligand binding. This cross talk is necessary in immune activation, hormone action and development.
6. **Energy transduction**. Membranes are involved in the energy transduction processes by which one type of energy is converted to another type (occurs during photosynthesis when energy in sunlight is absorbed by membrane-bound pigments, converted into chemical energy, and stored in carbohydrates).