

STRUCTURE OF PLASMA MEMBRANE (FLUID-MOSAIC MODEL) :

Plasma membrane is a dynamic, quasi-fluid structure and forms the external boundary of cells. It acts as a selectively permeable membrane and regulates the molecular traffic across the boundary. Different models were proposed to explain the structure of plasma membranes. In 1972, Jonathan Singer and Garth Nicolson proposed Fluid Mosaic Model which is now the most accepted model. In this model, the membranes are viewed as quasi-fluid structures in which proteins are inserted into lipid bilayers. It describes the mosaic arrangement of proteins embedded throughout the lipid bilayers as well as the fluid movement of lipids and proteins alike. The main features of this model are as follows —

1. Cell membrane have a quasi-fluid structure which lacks a complete covering sheath of protein at either of its faces. However, a continuous bilayer lipid is present.
2. The lipids are mainly phospholipid molecules which are polar hydrophilic heads are towards the two surfaces and the hydrophobic tails are towards the centre.

Two types of phospholipid occur in bilayer :
Glycerol phospholipids, in which, the hydrophobic regions are composed of two fatty acids joint to glycerol and sphingo phospholipids, in which a single fatty acids is joint to sphingosine. In addition to the phospholipids the plasma membrane also contain glycolipids and sterol.

3. Proteins are present like a mosaic pattern in the interior of lipid bilayer and also on the two surfaces. Thus, they are called protein icebergs in a sea of lipids. The membrane proteins are not fixed but are free to move laterally like icebergs floating in the sea.

4. The proteins are of two types i.e. —

(a) Intrinsic / Integrated

(b) Extrinsic / Peripheral proteins

* (a) The intrinsic proteins are embedded in the lipid bilayer while the extrinsic proteins are present on the two surfaces of the membrane. 70% are of the membrane proteins are intrinsic and 30% are extrinsic.

5. The lipid molecules exhibit both horizontal and lateral movement.

6. The ratio of lipid, protein and carbohydrates vary greatly amongst different membranes.

7. The external surface of the cell membrane possess carbohydrate chains of oligosaccharides which may be branched or unbranched. They are attached to both proteins and phospholipids producing glycoproteins and glycolipids respectively. This oligosaccharide coat is known as glycocalyx / cell coat.