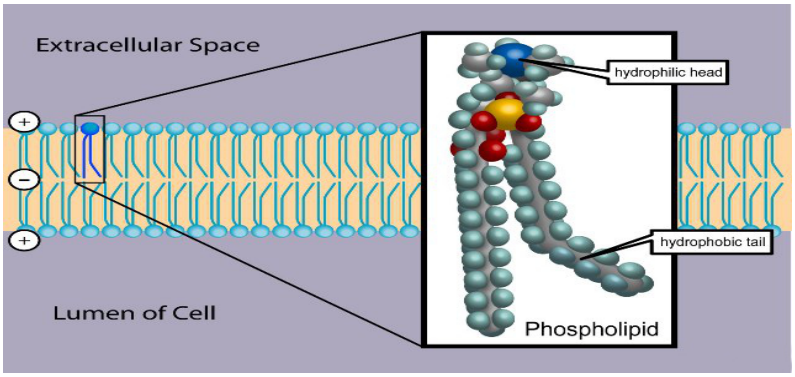
Membrane Structure and Function

The cell's organization and other important activities depend on the cell membrane. The typical main components of a cell membrane are the phospholipid layers and proteins. Recall that a phospholipid has a hydrophilic (water loving) head and two fatty acid tails which are hydrophobic (water dreading) in nature.



Below is a simplified diagram of a phospholipid: When phospholipids are immersed in water, the hydrophobic interactions may force the molecules to cluster together into two layers, wherein all the fatty acid tails sandwiched between the hydrophilic heads. This special arrangement, a lipid bilayer, is the structural basis of all the cellular membranes.

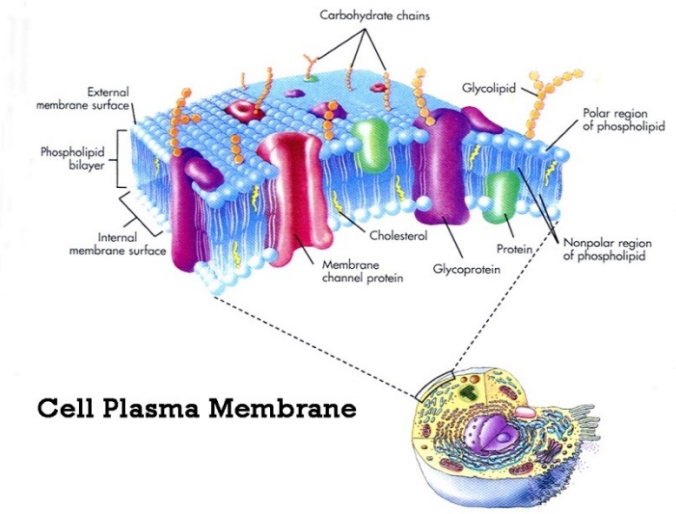


Figure 1.1 the generalized diagram of a fluid mosaic model of plasma membrane

Figure 1.1 is a diagram of a plasma membrane, which consists mainly of a lipid bilayer and some proteins. This cell membrane structure is regarded as **fluid mosaic model**. This model was devised by SJ singer and GL Nicolson in 1972. It is said the cell membrane has the consistency very similar to olive oil. They describe that the cell membrane as two-dimensional liquid wherein it restrict the lateral diffusion of the cell membrane components. The lipid molecules move sideways and their tails flex back and forth making the neighboring lipids not to become packed into a solid layer. The inward and outward facing surfaces of the plasma membrane differ depending in the kind and amounts of the lipids they contain. These variations play important roles in the structure and functions of cell membrane

in different kinds of cells. Membrane phospholipids are mostly saturated makes its tails kinks that increases the membranes fluidity.

The membrane is said to be “mosaic” because it contains a special protein composition embedded within the lipid bilayer. This current model defines some important features of the cell relevant to many processes which includes cell to cell signaling, apoptosis, cell division, and cell fusion ad budding. Some proteins carry out most of the membrane functions. **Integral**

bilayer. Instead, they are loosely bound to the surface of the integral protein or in the membrane. Proteins in all provide the following functions: They transport molecules, electrons, and ions through channels, pumps, carriers, and the electron transport chains; some proteins also act as enzyme; they act as receptors for hormones, neurotransmitter, and help immune cells in recognizing foreign bodies; they also serve in cell to cell attachments.

Cell membranes also contain **glycolipids**. Glycolipids are lipids with attached sugar and are found only in the outer part

of the cell membrane. The sugar group of the glycolipid makes its molecule polar, whereas its fatty acid tails are nonpolar. About 20% of the membrane lipid is **cholesterol**. Cholesterol

biological markers. Cells recognize other cells by the help of the cell's glycolcalyx. An example is the sperm's recognition to an ovum by means of the ovum's distinctive glycocalyx. The cells of the immune system also identify the invading bacterium by its glycocalyx.

The features common to all cell membranes can be summarized as:

- Cell membranes are mostly composed of lipids (phospholipids) and proteins
- The lipid molecules have polar hydrophilic heads at the two

surfaces to carry out most of the membrane's functions.