

## Membrane lipids

Membrane lipids are a group of compounds (structurally similar to fats and oils) which form the double-layered surface of all cells (lipid bilayer). The three major classes of **membrane lipids** are phospholipids, glycolipids, and cholesterol. Lipids are amphiphilic: they have one end that is soluble in water ('polar') and an ending that is soluble in fat ('nonpolar'). By forming a double layer with the polar ends pointing outwards and the nonpolar ends pointing inwards membrane lipids can form a 'lipid bilayer' which keeps the watery interior of the cell separate from the watery exterior. The arrangements of lipids and various proteins, acting as receptors and channel pores in the membrane, control the entry and exit of other molecules and ions as part of the cell's metabolism. In order to perform physiological functions, membrane proteins are facilitated to rotate and diffuse laterally in two dimensional expanse of lipid bilayer by the presence of a shell of lipids closely attached to protein surface, called annular lipid shell

### Cell Membrane Proteins:

1) **Transport Proteins:** Regulate movement of hydrophilic molecules through membrane

A) **Channel Proteins** (e.g. Na<sup>+</sup> channels)

B) **Carrier Proteins** (e.g. glucose transporter)

2) **Receptor Proteins:** Trigger cell activity when molecule from outside environment binds to protein

3) **Recognition Proteins:**

- Allow cells to recognize / attach to one another
- **Glycoproteins:** Proteins with attached carbohydrate groups

## **Membrane sugars**

Plasma membranes also contain carbohydrates, predominantly glycoproteins, but with some glycolipids (cerebrosides and gangliosides). For the most part, no glycosylation occurs on membranes within the cell; rather generally glycosylation occurs on the extracellular surface of the plasma membrane. The glycocalyx is an important feature in all cells, especially epithelia with microvilli. Recent data suggest the glycocalyx participates in cell adhesion, lymphocyte homing, and many others. The penultimate sugar is galactose and the terminal sugar is sialic acid, as the sugar backbone is modified in the golgi apparatus. Sialic acid carries a negative charge, providing an external barrier to charged particles.