

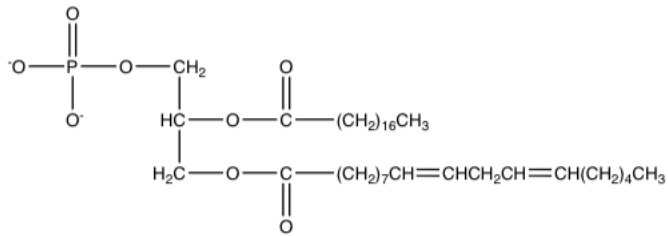
Tutorial 22: The Lipid Bilayer

Goals:

- ✓ To understand the general structure of phospholipids.
- ✓ To be able to describe the lipid bilayer.
- ✓ To understand how particles are transported across the lipid bilayer via passive and active transport.

Phospholipids

Phospholipids make up the basic structure of a cell membrane. Phospholipids are more polar than the lipids discussed thus far (triglycerides), because they contain a phosphate group in place of one of the fatty acid groups.

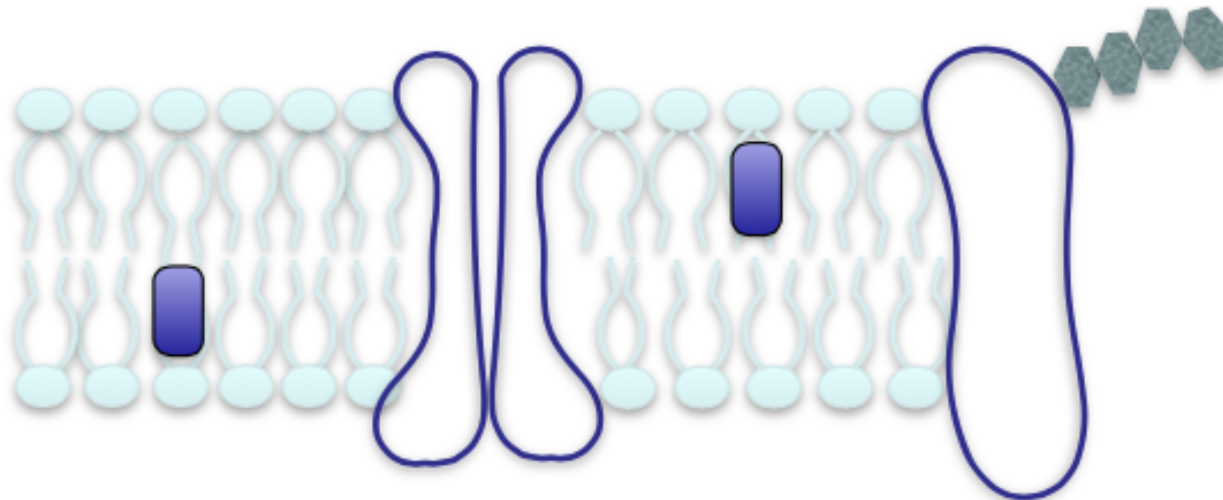


Phospholipid



Lipid Bilayer

- In the lipid bilayer, the polar “heads” of the phospholipids are arranged so as to interact with the aqueous environments on the inside and the outside of a cell, while the nonpolar “tails” coagulate together to form a nonpolar bilayer.
- The lipid bilayer also contains proteins channels that aid in the transport of ions and polar molecules.
- Glycolipids and glycoproteins are lipids and proteins that are attached to sugar units. These sugar units reside on the outside of the cell membrane and serve as receptors that interact with chemical messengers, drugs, other cells, antibodies, etc.
- The lipid bilayer also contains cholesterol (a steroid, which is a type of lipid). Cholesterol contributes to the structure of the bilayer. The cholesterol units are more rigid, and thus help to maintain the shape of the cell.



Transport Across the Bilayer

- **Passive transport** allows substances to move across the bilayer by diffusion from regions of higher concentration to regions of lower concentration.
 - Nonpolar molecules can pass directly through the lipid bilayer.
 - Ions and small polar molecules can pass through the integral protein channels so long as they can fit.
 - Larger polar molecules must undergo facilitated diffusion. This requires the binding to a protein, which in turn changes shape so as to allow the molecule in or out of the cell.
- **Active transport** requires energy from adenosine triphosphate (ATP) to get molecules across the bilayer.

Energy is required because these molecules are moving from regions of lower concentration to regions of higher concentration.