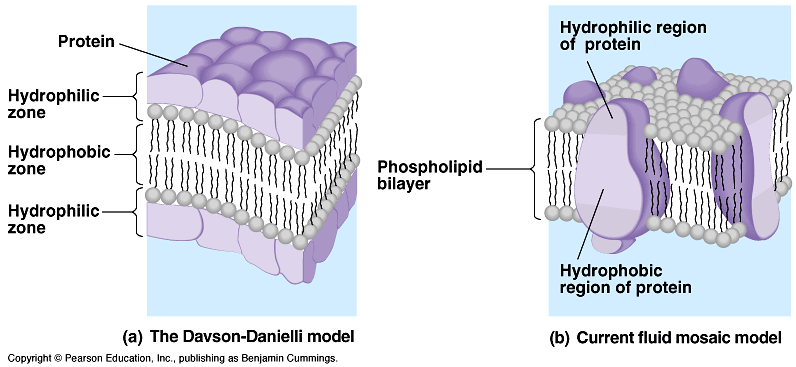
BI 107 CHAP 8

Membrane Structure & Function

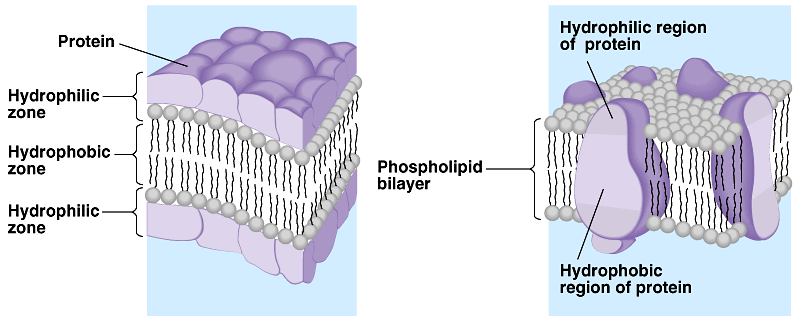
Membrane Structure

- In membranes lipids & proteins are very important carbohydrates are also very important
- A particular lipid is present – phospholipid – an amphipathic molecule- has both hydrophilic & hydrophobic regions
- Most membrane proteins have both hydrophilic & hydrophobic regions



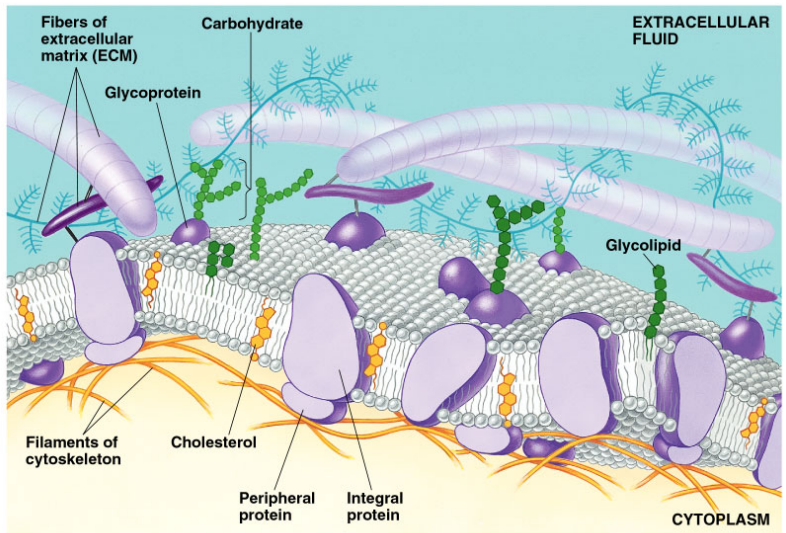
Membrane Structure cont.

- Currently accepted model of membrane structure called fluid- mosaic model
- Fluid – components can move – if fuse human & mouse cells proteins mix in 1 hr.
- Membrane held together mostly by hydrophobic interactions



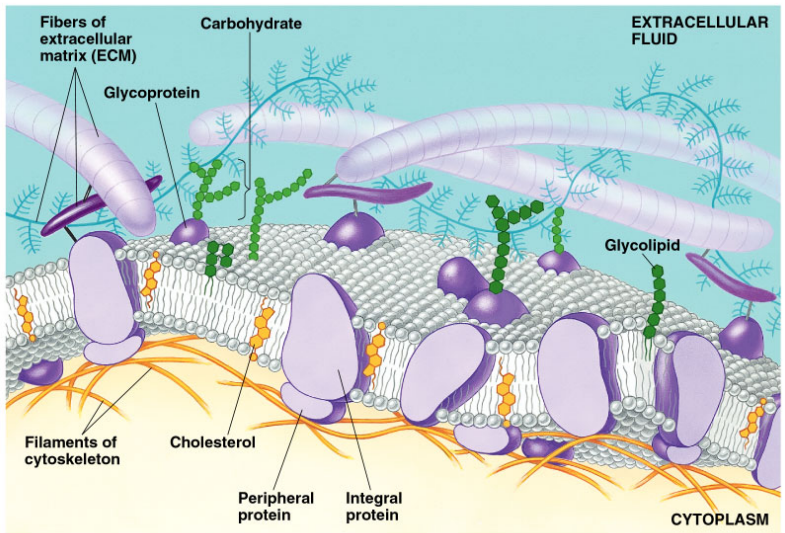
Membrane Structure cont.

- Lipid & protein can drift but no flip-flop
- Lipids move rapidly but proteins move slowly & some proteins held in place as are attached to cytoskeleton
- Membranes with phospholipids having double bonds are fluid at lower temperature



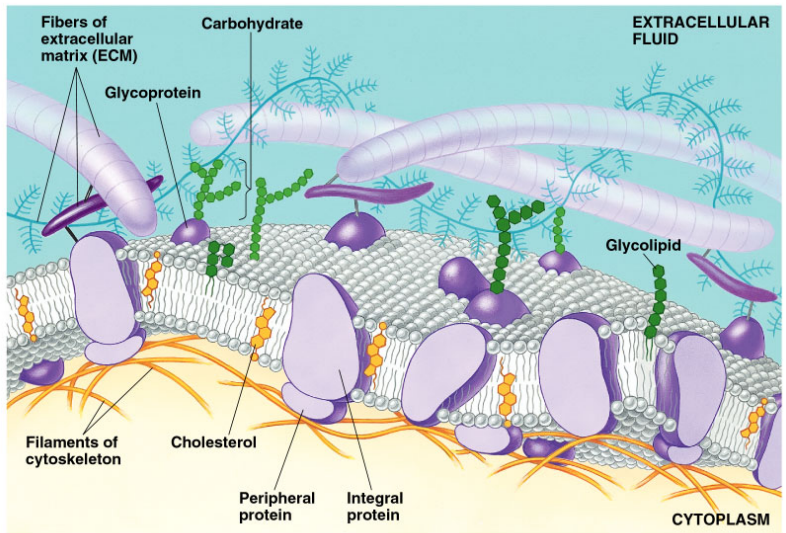
Membrane Structure cont.

- Cholesterol also present in membranes but at body temperatures cholesterol in membranes makes it less fluid
- Phospholipid molecules are hydrophilic for the phosphate head group allowing it to interact with water & hydrophobic for fatty acid tails which form interior of membrane



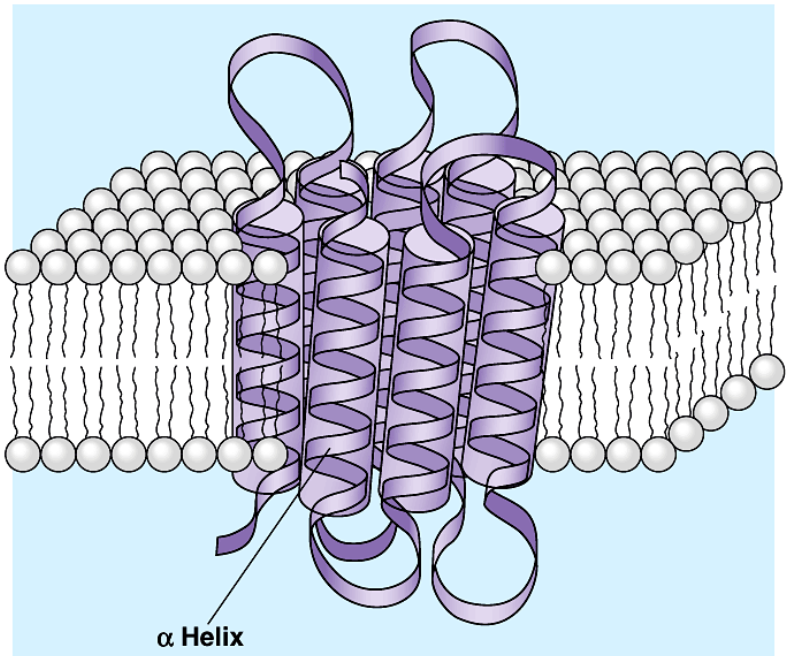
Membrane Structure cont.

- Membranes are mosaics of structure & function – collection of proteins embedded in phospholipid bilayer
- 2 major groups of membrane proteins – integral & peripheral



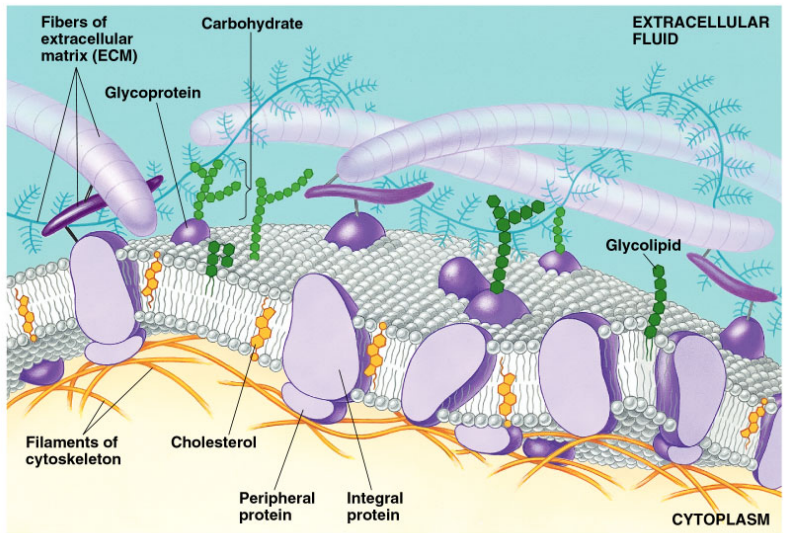
Membrane Structure cont.

- Integral membrane proteins are embedded in the phospholipid bilayer with many being transmembrane – completely spanning the membrane where 1 or more stretches of hydrophobic aa arranged in alpha helices



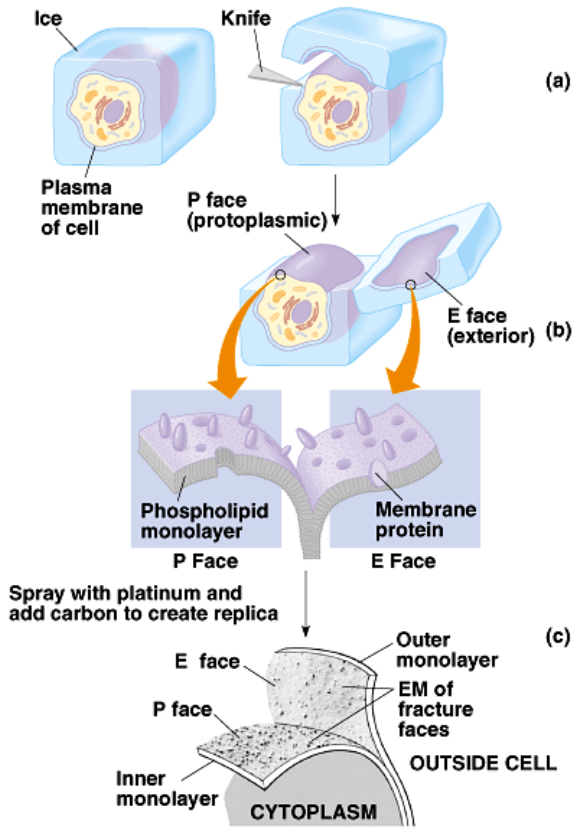
Membrane Structure cont.

- Peripheral membrane proteins attached on inside or outside surface but not embedded in membrane
- In cytoplasm some membrane proteins attached to cytoskeleton & on outside some membrane proteins attached to ECM



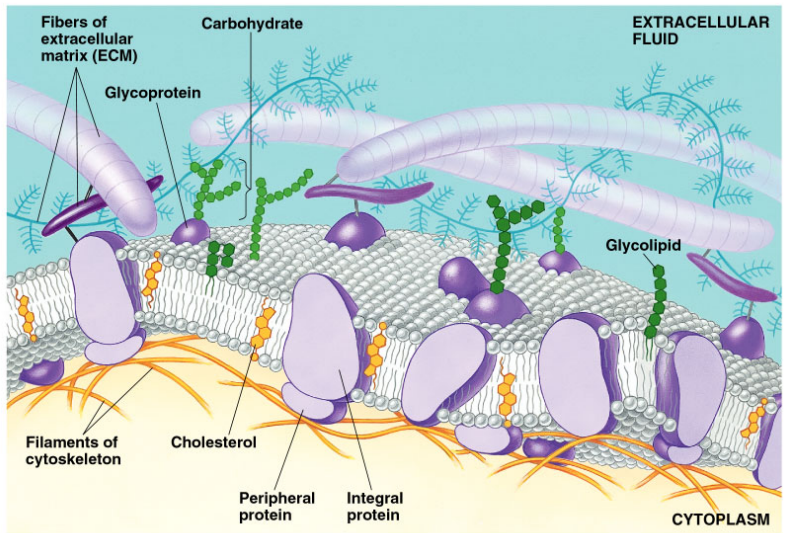
Membrane Structure cont.

- Membranes have inside & outside surfaces where lipid layers can have different compositions, and each surface can have different distributions of proteins, lipids, carbohydrates



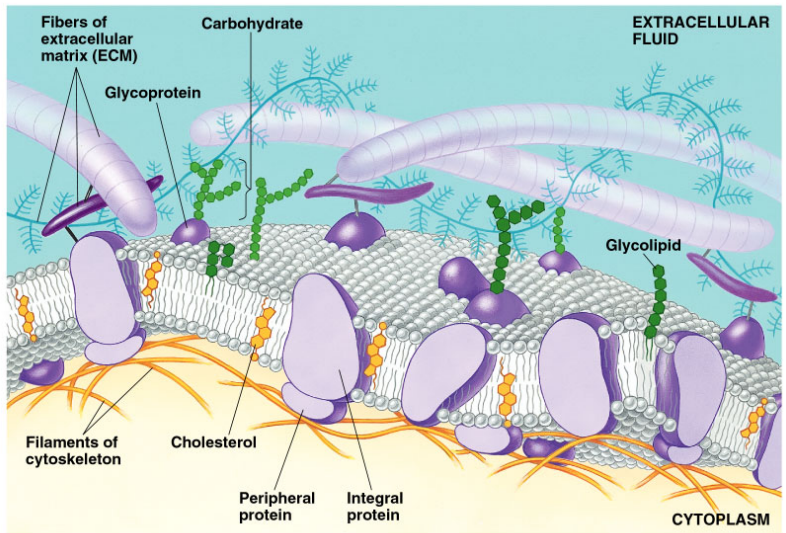
Membrane Structure cont.

- Membrane carbohydrates are very important esp. for cell-cell recognition
- Membrane oligosaccharides are branched & have less than 15 sugar residues – some attached to lipids called glycolipids but most attached to proteins making glycoproteins



Membrane Structure cont.

- Oligosaccharides on external surface vary with cell type in 1 person – blood groups determined by oligosaccharides on RBCs



Membrane Structure cont.

- Functions of membrane proteins – transport, enzyme activity, signal transduction, intercellular joining, cell-cell recognition, attachment to cytoskeleton & ECM