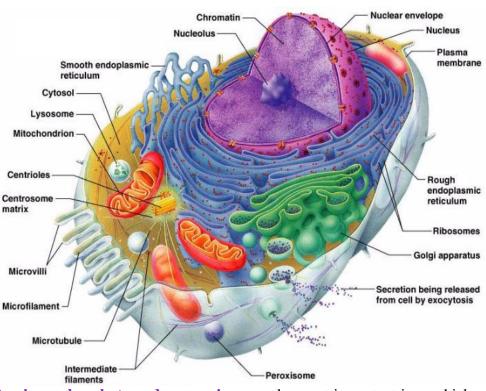
Unit I – Problem 2 – Biochemistry: Biological Membranes



- **Potassium, phosphate and magnesium** are the most important ions which are found in the intracellular fluid (inside the cell).
- <u>Sodium, chloride and bicarbonate</u> are the main ions which are found in the extracellular fluid (outside the cells).
- Biological membranes can be considered as barriers. Also, they support the uptake of nutrients and cell-cell communication. In addition, they receive and transmit various signals.
- The cell membrane is composed of:
 - Lipids:
 - ✓ They are more found in myelinated neurons. They are mainly responsible for the compartmentalization of cells.
 - ✓ <u>There are three forms of lipids:</u>
 - Phospholipids (composing 50-90% of the cell membrane: most abundant):
 - ➢ They are amphipathic.
 - Aggregation of phospholipids might lead to the formation of micelles (ball-shaped molecule with a hydrophobic cor and a hydrophilic surface) or bilayers (notice that a lipid bilayer is asymmetrical).
 - Sterols (composing 5-25% of the cell membrane):
 - They provide fluidity for the membrane such as cholesterol which is found between the hydrophobic tails.
 - *Glycolipids (they are present in cell membrane is very small amounts).*
 - Proteins:
 - ✓ <u>Classification of membrane proteins:</u>
 - Receptors.
 - Transporters: ion channels, aquaporins, glucose transporters.
 - ✤ Ion channels.
 - ✤ Enzymes.
 - ✤ Structural components.

- ✓ <u>The functions of these proteins:</u>
 - ✤ Catabolism (e.g. enzymes).
 - Receptors for hormones.
 - Transporting ions and nutrients.
 - Structural integrity.
- ✓ GPCRs (G-Protein Coupled Receptors) are protein which are linked with Gproteins.
- \checkmark Peripheral membrane proteins are held together by electrostatic interactions.
- ✓ More proteins are found in mitochondria of cells.
- \checkmark Proteins carry most of the reactions inside the cell.

• Carbohydrates:

- \checkmark They are present attached to proteins or lipids as glycoprotein or glycolipid.
- ✓ Typical sugars in glycoproteins and glycolipids include:
 - Glucose, galactose, mannose and fructose.
 - N-acetylated sugars (N-acetyl glucosamine, N-acetyl galactosamine, and N-acetyl neuraminic acid).
- ✓ Membrane sugars may be involved in cell identification and recognition (ABO blood groups).
- The protein-lipid ratio is 1:1 (in human erythrocytes).
- The movement of biological membranes can be:
 - Lateral movement (fast): hitting the next one.
 - **Flip-flop** (slow): what is outward becomes inward.

