**Functions of cell membrane proteins**

1. **Structural proteins** (integrity & strength)
2. **Channel proteins** (non-gated & gated)
3. **Carriers** in facilitated diffusion
4. **Carriers** in active transport (pumps): **uniport** (1x1), cotransport (**symport** 2x1 & **antiport** 2x2)
5. **Receptors**: at outer surface of membrane
6. **Enzymes**: at inner surface of membrane
7. **Identify proteins**: glycoproteins (recognition = identity sites) in self-differentiation & immune responses
8. **Intercellular connections**: tight junctions & gap junctions
9. **Cell adhesion to basal lamina & to each other**
10. **Fixation of parts of the cytoskeleton**
Transport through the cell membrane

**Diffusion**
- **Simple diffusion** (no carrier)
- **Facilitated diffusion** (carrier + enzyme)

**Active transport**
- **1st active transport**
  - Na⁺ – K⁺ pump
  - Water soluble S.
  - High M.W. (glucose)
- **2nd active transport**
  - Glucose 2nd to Na⁺
  - H⁺ – K⁺ pump
  - H⁺ pump
  - Ca²⁺ pump

**Vesicular transport**
- **Endocytosis** = **Exocytosis**
- **Endocytosis**
  - Pinocytosis
  - Phagocytosis

**Body fluids**

<table>
<thead>
<tr>
<th>(1) Intracellular fluid (I.C.F.)</th>
<th>(2) Extracellular fluid (E.C.F.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>40%</strong> of body weight {2/3 body water}…</td>
<td><strong>20%</strong> of body weight {1/3 body water}…</td>
</tr>
<tr>
<td>Inside the cells (tissue &amp; blood) cells</td>
<td>Outside the cells – Interstitial fluid (15%) .(plasma) Intravascular fluid (5%).</td>
</tr>
<tr>
<td>Main cations: (K⁺), Main anions: (proteins), PO₄³⁻, Osmolar conc. (osmolarity): (300 mOsm/L)</td>
<td>Main cations: (Na⁺), Anions: (Cl⁻) &amp; (HCO₃⁻), Osmolar conc. (Osmolarity): (300 mOsm/L)</td>
</tr>
</tbody>
</table>

**Factors affecting diffusion rate (DR):**
- Directly proportional to: 3
  - Conc. gradient
  - Area
  - Temperature
- Inversely proportional to: 2
  - √ M.W
  - Distance (thickness, length)

**Homeostasis:** the maintenance of constant conditions of the internal environment (ECF)
(Volume, composition, electrolytes, osmolality, pH, temperature)

**Intercellular communications**

- **Intercellular gap junctions**
  - Directly from cell to cell
- **Neural communication**
  - By Neurotransmitters crossing synaptic clefts between nerve cells
- **Endocrine communication**
  - By hormones reaching cells through blood stream.

**Paracrine communication**
By hormone from cell to neighboring cells

**Autocrine communication**
By hormone acting directly on its secreting cell