

1  **Cell Membranes**

2  **Fluid Mosaic Model**

- The cell membrane is composed of two layers of simple lipid molecules
- They are commonly depicted as a ball with two dangling strings

3  **Fluid Mosaic Model**

- The heads face outward – away from the middle of the lipid bilayer
- The heads are hydrophilic while the tails are hydrophobic

4  **Fluid Mosaic Model**

- The evidence for our model of cell membrane structure has been verified by numerous electron micrographs that show a dual layer

5  **Fluid Mosaic Model ***

- Membrane components include:
 - Lipids (gray)
 - Proteins (purple)
 - Cholesterol (yellow)

6  **Fluid Mosaic Model**

7  **Fluid Mosaic Model**

- Carbohydrates are frequently attached to the proteins on the external portion

8  **Membrane Proteins**

- There are several types of proteins associated with cell membranes:
 - Integral – embedded in the membrane and are difficult to remove
 - Integral Transmembrane – spans the entire membrane from inside to the outside of the cell membrane *
 - Peripheral – proteins loosely attached to the cell membrane on the inside or outside of the cell

9  **Membrane Proteins**

10  **Membrane Proteins**

11  **Membrane Proteins**

- Membrane proteins have a variety of functions they perform
 - Transport proteins allow the movement of materials into and out of the cell
 - Receptor proteins receive a signal from outside the cell and pass it inside
 - Recognition proteins display “self” signals to identify foreign cells
 - Adhesion proteins permit cell-cell junctions

12  **Membrane Transport**

- The cell membrane is both passively and actively involved in the movement of materials into and out of the cell

- Transport of water, ions and other substances will be treated separately

13 **Membrane Transport**

Phagocytosis *

A form of cell eating where large particles or cells are engulfed by a white blood cell *

14 **Membrane Transport**

Endocytosis

the process where materials are brought into the cell

vs.

Exocytosis

the process where materials are removed from the cell

15 **Membrane Transport**

- Endocytosis is a general term for the movement of substances into the cell

16 **Membrane Transport**

- Exocytosis is the removal of substances from within the cell to the outside
- This may be in the form of waste removal or the secretion of substances needed outside the cell

17 **Membrane Transport**

- Contractile vacuoles are used by protists to remove internal water

18 **Membrane Transport**

- Contractile vacuole in action

19 **Membrane Transport**

- Passive transport
 - Simple diffusion
 - Facilitated diffusion using a carrier molecule

20 **Membrane Transport**










- Passive transport – Simple Diffusion
 - Diffusion is the passive movement of materials from an area of greater concentration to an area of lesser concentration *

21 **Membrane Transport**

- Another view of facilitated diffusion

22 **Membrane Transport**

- Active transport* requires energy, usually in the form of ATP *, to move materials across the cell membrane
- Note that the pump works in the reverse of diffusion due to the added energy (from lower to higher concentration) *

- 23  **Membrane Transport**
- The sodium (Na /K) pump
- 24  **Isotonic, Hypotonic & Hypertonic Solutions**
- Solute – the dissolved solids in a solution (the salt in a salt/water solution)
 - Solvent - the liquid that dissolves the solids in a solution (the water in a salt/water solution)
- 25  **Isotonic, Hypotonic & Hypertonic Solutions**
- Diffusion is the passive movement of materials from an area of greater concentration to an area of lesser concentration *
- 26  **Isotonic, Hypotonic & Hypertonic Solutions**
- Diffusion *
- This animation shows the diffusion of small molecules from a concentrated source *
- 27  **Isotonic, Hypotonic & Hypertonic Solutions**
- A cell placed in an isotonic solution
- Isotonic means EQUAL SALT
- In the Solution:
 - Salt concentration that is equal to that of the cell (ie. 1.0% salt).
 - Water concentration that is equal to that of the cell (ie. 99.0%)
 - In the Cell:
 - Salt concentration is usually 1.0%
 - Water concentration is usually 99.0%
- 28  **Isotonic, Hypotonic & Hypertonic Solutions**
- A cell placed in an isotonic solution
- 29  **Isotonic, Hypotonic & Hypertonic Solutions**
- A cell placed in a hypotonic solution
- hypotonic means LESS SALT
- Solution:
 - Salt concentration that is less than that of the cell (ie. 0.1% or 0.0% salt)
 - Water concentration that is greater than that of the cell (ie. 99.9% or 100%)
 - Cell:
 - Salt concentration is usually 1.0%
 - Water concentration is usually 99.0%
- 30  **Isotonic, Hypotonic & Hypertonic Solutions**
- A cell placed in a hypotonic solution
- 31  **Isotonic, Hypotonic & Hypertonic Solutions**
- A cell placed in a hypertonic solution
- hypertonic means MORE SALT
- Solution:

- Salt concentration that is greater than that of the cell (ie. 2.0% or 10.0% salt)
- Water concentration that is less than that of the cell (ie. 98.0% or 90%)
- Cell:
 - Salt concentration is usually 1.0%
 - Water concentration is usually 99.0%

32 **Isotonic, Hypotonic & Hypertonic Solutions**

- A cell placed in a hypertonic solution*