

## How Stuff Gets In and Out of Cells :

### The Cell Membrane must....

- **bring raw materials in for building bigger things**
  - Amino acids....proteins
  - Monosaccharides...polysaccharides
- **Move out manufactured products**
- **Keep unwanted stuff out**
- **Keep useful stuff collected inside**

### The “Fluid Mosaic Model”....

- Flexible, semi permeable, phospholipid bilayer
- Maintains a constant internal set of conditions inside the cell
  - ( “*maintains homeostasis*” )
- allows some materials in, keeps others out
  - ( *membrane is selectively permeable*” )

### Getting Through the Membrane...

- fluid outside is called “**extracellular fluid**” ( a mix of dissolved chemicals in water )

- There are two options for getting through the membrane :

### Passive transport...

where stuff randomly moves through the membrane, and this **doesn't require any energy** on the part of the cell

- diffusion
- osmosis

### Active transport...

Energy is used to move stuff across the membrane

## Diffusion.....

- Random movement of molecules from where they are concentrated, towards where they are less concentrated. (A “**concentration gradient**”)  
(*Its made to happen by molecules colliding with each other and off of nearby surfaces.....*”**Brownian Motion**”)

Ex. Oxygen enters and carbon dioxide leaves a cell

- Cells having lots of surface area and little cell volume benefit from this, so cells are generally small

Facilitated diffusion is the movement of larger neutral molecules across a membrane using “**carrier proteins**”, specific to one kind of dissolved chemical. They change shape to let these molecules enter or leave.

### Osmosis...

- the diffusion of water molecules across a membrane due to a concentration gradient

Isotonic solutions

Hypotonic solutions

Hypertonic solutions

### Active transport.....

Using energy and cell movement to engulf and take in or release “secrete” substances.

Use of energy to move molecules AGAINST a concentration gradient, using up to 40 % of the cell's energy supply.

Kidney cells pump out sugar and amino acids and put them back into the blood

Walls of the stomach and intestine absorb nutrients from digested food

Endocytosis.....

using the cell membrane to surround and capture something the cell wants and bring it inside.

There are three kinds of endocytosis....

**pinocytosis**, “cell drinking”... a droplet of water is engulfed by the cell

**phagocytosis**, engulfing a solid particle the same way...could be another cell

Taking in specific molecules attached to protein receptors in the membrane.

