

<b>Course Information</b> Course: Biology Lab 2020 Unit: 3. CELLS Assignment: 5. Cell Membrane Function	<b>Originating Course Information</b> Course: Biology Unit: 3. CELLS Assignment: 8. Cell Membrane Function
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## CELL MEMBRANE FUNCTION

Membranes are classified into two groups. The first is called a *permeable membrane*, which allows all molecules to pass through it. The other type is a *semipermeable membrane*, which allows only certain types of molecules through.

### VOCABULARY

<b>homeostasis</b>	The maintenance of a constant internal body environment by an organism's body.
<b>hypertonic</b>	The name given to a solution which has a higher salt concentration than inside the cell.
<b>hypotonic</b>	The name given to a solution that has a lower salt concentration than inside the cell.
<b>isotonic</b>	A solution that contains the same salt concentration as inside the cell.
<b>nonpolar</b>	A molecule or part of a molecule that does not have a charge or partial charge.
<b>osmosis</b>	The diffusion of water across a semipermeable membrane.
<b>permeable membrane</b>	A membrane which allows any molecule to pass through without hindrance.
<b>semipermeable membrane</b>	A membrane which allows some molecules to pass through but excludes others.



Vocab Arcade

The plasma membrane of the cell is a semipermeable membrane. It allows water to go in and out of the cell freely, but it excludes other molecules. This process, called *osmosis*, is defined as *the diffusion of water from a region of greater concentration to a region of lesser concentration across a semi-permeable membrane*.

# OSMOSIS

Click to Play

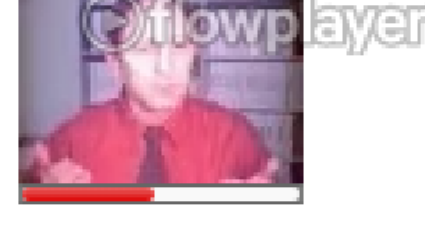
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### Cell Membrane

**Hypertonic, hypotonic, and isotonic solutions.** If a solution has a high concentration of molecular species dissolved in water, the concentration of the water will be reduced. For instance, if we have a beaker with 5% salt and 95% water, and another with 10% salt and 90% water, the beaker with 5% salt solution has a *higher concentration of water* because less salt is present. Let us make an analogy: You have two identical beakers. One contains five marbles (symbolizing the salt), the other beaker contains ten marbles. If you fill both beakers with sand to the same level (symbolizing the water), the beaker with the five marbles will contain more sand.

A cell might be exposed to three possible situations: (1) the salt concentration is greater *inside* the cell than outside; (2) the salt concentration is greater *outside* the cell than inside; and (3) the salt concentration is the same on both sides of the cell membrane.

A solution with a salt concentration lower than the salt concentration inside the cells is said to be *hypotonic*. The result is that cells swell with water. In this situation the concentration of water outside the cell is greater than inside. Water will therefore move *into* the cell (from a region of higher water concentration to a region of lower water concentration). As a result of this inflow of water, the cell may eventually burst.



A solution with a salt concentration higher than the salt concentration within the cell is called *hypertonic*, and results in cells shrinking from loss of water. In this situation, water would move out of the cell by osmosis from a higher water concentration to a lower water concentration. The result is the cell shrinking from loss of water.

In the third situation the cell will experience no net gain or net loss of water. Water molecules will continue to move in and out of the cell, but at equal rates. The type of solution in which the concentrations are identical is called *isotonic*. The liquid portion of your blood is this type of solution. If the salt concentrations inside and outside your cells are not kept the same, they would die either from water gain or from water loss.

When you drink a large amount of water, your body must get rid of the excess water to prevent the liquid in your body from becoming hypotonic to your cells.

Your body maintains a constant concentration of other substances such as sugar, pH and CO<sub>2</sub> in your blood. This maintenance of a constant internal environment is called *homeostasis*. Perhaps no other aspect of the study of biology can so clearly demonstrate the genius of our Creator and Father than the body's homeostasis.

Question #1 Matching

Show Answer

Match the following.

1. The maintenance of a constant internal body environment	<input type="checkbox"/> homeostasis
2. A higher salt concentration than inside the cell	<input type="checkbox"/> hypotonic
3. A lower salt concentration than inside the cell	<input type="checkbox"/> isotonic
4. The same salt concentration as inside the cell	<input type="checkbox"/> osmosis
5. Not having a charge or partial charge	<input type="checkbox"/> nonpolar
6. The diffusion of water across a semipermeable membrane	<input type="checkbox"/> permeable membrane
7. Any molecule can pass through without hindrance	<input type="checkbox"/> semipermeable membrane
8. Allows some molecules to pass through but excludes others	<input type="checkbox"/> hypertonic

Question #2 TextMultipleChoice

Show Answer

A membrane which limits the type of molecules which will pass through it is called .

Question #3 TextMultipleChoice

Show Answer

The passage of water through a semipermeable membrane is called .

Question #4 Matching

Show Answer

Make the correct match:

1. stable	<input type="checkbox"/> hypo
2. same	<input type="checkbox"/> stasis
3. less than, low	<input type="checkbox"/> hyper
4. greater than, high	<input type="checkbox"/> iso

Question #5 TextMultipleChoice

Show Answer

Which way will water flow for the following external solutions?

hypertonic:  the cell

hypotonic:  the cell

Question #6 MultipleChoice

Show Answer

The relative concentration of water in a hypotonic solution is:

low

stable

high

equal

Question #7 MultipleChoice

Show Answer

The relative concentration of water in a hypertonic solution is:

equal

high

stable

low

Question #8 MultipleChoice

Show Answer

The relative concentration of water in an isotonic solution is:

high

equal

low

stable

Question #9 MultipleSelect

Show Answer

If you were stranded on the ocean in a raft, what would happen if you kept drinking ocean water?

your blood would become hypotonic

water would flow out of your body cells

the excess water would flow into your cells

your blood would become hypertonic

the concentration of water in your blood would increase

the concentration of water in your blood would decrease

Question #10 TextMultipleChoice

Show Answer

Match the following:

higher salt concentration than inside the cell:

lower salt concentration than inside the cell:

same salt concentration as inside the cell:

cell bursts:

cell shrinks:

cell stays the same:

allows all substances to pass through:

allows some substances to pass through, excludes others:

Question #11 TextMultipleChoice

Show Answer

If you have two solutions separated by a semipermeable membrane, one having a 7 % concentration of salt in water and the other having a 12 % solution of salt in water, the water will flow from the side with the  % solution to the side with the  % salt solution.

Question #12 TextMultipleChoice

Show Answer

Homeostasis is the maintenance of a  internal environment by the body.

Question #13 TrueFalse

Show Answer

An example of homeostasis in the human body is the glucose, pH, CO<sub>2</sub> concentration in the blood being kept constant.

True

False

