

Effects of Osmosis on Living Blood Cells

A living cell interacts constantly with the environmental medium that surrounds it. The plasma membrane surrounding a cell is a living, selectively permeable structure. It helps to regulate which materials enter and leave the cell. Both the cytoplasm of a cell and its external environmental medium consist mainly of water. You may recall that the plasma membrane is permeable to water. Therefore, water enters or leaves a cell through the process of osmosis. A cell's environmental medium is called hypotonic if it contains a greater water concentration than the cell itself.

If a cell's environmental medium has a lower water concentration than the cell, it is said to be hypertonic. An environmental medium that has the same water concentration as the cell is called isotonic.

What might happen to a cell that is placed in an environmental medium that has a different water concentration than the contents of the cell? In this investigation, you will study the effects of various osmotic environments on living human red blood cells.

Materials

3% sodium chloride (salt) solution	cover slips (3)
0.9% sodium chloride solution	absorbent cotton
distilled water	microscope slides (3)
alcohol	sterile lancet
compound microscope	

CAUTION: Use the lancet only once and dispose of it in 10% bleach after use. It must not be reused, since reuse can spread diseases.

Procedure

1. Label 3 microscope slides as follows: 3% sodium chloride solution, 0.9% sodium chloride solution, distilled water.
2. Sterilize the tip of one of your fingers, using absorbent cotton soaked with alcohol. Then prick the tip of this finger with the sterile lancet. **DISCARD THE LANCET.**
3. Place a drop of blood on each of the 3 slides. Place cover slips on the slides. Then place the slide labelled 3% sodium chloride on the stage of the microscope.
4. Examine the mount under low, medium, and high power. Describe the appearance of individual red blood cells.
5. Add a drop or two of 3% sodium chloride to the edge of the cover slip. Draw the solution under the cover slip by using the paper towel. Observe the red blood cells until no further change occurs. Record your observations and sketch a diagram of an individual red blood cell as it appears in a 3% sodium chloride solution.
6. Repeat steps 4 and 5 using the remaining two slides and the appropriate solutions.

Questions

1. Which medium was hypertonic? How do you know?
2. Which medium was hypotonic? How do you know?
3. Explain what happens when the cells are placed in 0.9% sodium chloride solution.
4. a) What would you assume about the osmotic relationship between human red blood cells and blood plasma?
b) What do you think is the concentration of salts in human plasma?
5. Describe what would happen if you transferred some red blood cells from the 3% sodium chloride solution into distilled water.