CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J0421

Project Title
Effects of the Extracellular Fluid Tonicity on the Volumes of the Living Cells

Abstract

Objectives/Goals
The cell volumes will change depending on the tonicity of the ECF (Extracellular Fluid).

Methods/Materials
U-tube experiment demonstrates the concepts of simple diffusion of water movements across the semipermeable cell membrane via the osmotic gradient. Human cells (red blood cells and buccal mucosal cells) and plant cells (onion cell) are challenged by different tonicities of ECF.

Results
In U- tube experiment, 0.9 Normal Saline (left side of U-tube) versus 3% sodium chloride (hypertonic) (right side of the U-tube), water will move from higher water concentration (0.9 Normal Saline) to lower water concentration (3% sodium chloride) across semipermeable membrane. Opposite direction occurs in 0.9 Normal Saline versus distilled water (hypotonic). Cell volumes do not change in isotonic ECF, but increase in hypotonic ECF and decreased in hypertonic ECF. The plant cells exhibit "turgid state" in hypotonic ECF and "plamolysis" in hypertonic ECF due to the rigid cell wall in plant cell.

Conclusions/Discussion
The cell volumes will change inversely to the ECF tonicity. This project can be applied to preservation of meat, fish, and vegetables with salt and the use of different Intravenus fluid for fluid resuscitation to dehydrated patients.

Summary Statement
Effects of Extracellular Fluid tonicity on the cell volumes are researched.

Help Received
I sincerely give thanks to Mrs. Griego for providing me with necessary information. Secondly, I thank David Wong for editing my work. Lastly, to San San Wong for her assistance in visual display.