Osmosis in red onion cells assignment

Osmosis in Red Onion Cells By: Youssef Gharib Brief Description of Osmosis in Red Onion cells: Osmosis is the diffusion of water from an area of low concentration to an area of high concentration across a semi-permeable membrane. The purpose of this lab is to compare the three different types of solutions affect on the relative size of the vacuole to the cell, the outer membrane of onion red cells (tunics) are used to figure out the different types. In the red onion you can see effects promptly when the onion cells are placed in different type of solutions.

The effect of the solutions is shown through the purple part within the membrane since that's where the vacuoles are present. Question: How will the vacuole inside the cells of the outer membrane of a red onion react when deionized water, a 1%, and a 10% saline solution are added to the cells? Hypothesis: If a saline solution is added to the outer membrane of a red onion cell, then based on the amount of the solution, it will cause the vacuole inside the cell to become hypertonic thus shrinking in size.

This is because water moves from inside the vacuole, to the cell since the saline solution is entering the vacuole. While if deionized water is added on to cell, then the vacuole size should get larger or stay the same. Variables: Independent Variables: type of solution, amount of solution, and the type of onion. Levels of IV: Deionized water, 1% saline solution, 10% saline solution, red onion outer membrane. Control group: Red onion without any solution added to it. Dependent Variables: amount of water inside the vacuole. Controlled Variables: . Constant temperature – this will be insured by keeping the room at a constant temperature of 21 degrees, because if temperature is not kept constant, the data might be affected. 2. Type of onion – this will be

insured by using the same onion (red onion) to collect data, if a different type of onion is used, this might cause the data to be inaccurate. 3. Microscope – while collecting data, and observing what happens to the red onion, the same microscope shall be used for observing what happens to the vacuoles. Materials: * Red Onion Scissors/ Scalpel * Microscope * 1%, 10% saline solutions * Deionized/Distilled water * Plastic cups * Cover slips Procedure: 1. Take a small piece of onion and peel off a sheet of the purple skin. Cut a piece of skin about the size of a little fingernail. 2. Place the piece onto a microscope slide, and put it under the microscope to record data as this is the control group. 3. Then add five drops of deionized water onto the slide, then record qualitative and quantitative observations on the size of the vacuole inside the cell. 4.

Then repeat step one, and put the piece of skin on another microscope slide. 5. Add five drops of 1% saline solution on the slide, then record qualitative and quantitative observations on the change in size of the onion cell vacuole. 6. Step four was repeated, then five drops of 10% saline solution were dropped onto the slide. Record qualitative and quantitative observations again on the change in size of the onion cell vacuole. 7. Steps 2, 3, 5, and 6 were all recorded under high-power objective in the microscope. 8. Clean and dry slide and coverslip.

Data/Data Table: The effect of Deionized water, 1%, and 10% saline solution on the outer membrane of a red onion Amount of water inside the vacuoles| No solution (control group)| Deionized water| 1% solution| 10% solution| Before| 100%| 100%| 100%| 100%| After| 100%| 100%| 85%| 65%| % change| 0%| 0%| 15%| 35%| Qualitative data/ Observations| No change,

purple onion cell walls only visible| No change, deionized water didn't cause vacuoles to shrink| Vacuoles shrank, but not significant amount. | Vacuoles shrank a lot, and are visibly hypertonic| Data Analysis:

In the lab, observations were recorded to see how a 1% saline solution and a 10% saline solution affected the size of the vacuole inside the cells of the outer membrane of a red onion. The independent variables in the experiment were the: type of solution, amount of solution, and the type of onion. There was a 1% saline solution and a 10% saline solution. The type of onion used in this experiment was a red onion, and the purple outer membrane was used to record data. The control group that the experiment was based upon was a slice of the outer membrane without any solutions added to it.

The dependent variable was the amount of water inside the vacuole that changed based on the addition of the saline solutions, and the deionized water. The controlled variables in the experiment were: constant temperature, the type of onion, and the microscope. The constant temperature would be insured by keeping the room at a constant temperature of 21 degrees (room temp.), because if temperature is not kept constant, the data would be affected. The type of onion will be insured by using the same onion (red onion) to collect data, if a different type of onion is used, this would increase chance of error while collecting data.

While collecting data, and observing what happens to the red onion, the same microscope was used for observing what happens to the vacuoles. The data collected and observations recorded showed that the more

concentrated the saline solutions were, the more the vacuole shrunk in size. For example, when the 1% solution was added, only 15% of the vacuole lost water, while when the 10% solution was added, 35% of the vacuole lost water. The deionized water however showed barely any change in size, so it did not shrink or grow.

The percentages recorded in the data table though were not accurate since they were just assumptions because the tools to correctly measure the percent change were not present. Since the experiment was only conducted once, there were no repeated trials, leading the data to be more prone to errors and uncertainties. Another error in the data was that at first many slices of the tunic had to be peeled to finally get a single strand of cells, because every time a slice would be peeled, there would be a double layer of cells, causing it to be hard to see through the microscope.

Conclusion and Evaluation: In the lab, many conclusions were drawn from the results found. The data calculated, and the observations recorded supported the hypothesis, since in the data the saline solutions caused the vacuoles to shrink, and the deionized water caused the vacuole to stay the same. The saline solutions caused the vacuoles to shrink because since there was more salt outside the vacuole, the vacuole became hypertonic causing it to release water and absorb salt into the vacuole.

The use of a control group in this experiment establishes the basis of a means for comparison between the different levels of IV and the control group. The procedure was not as descriptive as possible, and could have been more explanatory, and instructive. Limitations in the experiment could

have been that the tunic of the red onion was not thin enough to record accurate data since it was very hard to get a single strand of cells without having two strands on top of each other. Another imitation in the experiment would've been that the correct tools to measure the quantitative data in the experiment were not present, and it caused the data to be approximated, and not accurate. A weakness in the experiment could have been that at first, the saline solutions didn't seem to change the size of the vacuoles, until another observation was conducted from the microscope and it became visibly different. An error in the experiment would've included only having one trial, and not repeating any.

Another error could've been contaminations with the contact of the cells with skin, and or contaminations with the dropper used for the experiment. Improvements that could've been made to this experiment were repeated trials to make the data more precise, also a way to measure the relative size of the vacuole to the cell more accurately. Another improvement could've been using a microscope with higher magnification and resolution leading to better image quality and better data. Protocol Diagram: