

MODEL OF DEHYDRATION AND OVERHYDRATION

ELABORATE LESSON 13



Materials

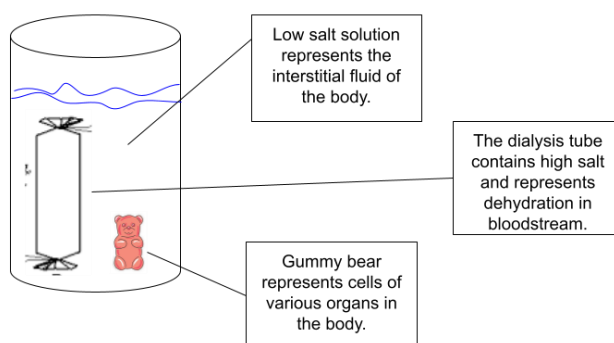
- Beakers or cups (2 per group, approximately 200 mL capacity)
- Distilled water
- Salt
- Gummy bears (at least 2 per group)
- Dialysis tubes (2 per group, each approximately 3 inches in length, soaked in distilled water prior to start of activity)
- String or clips (at least 4 per group, to tie off end of dialysis tubes)
- Balance (or scale)
- Paper towel

Set-Up

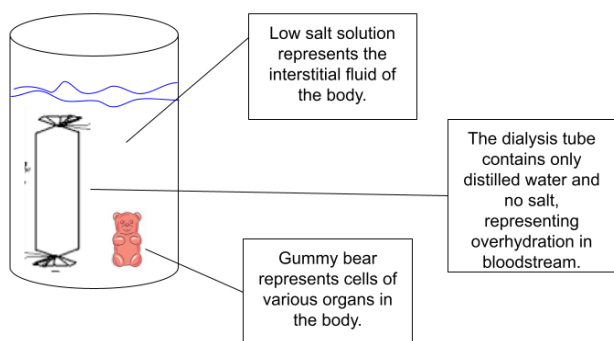
This hands-on model will demonstrate how cells can gain or lose water depending on what the water and salt concentrations of their environment are. You will set up two different conditions that match the Lesson 13: Case Studies.

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First, for the dehydration case, set up a dialysis tube (approximately 3 inches in length) to be filled with a high salt solution. Prepare this by mixing 10 g of salt with 150 mL of water. Tie off or clip one end of the dialysis tube, leaving an opening at the top. Carefully pour the solution into the dialysis tube, nearly filling it. Note that you should leave a little room in the tube, but the tube should be solid after being filled. Seal the tube with a tie or clip, and be sure that the bag is not leaking. Rinse the dialysis tube and then place the filled dialysis tube in a beaker (or cup), covering it completely. Make a low-salt solution using salt and distilled water (prepare by mixing 3 g of salt with 150 mL of water). This solution will represent the interstitial fluid around body cells and will be much less concentrated than the salt solution in the dialysis tube. Fill the beaker (or cup) with enough of the low-salt solution to cover the dialysis tube entirely. In the same beaker, place at least one gummy bear for observation. The gummy bear will represent the body cells of organs in the body. Display for students or take a photo of the initial setup. Show students the results after the beaker sits for at least 1 hour and again after 24 hours.



Make a second dialysis tube to represent the overhydration case. Fill the dialysis tube with distilled water (no salt) and place it in a beaker with the low-salt solution. Place the filled tube in the second beaker (or cup). Again, be sure to fill it with enough of the low-concentration saltwater solution that it is entirely covered. Place at least one gummy bear in the beaker with the dialysis tube. Display for students or take a photo of the initial setup. Show students the results after the beaker sits for at least 1 hour and again after 24 hours.

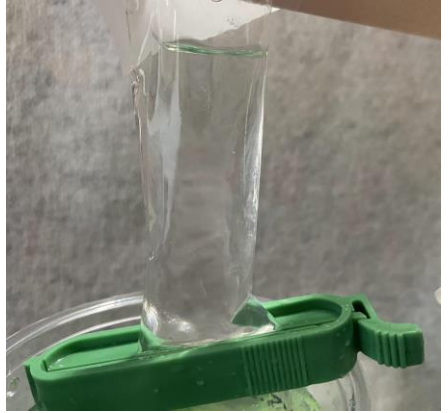
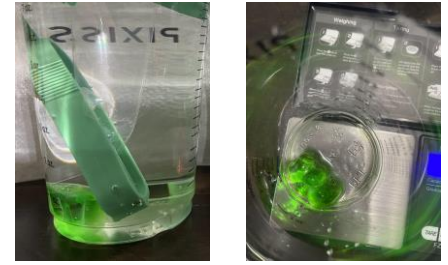


Expected Outcomes

Dehydration Model	Initial Conditions	After 24 hours
Bloodstream (Dialysis Tube Bag)	Bag is full of water	Bag appears more full (rigid) 
Body Cells (Gummy Bears)	Normal size	Shriveled in size 

Summary of Dehydration Model

The gummy bears decrease in size over the course of the experiment as water moves from the gummy bear into the interstitial fluid and eventually into the dialysis tube.

Overhydration Model	Initial Conditions	After 24 hours
Bloodstream (Dialysis Tube Bag)	Bag is full of water	Bag appears to have less water in it 
Body Cells (Gummy Bears)	Normal size	Increased in size 

Summary of Overhydration Model

The gummy bears increase in size over the course of the experiment as water moves from the dialysis tube into the interstitial fluid and eventually into the gummy bear.