**Modeling Kidney Function Lab**

Medical tests are often required to assess an individual’s state of health. Although many sophisticated, expensive, highly technological tests have recently become available and popular (e.g., MRI, genetic screening), the most common and useful tests are still the ones that are simple, inexpensive, and non-invasive. Examples include patient history, body temperature, heart rate and blood pressure, and the analysis of blood and urine samples. In this lab, you will test (simulated) urine solutions to see what substances are present and diagnose two patient urine samples.

**Safety**

* Wear safety goggles.
* The dye in the simulated blood solution will stain skin and clothing. Avoid getting the solution on your skin and clean up spills quickly to minimize staining.

**Set Up:**

Create this data table in your lab book

|  |  |  |
| --- | --- | --- |
| Test Factor | Observations | |
| Inside Dialysis Tubing (kidney) | Inside Cup (urine) |
| Color at start |  |  |
| Color after 30 minutes |  |  |
| Color after 24 hours |  |  |
| Salt at start (Y/N) |  |  |
| Salt after 30 minutes (Y/N) |  |  |
| Salt after 24 hours (Y/N) |  |  |

**Procedure and Notes**

1. Label a plastic cup with your initials.
2. Get a piece of wet dialysis tubing and gently tie one end with a string to that it will not leak.
3. Fill the tubing with water and test it for leaks at a sink, then empty the tubing.
4. Using a graduated cylinder, pour about 10 mL of simulated blood solution into the dialysis tubing.
5. Tie the open end of the tubing with another piece of string. This filled tube represents a model kidney.
6. Rinse the kidney model at a sink to wash off any excess simulated blood that may have spilled on the outside of the tubing. Be sure that the tubing does not leak before proceeding.
7. Place your kidney model in the labeled clear cup and fill the cup to within 1 inch from the top with distilled water.
8. Immediately dip a salt test strip into the water in the cup for 1-2 seconds to test it for the presence of salt. Read the results after 4 minutes. If salt is present, the color paf at the bottom of the strip will turn from yellow to light green for low salt concentration and change to a darker shade of green for high salt concentration. Record the results in your data table.
9. Observe the colors of the solutions in the cup and in the kidney model and record in your data table.
10. After 30 minutes, again observe the color and test for the presence of salt. Record observations in your data table.
11. Place your kidney model cups in a location where they will be undisturbed for 24 hours.
12. After 24 hours, again observe the colors and test the simulated urine for salt. Record your results in the data table.

Analysis

1. Describe the changes to color and salt which occurred before and after kidney dialysis.
2. What process caused the salt to move out from the dialysis tubing into the cup?
3. Why did the simulated blood remain inside the membrane?
4. In what way(s) does this activity demonstrate kidney function?
5. How is this activity related to homeostasis?