



**A Day in the Life of a Diabetic
teacher instructions**

Materials

glucose solutions

- Prepare glucose solutions of the following concentrations
 - 40 mg/dL (0.4 g/liter)
 - 80 mg/dL (0.8 g/liter)
 - 200 mg/dL (2 g/liter)
 - 400 mg/dL (4 g/liter)
- These solutions should be either sterile, or prepared no earlier than the day before use to prevent the growth of mold.
- Label the solutions in a coded manner. I have labeled the worksheet with color codes for the 4 different concentrations of glucose. You will also probably want to aliquot the solutions so that several students can have tubes at once.
- I have noticed over time that the strips seems to give slightly high readings. Below are the values I often observe.

<u>concentration of solution</u>	<u>value obtained</u>	<u>color tube</u>	<u>time/activity</u>
40 mg/dL	50 mg/dL	clear	after exercise
80 mg/dL	100 mg/dL	purple	before breakfast
200 mg/dL	250 mg/dL	yellow	after lunch
400 mg/dL	500 mg/dL	green	after cake

glucose strips

- Order from McKesson Medical (303) 373-1145
0810-417144 - Boehringer Mannheim Urinalysis strips, Chemstrip 4
\$33.83 for 100 strips
- The strips come with 4 squares. To minimize confusion, cut the end two squares off and throw out. The strips need to be stored in a dark, dry environment. The easiest way to do this is to store them in the cans, which contain a desiccant in the lid.
- Remember to save the cans and to have them handy during class since they have the key for reading the strips on the side.
- Old strips (older than 6 months or not stored in a completely dry, dark place) will change color faster giving much higher results than expected.

Goal

To apply what you have learned about diabetes and how different foods and activities influence blood sugar levels to practical questions.

Background

Normal glucose levels in non-diabetic individuals

fasting	70-110 mg/dL
within 2 hrs of eating	100-180 mg/dL

Assume the person you are studying is a type I diabetic taking insulin. Assume she has eaten a normal dinner the night before and taken a regular dose of insulin.

Step 1 - Predictions

Based on what you know about diabetes, insulin and blood glucose levels, make a prediction as to how and why each of the following activities would affect blood sugar levels (ie, would the proposed activity raise or lower blood sugar levels, by how much, and why). Then, choose a blood glucose level (mg/dL value or range) which is consistent with your prediction. Be sure to explain why you chose the level you did. You may also record your predictions in the “expected glucose level” column on the attached data sheet.

1. The diabetic wakes up in the morning before breakfast. She has not eaten since the previous evening and took her usual insulin shot before bed.

Predicted blood sugar level - _____ mg/dL

Why?

There are several possibilities here. The important thing is for the student to have a reason for the answer they chose.

low (40 - 60 mg/dL) - This could happen as the diabetic has not eaten in a while. It would also be likely to happen if the diabetic ate less than usual the evening before, or took more insulin than usual.

normal (70 - 100 mg/dL) - This would happen in well controlled diabetics who have no problem controlling their blood sugar levels and have lots of practice with how much to eat and how much insulin to inject.

high (above 120 mg/dL) - Dawn Affect - This often happens due to what is known as the dawn affect. Near morning, everyone's body produces hormones which help wake them up. Part of this waking up process involves an increase in blood sugar to prepare the body to be more active.

2. The diabetic eats a normal lunch, sandwich, chips and apple. She measures her blood sugar 2 hr. after this meal.

Predicted blood sugar level - _____mg/dL

Why?

High end of normal (around 120 mg/dL) - This would happen in well-controlled diabetics who ate regular meals and had worked out how much insulin they need.

High (200 up to 400 or so) - This would happen in less well-controlled diabetics.

3. In the afternoon, the diabetic runs 10 miles. She usually only runs 2 miles, but today she felt full of energy and wanted to see how far she could run.

Predicted blood sugar level - _____ mg/dL

Why?

While it is true that a small amount of exercise can increase blood sugar levels by stimulating the liver to release glucagon, with a run of 10 miles, one would definitely expect a low blood sugar (40 - 70 mg/dL).

4. That evening, the diabetic helps her mother celebrate her birthday and eats a large slice of birthday cake.

Predicted blood sugar level - _____ mg/dL

Why?

High (200 - 800 mg/dL) - after eating cake, a diabetics blood sugar would be high, how high would depend on how much insulin they had taken, what else they ate and how well controlled their diabetes was.

Step 2 - Testing your predictions

You will be given a glucose test strip and a liquid solution which represents of the blood samples taken from the diabetic in this scenario. Note the color of your tube (the plastic tube, not the liquid in the tube). The different colors of tubes refer to the different blood samples that the class will be testing.

purple - time 1 - before breakfast

yellow - time 2 - after lunch

clear - time 3 - after exercise

green - time 4 - after birthday cake

GLUCOSE TESTING INSTRUCTIONS

1. Wet the yellow square on the end of your glucose strip by sticking it into the simulated blood in your tube. When the square is wet, remove it from the liquid.
DO NOT leave your glucose strip in the blood sample longer than the time needed to wet it.
2. Wait one minute.
DO NOT wait longer than one minute. The strip will become darker over time!
The color of the yellow square will change to green. At one minute, determine the glucose concentration in your simulated blood sample by comparing the color of your strip to the color of the squares on the can. If your color is between two of the squares on the can, estimate a number between the two.
3. Record your value on the attached activity sheet

Step 3 - Data Analysis

How does the glucose level you obtained compare with the level you predicted in step 1?

Summary of results

<u>time of day/activity</u>	<u>actual blood glucose level (mg/dL)</u>
before breakfast (purple tube)	100
after lunch (yellow tube)	250
after exercise (white tube)	50
after cake (green tube)	500