

PhysioEx Lab Report

Exercise 4: Endocrine System Physiology

Activity 2: Plasma Glucose, Insulin, and Diabetes Mellitus

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Pre-lab Quiz Results

You scored 100% by answering 5 out of 5 questions correctly.

1 Which of the following statements is *false*?

You correctly answered: **Insulin is a hormone secreted into the stomach to aid with starch digestion.**

2 Which of the following statements is *true*?

You correctly answered: **All of these statements are true.**

3 A diagnosis of type 1 diabetes mellitus implies that

You correctly answered: **the pancreas is not producing sufficient insulin.**

4 A diagnosis of type 2 diabetes mellitus implies that

You correctly answered: **the cells of the body are unresponsive to circulating insulin.**

5 Glucagon is a hormone

You correctly answered: **that opposes the action of insulin.**

Experiment Results

Predict Question

1 Predict Question: To measure the amount of plasma glucose in a patient sample

Your answer: **the optical density of the sample will be measured and the glucose concentration will be extrapolated from the glucose standard curve.**

Stop & Think Question

1 Why does the color in the tubes vary?

You correctly answered: **The tubes contain different amounts of glucose.**



Experiment Data

| | Tube | Optical Density | Glucose (mg/deciliter) |
|--------|------|-----------------|------------------------|
| Part 1 | 1 | 0.30 | 30 |
| | 2 | 0.50 | 60 |
| | 3 | 0.60 | 90 |
| | 4 | 0.80 | 120 |
| | 5 | 1.00 | 150 |
| Part 2 | 1 | 0.73 | 105 |
| | 2 | 0.79 | 115 |
| | 3 | 0.89 | 132 |
| | 4 | 0.83 | 120 |
| | 5 | 0.96 | 143 |

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X

Post-lab Quiz Results

You scored 83% by answering 5 out of 6 questions correctly.

- A male patient has had successive fasting plasma glucose readings of 115, 110, and 122 mg/dl. The healthcare provider will inform him that

You correctly answered: **he appears to have impairment or borderline impairment of insulin-mediated glucose uptake by his cells.**
- To obtain an accurate spectrophotometric measurement of the glucose concentration in the sample

You correctly answered: **heparin is added to prevent blood clots.**
- In the spectrophotometric assay used in this experiment, the _____ as the glucose concentration in the sample increases.

You correctly answered: **optical density increases.**
- A female patient has had successive fasting plasma glucose readings of 130, 140, and 128 mg/dl. The healthcare provider will inform her that

You correctly answered: **she has developed diabetes.**
- To maintain plasma glucose homeostasis

Your answer: **glucagon-mediated transport of glucose into cells acts as negative feedback when plasma glucose levels rise.**

Correct answer: **insulin-mediated transport of glucose into cells acts as negative feedback when plasma glucose levels rise.**

- 6** A laboratory technician withdraws a blood sample from a vein in your upper arm knowing that

You correctly answered: **the plasma glucose concentration will be the same in both the arm vein and the index finger.**

Review Sheet Results

- 1** What is a glucose standard curve, and why did you need to obtain one for this experiment? Did you correctly predict how you would measure the amount of plasma glucose in a patient sample using the glucose standard curve?

Your answer:

The glucose standard curve illustrates the relationship between glucose concentration and optical density to determine the amount of glucose circulating in the blood and diagnose diabetes mellitus. I needed to obtain a curve to compare the various samples from the patients and to diagnose them properly. My prediction was correct and correlated with my results.

- 2** Which patient(s) had glucose reading(s) in the diabetic range? Can you say with certainty whether each of these patients has type 1 or type 2 diabetes? Why or why not?

Your answer:

Patient 5 can be diagnosed with diabetes since both FPG values were greater than 126 mg/dl. Patient 4's results indicate borderline impairment of insulin-mediated glucose uptake by cells since the FPG values were in the range of 110 - 126 mg/dl. Patients 2 and 3 had one FPG value that was either borderline or could be considered diabetic. I cannot say with certainty whether each of the patients have type 1 or 2 diabetes because there is no indication with the administered test. Therefore, more tests would need to be conducted.

- 3** Describe the diagnosis for patient 3, who was also pregnant at the time of this assay.

Your answer:

Patient 3 has gestational diabetes, which typically disappears after pregnancy.

- 4** Which patient(s) had normal glucose reading(s)?

Your answer:

Patient 1.

- 5 What are some lifestyle choices these patients with normal plasma glucose readings might recommend to the borderline impaired patients?

Your answer:

Patients should monitor their sugar intake and check their glucose levels regularly. They could also try to exercise more and try to follow a diet.

