CASE STUDY 13-2

A 58-year-old, obese man with frequent urination is seen by his primary care physician. The following laboratory work was performed, and the following results were obtained:

CASUAL PLASMA GLUCOSE			225 mg/dL
URINALYSIS RESULTS			
Color and appearance	Pale/clear	Blood	Negative
pH	6.0	Bilirubin	Negative
Specific	1.025	Urobilinogen	Negative
Glucose	2+	Nitrites	Negative
Ketones	Negative	Leukocyte esterase	Negative

Questions

1. What is the probable diagnosis of this patient?
2. What other test(s) should be performed to confirm this? Which is the preferred test?
3. After diagnosis, what test(s) should be performed to monitor his condition?

1-Based on the elevated plasma glucose level and frequent urination, the probable diagnosis is diabetes.

2-To confirm the diagnosis of diabetes, the preferred test is the fasting plasma glucose test. This test measures the blood glucose level after a period of fasting, usually overnight. Other tests that can be performed include the oral glucose tolerance test and the hemoglobin A1c test.

3-After diagnosis, the patient should undergo regular monitoring of their condition. This typically involves performing regular blood tests to measure their blood glucose levels, such as the fasting plasma glucose test or the hemoglobin A1c test. These tests help assess how well the patient's diabetes is being managed and guide any necessary adjustments to their treatment plan.

CASE STUDY 13-3

A 14-year-old, male student was seen by his physician. His chief complaints were fatigue, weight loss, and increases in appetite, thirst, and frequency of urination. For the past 3 to 4 weeks, he had been excessively thirsty and had to urinate every few hours. He began to get up 3 to 4 times a night to urinate. The patient has a family history of diabetes mellitus.

LABORATORY DATA

Fasting plasma glucose	160 mg/dL	
Urinalysis	Specific gravity	1.040
	Glucose	4+
	Ketones	Moderate

Questions

1. Based on the preceding information, can this patient be diagnosed with diabetes?
2. What further tests might be performed to confirm the diagnosis?
3. According to the American Diabetes Association, what criteria are required for the diagnosis of diabetes?
4. Assuming this patient has diabetes, which type would be diagnosed?

1. Based on the information provided, it is highly likely that this patient can be diagnosed with diabetes. The symptoms of increased thirst, frequent urination, weight loss, and a family history of diabetes, along with the elevated fasting plasma glucose and presence of glucose and ketones in the urinalysis, strongly suggest a diagnosis of diabetes.

2. To confirm the diagnosis, further tests that may be performed include the oral glucose tolerance test (OGTT) and the hemoglobin A1c test. The OGTT measures blood glucose levels before and after consuming a glucose-rich drink, while the hemoglobin A1c test provides an average of blood glucose levels over the past few months.

3. According to the American Diabetes Association, the criteria required for the diagnosis of diabetes include:
- A fasting plasma glucose level of 126 mg/dL or higher on two separate occasions.
- A random plasma glucose level of 200 mg/dL or higher, along with symptoms of diabetes.
- An oral glucose tolerance test with a plasma glucose level of 200 mg/dL or higher after two hours.

4. If this patient is diagnosed with diabetes, further evaluation is needed to determine the type. Given the symptoms and presentation, it is more likely that this patient would be diagnosed with type 1 diabetes, which is characterized by the body's inability to produce insulin.

CASE STUDY 13-4

A 13-year-old girl collapsed on a playground at school. When her mother was contacted, she mentioned that her daughter had been losing weight and making frequent trips to the bathroom in the night. The emergency squad noticed a fruity breath. On entrance to the emergency department, her vital signs were as follows:

Blood pressure	98/50 mm Hg
Respirations	Rapid
Temperature	99°F

Stat lab results included:

RANDOM URINE		SERUM CHEMISTRIES	
pH	5.5	Glucose	500 mg/dL
Protein	Negative	Ketones	Positive
Glucose	4+	BUN	6 mg/dL
Ketones	Moderate	Creatinine	0.4 mg/dL
Blood	Negative		

Questions

1. Identify this patient's most likely type of diabetes.
2. Based on your identification, circle the common characteristics associated with that type of diabetes in the case study above.
3. What is the cause of the fruity breath?

1. The most likely type of diabetes for this patient is type 1 diabetes.

2. Common characteristics associated with type 1 diabetes in the case study above include weight loss, frequent urination, fruity breath, elevated blood glucose levels, presence of ketones in the urine, and rapid respirations.

3. The fruity breath is caused by a condition called diabetic ketoacidosis (DKA). In DKA, the body breaks down fat for energy instead of using glucose, resulting in the production of ketones. The presence of ketones in the body leads to the fruity breath odor.

CASE STUDY 13-5

A 28-year-old woman delivered a 9.5-lb infant. The infant was above the 95th percentile for weight and length. The mother's history was incomplete; she claimed to have had no medical care through her pregnancy. Shortly after birth, the infant became lethargic and flaccid. A whole blood glucose and ionized calcium were performed in the nursery with the following results:

Whole blood glucose	25 mg/dL
Ionized calcium	4.9 mg/dL

Plasma glucose was drawn and analyzed in the main laboratory to confirm the whole blood findings.

Plasma glucose	33 mg/dL

An intravenous glucose solution was started and whole blood glucose was measured hourly.

Questions

1. Give the possible explanation for the infant's large birth weight and size.
2. If the mother was a gestational diabetic, why was her baby hypoglycemic?
3. Why was there a discrepancy between the whole blood glucose concentration and the plasma glucose concentration?
4. If the mother had been monitored during pregnancy, what laboratory tests should have been performed and what criteria would have indicated that she had gestational diabetes?

1. The possible explanation for the infant's large birth weight and size could be maternal diabetes during pregnancy. When a mother has diabetes, her baby may receive excess glucose through the placenta, leading to increased fetal growth.

2. If the mother was a gestational diabetic, her baby could still be hypoglycemic due to the sudden decrease in the supply of glucose after birth. The baby's pancreas may continue to produce high levels of insulin to compensate for the high glucose levels during pregnancy, causing low blood sugar levels after birth.

3. The discrepancy between the whole blood glucose concentration and the plasma glucose concentration could be due to the different methods used to measure glucose levels. Whole blood glucose measurements may be slightly lower than plasma glucose measurements due to the presence of other components in whole blood.

4. If the mother had been monitored during pregnancy, laboratory tests that should have been performed include fasting blood glucose levels, oral glucose tolerance test, and glycated hemoglobin (HbA1c) test. Criteria indicating gestational diabetes would include fasting blood glucose levels of 92 mg/dL or higher, a 1-hour glucose level of 180 mg/dL or higher during the oral glucose tolerance test, or an HbA1c level of 5.7% or higher. These tests help identify and manage gestational diabetes during pregnancy.

CASE STUDY 13-6

Laboratory tests were performed on a 50-year-old lean white woman during an annual physical examination. She has no family history of diabetes or any history of elevated glucose levels during pregnancy.

LABORATORY RESULTS	
Fasting blood glucose	90 mg/dL
Cholesterol	140 mg/dL
HDL	40 mg/dL
Triglycerides	90 mg/dL

Questions

1. What is the probable diagnosis of this patient?
2. Describe the proper follow-up for this patient.
3. What is the preferred screening test for diabetes in nonpregnant adults?
4. What are the risk factors that would indicate a potential of this patient's developing diabetes?

1. Based on the laboratory results, the probable diagnosis for this patient could be impaired fasting glucose (IFG) or prediabetes. IFG is diagnosed when the fasting blood glucose level is between 100-125 mg/dL, indicating higher than normal blood sugar levels.

2. The proper follow-up for this patient would include regular monitoring of blood glucose levels to assess any progression towards diabetes. Lifestyle modifications such as adopting a healthy diet, increasing physical activity, and maintaining a healthy weight are recommended to prevent or delay the onset of diabetes.

3. The preferred screening test for diabetes in nonpregnant adults is the fasting plasma glucose (FPG) test. It measures the blood glucose level after an overnight fast and is a reliable indicator of diabetes.

4. Risk factors that would indicate a higher risk for developing diabetes include obesity, sedentary lifestyle, family history of diabetes, history of gestational diabetes, high blood pressure, and certain ethnic backgrounds such as African, Hispanic, Asian, or Native American descent. These risk factors should be taken into consideration when assessing an individual's risk for diabetes.

CASE STUDY 13-7

For 3 consecutive months, a fasting glucose and glycosylated hemoglobin were performed on a patient. The results are as follows:

	QUARTER 1	QUARTER 2	QUARTER 3
Plasma glucose, fasting	280 mg/dL	85 mg/dL	91 mg/dL (FPG)
Glycosylated hemoglobin	7.8%	15.3%	8.5%

Questions

1. In which quarter was the patient's glucose the best controlled? The least controlled?
2. Do the fasting plasma glucose and glycosylated hemoglobin match? Why or why not?
3. What methods are used to measure glycosylated hemoglobin?
4. What potential conditions might cause erroneous results?

1. It looks like the patient's glucose was best controlled in the second quarter, with a fasting plasma glucose (FPG) level of 85 mg/dL. On the other hand, the least controlled quarter was the first one, with a fasting plasma glucose level of 280 mg/dL.

2. The fasting plasma glucose and glycosylated hemoglobin don't quite match up. The fasting plasma glucose reflects the current blood sugar level, while the glycosylated hemoglobin provides an average of blood sugar levels over a longer period of time, typically the past 2-3 months. So, they measure different aspects of glucose control.

3. To measure glycosylated hemoglobin, a method called hemoglobin A1c (HbA1c) test is commonly used. It measures the percentage of hemoglobin that has glucose attached to it.

4. There are a few potential conditions that might cause erroneous results in the glycosylated hemoglobin test. Conditions like anemia, certain blood disorders, or recent blood transfusions can affect the accuracy of the results.

CASE STUDY 13-8

A 25-year-old, healthy, female patient complains of dizziness and shaking 1 hour after eating a large, heavy-carbohydrate meal. The result of a random glucose test performed via fingerstick was 60 mg/dL.

Questions

1. Identify the characteristics of hypoglycemia in this case study.
2. What test(s) should be performed next to determine this young woman's problem?
3. To which category of hypoglycemia would this individual belong?
4. What criteria would be used to diagnose a potential insulinoma?

1. The characteristics of hypoglycemia in this case study include symptoms like dizziness and shaking, which can occur when blood sugar levels drop too low. The random glucose test result of 60 mg/dL confirms the presence of low blood sugar.

2. To determine the underlying problem, further tests can be done. Some common tests that may be performed include a fasting plasma glucose test, an oral glucose tolerance test.

3. Based on the information provided, this individual would belong to the category of reactive hypoglycemia. Reactive hypoglycemia occurs when blood sugar levels drop after a meal, usually due to an exaggerated insulin response.

4. To diagnose a potential insulinoma, certain criteria are considered. These include documented low blood sugar levels, symptoms of hypoglycemia, and the presence of an insulinoma on imaging studies like a CT scan or MRI.

CASE STUDY 13-9

A nurse caring for patients with diabetes performed a fingerstick glucose test on the Accu-Chek glucose monitor and obtained a value of 200 mg/dL. A plasma sample, collected at the same time by a phlebotomist and performed by the laboratory, resulted in a glucose value of 225 mg/dL.

Questions

1. Are these two results significantly different?
2. Explain.

1. Based on the values you shared, the fingerstick glucose test showed a result of 200 mg/dL, while the laboratory result from the plasma sample showed a value of 225 mg/dL. These values are slightly different, but it's important to consider the acceptable range of variability for glucose measurements.

2. The difference between the two results is within the range of expected variability for glucose measurements. Factors like slight variations in the testing methods and the time of sample collection can contribute to these differences.
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