

# Blood glucose tests and medication



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**Definition:**

A blood glucose test measures the amount of a type of sugar (glucose) in the blood. Glucose comes from carbohydrate foods. It is the main source of energy used by the body. Insulin hormone helps the cells of the body use the glucose. Insulin produced by the pancreas and released into the blood when the amount of glucose in the blood rises.

In the normal conditions blood glucose levels are slightly high after eating. This increase makes the pancreas to release insulin so that the blood glucose levels don't get too high. Blood glucose levels that remain high over time can damage the eyes, kidneys, nerves and blood vessels.

**The importance of this test:**

This test is used to evaluate blood glucose levels. It may be used to diagnose or screen for diabetes and to monitor control in patients who have diabetes.

Most dietary carbohydrate eventually ends up as glucose in the blood. Excess glucose is converted to glycogen for storage by the liver and skeletal muscles after meals. Glycogen is gradually broken down to glucose and released into the blood by the liver between meals. Excess glucose is converted to triglyceride for energy storage.

The major hormone regulating glucose concentration in the body is insulin (although other hormones such as glucagon, epinephrine, and cortisol also affect it).

Glucose levels are measured to diagnose diabetes or to monitor adequacy of diabetic control. Diabetes is a very common disease affects about 2% of the  
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general population results from insulin deficiency or insensitivity by the body to the level of insulin present.

People with type 1 diabetes require daily injections of insulin to control their disease. Injection of too much or too little insulin can be dangerous because there is a limited range of blood sugar levels in which the brain can function normally.

**Types of blood glucose tests:**

- Fasting blood sugar (FBS) measures blood glucose after you have not eaten for at least 8-10 hours. It often is the first test done to check for diabetes.
- 2-hour postprandial blood sugar measures blood glucose exactly 2 hours after you eat a meal.
- Random blood sugar (RBS) Several random measurements taken throughout the day. Random testing is useful because glucose levels in healthy people do not vary widely throughout the day.
- Oral glucose tolerance test: A blood test done to diagnose diabetes mellitus. It's also done to diagnose hypoglycemia (low blood sugar) or a malabsorption syndrome in which sugar is not absorbed properly through the intestines into the bloodstream.

The test was designed originally to determine the tolerance for the sugar glucose. "Tolerance" refers to the body's ability to handle (tolerate) glucose.

**The test depends on a number of factors:**

- The ability of the intestine to absorb glucose,

- The power of the liver to take up and store glucose,
- The capacity of the pancreas to produce insulin,
- The amount of “ active” insulin it produces
- The sensitivity of the cells in the body to the action of insulin.

Fasting overnight is important for this test and the patient is given 100 grams of glucose by mouth and then your blood glucose levels are monitored for 3 hours. Normally, the blood glucose should return to normal within 2 to 2½ hours. The outcome of the test may indicate:

- Normal glucose tolerance
- Abnormal glucose tolerance

*Depressed glucose tolerance*: in which the blood glucose peaks sharply before declining slower than usual to normal levels as in: Diabetes mellitus

*Increased glucose tolerance*: in which the blood glucose levels peak at lower than normal levels as in the: Malabsorption syndrome, Insulinoma (an insulin-producing tumor)

Since the dose of glucose is taken by mouth, the test is sometimes called an oral glucose tolerance test.

This test is commonly used to diagnose diabetes that occurs during pregnancy (gestational diabetes).

### **Glycosuria**

Glycosuria refers to sugar in the urine. Less than 0.1% of glucose normally filtered by the glomeruli appears in the urine, and less than 130 mg should appear in the urine over a 24-hour period.

Glucose is present in glomerular filtrate but is reabsorbed by the kidney's proximal tubule. If the blood glucose level exceeds the capacity of the tubules to reabsorb all the glucose present in the glomerular filtrate, the renal threshold is reached and glucose spills into the urine. Finding of glycosuria indicates hyperglycemic or lowered renal threshold for glucose.

The renal threshold for glucose is 160 to 190mg/dl of blood; glucose does not appear in the urine until the blood glucose rises above this level.

Glycosuria may be a normal finding, such as after eating a heavy meal or during times of emotional stress.

Some individuals have a benign condition in which they have a lower than usual renal threshold for glucose (120 mg %), but have normal blood glucose levels.

In pregnancy, the renal threshold for glucose may be lowered so that small amounts of glycosuria may be present. Patients on hyperalimentation may have glycosuria if the carbohydrate solution is being infused faster than the pancreas can produce insulin. The most common reason for glycosuria is diabetes mellitus. Urine glucose tests are used to screen for diabetes, to confirm a diagnosis of diabetes, or to monitor diabetic control.

#### **Blood sugar test results:**

##### **Normal Results**

fasting plasma glucose test: 55-109 mg/dL

- oral glucose tolerance test at two hours: less than 140 mg/dL

- glycated hemoglobin: 3-6 percent
- fructosamine: 1.6-2.7 mmol/L for adults (5% lower for children)
- gestational diabetes screening test: less than 140 mg/dL
- urine glucose (random semi quantitative): negative

**Abnormal results:**

- A fasting blood glucose level is 126 mg/dL (7.0 mmol/L) or higher.
- A 2-hour oral glucose tolerance test result is 200 mg/dL (11.1 mmol/L) or higher.
- Symptoms of diabetes are present and a random blood glucose test is 200 mg/dL (11.1 mmol/L) or higher.
- If your fasting blood glucose level measures in the range of 100 mg/dL (5.5 mmol/L) to 125 mg/dL (6.9 mmol/L), you are considered to have pre diabetes.

Many forms of severe stress (for example, trauma, stroke, heart attack, and surgery) can temporarily increase glucose levels.

**Drugs that can increase glucose measurements include the following:**

- Corticosteroids
- Diuretics
- Epinephrine
- Glucagon

Epinephrine: It elevates the blood sugar level by increasing catabolism of glycogen to glucose in the liver, and also begins to break lipids in fat cells.

Glucagon: Glucagon causes an increase in blood glucose, by stimulating gluconeogenesis and glycogenolysis and facilitating glucose release from

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hepatocytes. Low blood glucose stimulates the alpha cells of pancreas to release glucagon.

Corticosteroids: These increase blood glucose by inducing glucose release from hepatocytes and inhibiting glucose uptake by cells by decreasing GLUT-4. Corticosteroids stimulate gluconeogenesis and glucagon secretion (that increases blood glucose).

**Drugs that can decrease glucose measurements include the following:**

- Alcohol
- Anabolic steroids
- Clofibrate
- MAO'S inhibitor

Alcohol: After the ingestion of the food, the body turns the food to sugar or glucose. The pancreas produces insulin to help move the glucose into the body's cells for energy use.

When insulin is working effectively blood sugar levels are stable. Alcohol has the ability to lower blood sugar levels. For those who are on insulin, this can be dangerous because the combination of insulin and alcohol can cause hypoglycemia (low blood sugar). Low blood sugar levels can lead to coma and possible death.

**Sources Used**

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