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Medical Encyclopedia: Glucose test

URL of this page: <http://www.nlm.nih.gov/medlineplus/ency/article/003482.htm>

Alternative names

FBS; Blood sugar levels; Fasting blood sugar

Definition

A glucose test measures the amount of sugar (glucose) in the blood.

How the test is performed

Blood is drawn from a vein (venipuncture), usually from the inside of the elbow or the back of the hand. The puncture site is cleaned with antiseptic, and a tourniquet (an elastic band) or blood pressure cuff is placed around the upper arm to apply pressure and restrict blood flow through the vein. This causes veins below the tourniquet to distend (fill with blood).

A needle is inserted into the vein, and the blood is collected in an airtight vial or a syringe. During the procedure, the tourniquet is removed to restore circulation. Once the blood has been collected, the needle is removed, and the puncture site is covered to stop any bleeding.

Infant or young child:

The area is cleansed with antiseptic and punctured with a sharp needle or a lancet. The blood may be collected in a pipette (small tube), on a slide, onto a test strip, or into a small container. Cotton or a bandage may be applied to the puncture site if there is any continued bleeding.

How to prepare for the test

Adults should fast (not eat) for 6 hours before the test.

A random serum glucose test can be performed at any time but will reflect such factors as dietary intake and activity.

How the test will feel

When the needle is inserted to draw blood, some people feel moderate pain, while others feel only a prick or stinging sensation. Afterward, there may be some throbbing.

Why the test is performed

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.

Glucose is a major source of energy for most cells of the body. Some cells (for example, brain and red blood cells), are almost totally dependent on blood glucose as a source of energy. The brain, in fact, requires that glucose concentrations in the blood remain within a certain range in order to function normally. Concentrations of less than about 30 milligrams per deciliter (mg/dL) or greater than about 300 mg/dL can produce confusion or unconsciousness.

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 most commonly to diagnose diabetes or to monitor adequacy of diabetic control. Diabetes is a very common disease, affecting about 2% of the general population, that 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.

Normal Values

Levels up to 100 mg/dL are considered normal.

Levels between 100 and 126 mg/dl are referred to as impaired fasting glucose or pre-diabetes. These levels are considered to be risk factors for type 2 diabetes and its complications.

Diabetes is typically diagnosed when fasting blood glucose levels are 126 mg/dl or higher.

Note: mg/dL = milligrams per deciliter

What abnormal results mean

Greater than normal levels (hyperglycemia) may indicate:

- Acromegaly (very rare)
- Cushing's syndrome (rare)
- Diabetes mellitus -- fasting blood glucose of greater than 126 mg/dL
- Impaired fasting glucose -- 110 to 126 mg/dL -- a prediabetic state
- Hyperthyroidism
- Pancreatic cancer
- Pancreatitis
- Pheochromocytoma (very rare)
- Insufficient amount of insulin
- Excessive food intake

Lower than normal levels (hypoglycemia) may indicate:

- Hypopituitarism
- Hypothyroidism
- Insulinoma (very rare)
- Injection of too much insulin
- Insufficient dietary intake

Additional conditions under which this test may be performed:

- Acute adrenal crisis
- Cushing's syndrome caused by adrenal tumor
- Cushing's syndrome - exogenous
- Delirium
- Dementia
- Dementia due to metabolic causes
- Diabetic hyperglycemic hyperosmolar coma
- Diabetic ketoacidosis
- Diabetic nephropathy/sclerosis
- Ectopic Cushing's syndrome
- Epilepsy
- Generalized tonic-clonic seizure
- Glucagonoma
- Islet of Langerhans' tumor
- Multiple endocrine neoplasia (MEN) I
- Pituitary Cushing's (Cushing's disease)
- Syphilis
- Syphilis - primary
- Syphilis - secondary
- Syphilis - tertiary
- Type 1 diabetes
- Type 2 diabetes
- Transient ischemic attack (TIA)

What the risks are

- Excessive bleeding
- Fainting or feeling lightheaded
- Hematoma (blood accumulating under the skin)
- Infection (a slight risk any time the skin is broken)
- Multiple punctures to locate veins

Special considerations

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:

- Tricyclic antidepressants
- Corticosteroids
- Diazoxide
- Intravenous dextrose
- Diuretics
- Epinephrine
- Estrogens
- Glucagon
- Isoniazid
- Lithium
- Phenothiazines
- Phenytoin

- Salicylates (acute toxicity -- see aspirin overdose)
- Triamterene

Drugs that can decrease glucose measurements include the following:

- Oral acetaminophen
- Alcohol
- Anabolic steroids
- Clofibrate
- Disopyramide
- Gemfibrozil
- Monoamine oxidase inhibitors (MAOIs)
- Pentamidine
- Sulfonylurea medications (such as glipizide, glyburide, and glimepiride)

Veins and arteries vary in size from one patient to another and from one side of the body to the other. Obtaining a blood sample from some people may be more difficult than from others.

Update Date: 2/2/2005

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