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# Diagnosis of Diabetes Measurements with A Glucometer

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ABSTRACT

Diabetes mellitus, causes of diabetes mellitus, main causes of the development of the disease, symptoms, diagnosis, determination of blood glucose levels, treatment of diabetes mellitus, insulin therapy.

**Keywords:**

Hyperglycemia, Glucometer, Test Strip, Hypercortisolism, Insulin, Test Strip, Pen Glucometer, Atherosclerosis, Angina Pectoris, Genetic Heterogeneity, Endocrinology.

Diabetes mellitus (lat. Diabetes mellitus, “diabetes mellitus”) is a group of endocrine diseases associated with impaired glucose uptake and relative or absolute deficiency of the hormone insulin. This leads to hyperglycemia, a persistent increase in blood sugar levels. The disease is characterized by a chronic course, as well as disorders of carbohydrate, fat, protein, mineral and water-salt metabolism.

**Description:** Excess blood glucose is the first sign of diabetes. Pancreatic cells (beta cells) are responsible for the production of insulin in the human body. It helps hormonal cells absorb glucose. In diabetes, insulin is produced in small amounts, and the amount of glucose in the blood increases. However, since glucose cannot be digested without insulin, there is a lack of glucose in the cells. This metabolic disease can be inherited or acquired. Insulin deficiency is associated with such secondary pathologies as purulent and other skin diseases, damage to the teeth, kidneys, nervous

system, atherosclerosis, angina pectoris, glucometry, tespelosca, pen glucometry, development, visual impairment.

**Causes of Diabetes:** There is now a proven genetic predisposition to diabetes. In type 1 diabetes, there is genetic heterogeneity, that is, the disease can be caused by different groups of genes. The detection of antibodies to pancreatic B-cells in the blood serves as a laboratory and clinical indicator in the detection of type 1 pathology. The nature of intergenerational transmission has not been fully elucidated. The pathogenetic basis of diabetes mellitus depends on the form of the disease. There are two types that are fundamentally different from each other. Although modern endocrinology calls the classification of the disease conditional, it is important to determine the treatment tactics for each type.

The main causes of the disease are:

Hereditary causes - the disease does not develop in the absence of factors, but susceptibility is high.

Causes of obesity. Being overweight leads to type 2 diabetes.

If diabetes is left untreated, the following conditions may occur. Diseases that cause damage to the B cells responsible for producing insulin. These include pancreatitis, pancreatic cancer and other diseases of the endocrine glands. Viral infections - measles, chicken pox, infectious hepatitis and other diseases. These infections contribute to the development of diabetes. This is especially true for people at risk. Nervousness, stress. It is recommended to avoid stress and nervousness. As we age, the risk of developing diabetes doubles every ten years. This list does not include factors that can cause secondary diabetes, as the disease will be cured when the underlying factor is eliminated. In addition, the following factors can influence the development of the disease:

Pheochromocytoma - a tumor of the adrenal glands, leading to the production of many hormones that counteract insulin;  
adrenal hyperactivity (hypercorticism);  
Hyperthyroidism; Cirrhosis of the liver;  
Disturbances of sensitivity to carbohydrates;  
Transient hyperglycemia is a temporary increase in blood glucose levels.

The most important cause of the problem is a violation of tissue-insulin interactions. Glucose is necessary for the body as the main energy substrate to maintain life processes. The lack of glucose in tissues and the fact that glucose does not accumulate in the liver as glycogen leads to an increase in its amount in the blood. These changes are called diabetes. Any hyperglycemia is not considered true diabetes. Only changes caused by insulin are considered a disease.

**Pathogenesis:** Insufficient production of insulin by the endocrine cells of the pancreas. Violations of the interaction of insulin with cells of body tissues (insulin resistance).

The reasons for this are: a change in the structure or a decrease in the number of insulin-specific receptors, a change in the structure of insulin itself, a violation of the

mechanism of signal transmission from receptors inside cells to organelles.

As mentioned above, diabetes can be passed from parent to child. In the presence of a disease in one of the parents, the probability of procreation is 10% for type 1 and 80% for type 2.

Pancreatic insufficiency (type 1 diabetes). The old name is insulin-dependent diabetes. Most often, young people, people under 40 years old, thin people suffer. The disease is severe and is treated with insulin. The first stage in the development of this type of diabetes is the massive destruction of the endocrine cells of the pancreas (islands of Langerhans). As a result, the level of insulin in the blood falls sharply. Cell damage can be caused by viral infections, cancer, pancreatitis, toxic damage to the pancreas, stressful situations, and various autoimmune diseases. In humans, the disease is genetically determined and predisposed to a defect in a number of genes located on chromosome 6.

These deficiencies increase the body's autoimmune aggression against pancreatic cells and negatively affect the regenerative capacity of B cells. Provoking factors can also be prolonged hypoxia of pancreatic cells, a diet rich in carbohydrates and fats, low in proteins. This leads to a decrease in the secretory function of cells and ultimately to their death. After mass cell death, the mechanism of their autoimmune damage is activated. Type 1 diabetes cannot be completely cured, but in some cases, if the function of the gland is preserved and the diet is followed, the disease will not be too disturbing. Artificial insulin is required on a regular basis. Because insulin is broken down in the gastrointestinal tract, it can only be given by injection. It is important to follow a strict diet and completely eliminate easily digestible carbohydrates (sugar, sweets, fruit juices) from the diet.

Extrapankreatic insufficiency (type 2 diabetes). The old name is non-insulin dependent diabetes. Older obese people are more likely to get sick (the main risk factor is overweight in 80% of patients), as well as people over 40 years old. Receptors cannot interact with the

hormone due to a change in structure or a decrease in their number. Also, the structure of the hormone (genetic defects) can sometimes change. In addition to obesity, risk factors for type 2 diabetes include: aging; smoking; alcohol consumption; arterial hypertension; chronic overeating; passive lifestyle. Genetic predisposition to type 2 diabetes has been proven. This is 100% consistent with the presence of the disease in homozygous twins. Insulin is not always needed to treat the disease. The treatment regimen can only be prescribed by a qualified doctor. First of all, such patients are prescribed a diet. It is important to follow the doctor's advice. It is recommended to gradually lose 2-3 kg per month until body weight returns to normal. Drugs are prescribed to lower blood sugar levels outside the diet, and in the most severe cases, insulin.

**Symptoms:** The symptoms of diabetes develop gradually and begin slowly. High blood glucose levels are common. At the onset of the disease, patients have the following main symptoms: polydipsia - unsatisfactory constant thirst, polyuria - increased daily urination due to an increase in osmotic pressure due to glucose dissolved in urine, polyphagia - constant unsatisfactory hunger. Occurs as a result of metabolic disorders.

Weight loss will be accompanied by tiredness and constant tiredness. Occurs due to the active catabolism of proteins and fats due to the lack of carbohydrates in the energy metabolism of cells. There are also secondary symptoms of the disease. They develop slowly and are characteristic of any type of diabetes. Constant dry mouth, weight loss or a sharp increase in body weight, severe itching and dryness of the skin, the appearance of purulent ulcers on the skin and soft tissues, muscle weakness and increased sweating, difficulty healing any wounds, visual disturbances, headache, dizziness and decreased mental activity, pain in the heart, liver enlargement, pain in the legs and gait disturbance, decreased skin sensitivity, especially on the legs, ulcers, increased blood pressure, swelling of the face and legs, the smell of acetone from the patient.

**Diagnosis:** If there is a suspicion of a disease, it must be confirmed or refuted. To do this, there are a number of laboratory and instrumental diagnostic methods that can be used to make an accurate diagnosis of the disease. They; fasting blood glucose test, glucose sensitivity test to compare fasting glucose and two hours after eating, glycemic monitoring, blood sugar testing several times a day. It is used to study the effect of treatment, check the presence of glucose, protein, leukocytes in the urine, check the presence of acetone in the urine, determine the amount of glycated hemoglobin in the blood, biochemical blood test. blood, endogenous insulin in the blood, ECG - myocardial damage against the background of diabetes, the study of the degree of vascular damage using UTT, capillaroscopy, etc. All patients with diabetes should consult with the following specialists. Endocrinologist, cardiologist, neurologist, ophthalmologist, surgeon.

**Levels of the disease:** the classification of the disease according to the severity is very important. Basically, it varies depending on the level of glycemia. Leveling aids in diagnosis and plays an important role in preventing complications. Depending on the medical documentation, it is possible to differentiate the course of the disease and the severity of complications.

**Level 1:** Being the best indicator of disease, any treatment process will aim to reduce the disease to this level. The amount of sugar is completely covered by insulin, the glucose level is about 6-7 mmol / l, glucosuria (excretion of glucose in the urine) is not observed, the rest of the indicators are normal. Pathologies that developed against the background of the disease are not observed, complications are not observed. This is achieved through full compliance with the course of treatment and diet.

**Level 2:** This level indicates that insulin cannot cover the amount of sugar a little. Eyes, kidneys, heart, blood vessels, legs, nerve fibers are affected.

Level 3: At this level, the disease is actively developing and is not amenable to medical control. The glucose level is about 3-14 mmol / l, glucosuria is persistent, high proteinuria is observed, signs of the affected organs gradually begin to appear. Visual acuity decreases rapidly, hypertension is observed, sensitivity in the feet and toes decreases.

Level 4: At this level, there is absolute decompensation, which indicates that the treatment (if any) provided no benefit. The glucose level rises to critical values (15-25 mmol / l and above), and attempts to lower the sugar level are ineffective. Urinary protein excretion is additionally activated. Kidney failure occurs, skin lesions and gangrene are possible. The risk of falling into a coma is very high. Blood glucose is slightly elevated and is about 7-10 mmol/l, glucosuria is absent. Other indicators may be slightly higher than normal.

Determination of glucose in the blood

Necessary equipment: glucometer, tespalosk, glucometer pen, sterile cotton wool, disposable rubber gloves, ethyl alcohol, caliper.

Procedure:

1. Prepare your meter
2. Attach the caliper to the handle of the meter.
3. Install the test strip on the meter.
4. Blood sampling from a patient with diabetes mellitus
5. Place blood on the meter strip.
6. The amount of glucose was determined on a glucometer

Result: Normal blood glucose level is 3.3-6.1 mmol/l. Diabetes mellitus occurs when the glucose level in the glucometer exceeds the normal range.

Conclusion: The advantage of the glucometer is as follows.

1. The patient determines the amount of glucose in the blood in a short period of time with accurate readings
2. No queues and no wasted time
3. In milligrams of blood, all tests are absolutely accurate.

Diabetes treatment

Compensation of carbohydrate metabolism, prevention and treatment of complications, normalization of body weight, awareness of the

patient, compensation of carbohydrate metabolism are achieved in two ways. Delivery of insulin into cells by different methods depending on the type of diabetes mellitus. Maintaining a constant supply of carbohydrates in the body through diet. The diet should be balanced in carbohydrates, fats and proteins. Easily digestible carbohydrates should be completely excluded from the diet. Treatment is recommended to start with minimal doses. The dose is increased in the absence of compensation for carbohydrate metabolism and glycosuria. Given the possibility of developing hypoxia, drugs in this group should be used with caution in patients with ischemic changes in the myocardium or other organs. In some patients, the effectiveness of anticoagulants may be reduced. This is due to a decrease in the secretory activity of the pancreas, which ultimately leads to the ineffectiveness of such drugs and the need to switch to insulin therapy.

**Insulin therapy:** Insulin is injected under the skin using a special syringe or pump dispenser. Insulin therapy is aimed at maximizing carbohydrate metabolism, preventing hypo- and hyperglycemia and thus preventing the complications of diabetes. Insulin therapy is vital for patients with type 1 diabetes. In some cases, type 2 can be used. Instructions for use: Type 1 diabetes mellitus; ketoacidosis, diabetic hyperosmolar, hyperlactidemic coma, pregnancy and childbirth in diabetes mellitus; The ineffectiveness of the treatment of type 2 diabetes mellitus by other methods; Significant weight loss during illness, diabetic nephropathy.

There are many types of insulin available today. They differ in the duration of exposure (ultrashort, short, medium and long), the degree of purification (monopic, monocomponent), specificity (human, bovine, genetically engineered, etc.).

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