

## Investigation of glycaemia by glucometer

Investigation of glycaemia is included in basic biochemical investigation in preventive examination as well as in screening of metabolic diseases (particularly of diabetes mellitus) and other chronic diseases.

**Diabetes mellitus (DM)** is chronic metabolic syndrome caused by deteriorated metabolism of glucose due to absolute insulin insufficiency (I. type of DM) or due to relative insulin insufficiency from insulin resistance (II. type of DM). Deteriorated metabolism of saccharides, lipids and proteins leads into the development of severe chronic microvascular (retinopathia – injury of vision, nephropathia – injury of kidneys, neuropathia – injury of nervous system) and macrovascular complications (ischemic disease of heart, brain and lower extremities), which may finally result into the myocardial infarct, renal failure, or amputation of lower extremities.

The most important parameter in evaluation of glucose metabolism (glycaemic profile) is the value of **glycaemia** in the venous blood. Since in fasting glycaemia (i.e. after 8 hours fasting) the level of glucose in venous and capillary blood is comparable, postprandial glycaemia (i.e. after the meal) the glucose in capillary blood is little higher than in the venous blood.

Investigation of glycaemia in the capillary blood is frequently used for home monitoring of glucose levels in the patients with diabetes, especially in diabetics treated by insulin. Investigation of glycaemia by electronic glucometer is easy and fast and allows the control of glycaemia between the regular visits in the diabetologist.

Approximately one third of cases of deteriorated metabolism of glucose cannot be diagnosed just by fasting glycaemia, but using other methods, e.g. using oral **glucose-tolerance test (oGTT)**. To obtain correct results from oGTT test, some instructions and recommendations should be kept: 3 days before oGTT test the patient takes standard mixed food (at least 150 g of saccharides daily) and performs standard physical activity, 8-14 hours before oGTT test the patient takes no food, but may drink water ad libitum, during oGTT test the patient doesn't smoke and should sit in rest; oGTT test is not performed in patients with acute disease, in patients with disorders of resorption, in stress situation or in menstruation. Before oGTT test, investigation of fasting glycaemia is done. Then patient drinks 75 g of dehydrated glucose dissolved in 250-300 mL of water within 5 minutes. In children, 1.75 g glucose per kg of body weight (maximally 75 g) is administered. Precisely 2 hours after the beginning of glucose intake, the investigation of postprandial glycaemia is performed. According to the results, normal tolerance of glucose, intolerance of glucose or diabetes mellitus is determined (see Table 1).



### Material and needs

Diagnostic strips for estimation of glycaemia, electronic glucometer (Accu Chek Active, Roche), needs for capillary blood taking, dehydrated glucose for oGTT test (75 g).

## Methods

After disinfection of the pulp of the fourth finger put 1 drop of capillary blood on the diagnostic strip. Insert the strip into the glucometer and within several seconds read the result of fasting glycaemia directly on the display of the device. Then the volunteer drinks the solution of glucose (75 g of glucose dissolved in 250-300 ml of water) within 5 minutes. Precisely 2 hours after the beginning of glucose intake measure the postprandial glycaemia. Compare both values with diagnostic criteria in Table 1.

**Table 1. Diagnostic criteria for glucose intolerance and diabetes mellitus**

	<b>Normal values</b>	<b>Border values of fasting glycaemia</b>	<b>Intolerance of glucose</b>	<b>Diabetes mellitus</b>
<b>Fasting glycaemia</b>	<6.1 mmol/L	6.1-6.9 mmol/L	<7.0 mmol/L	≥7.0 mmol/L
<b>Postprandial glycaemia (2 hrs after oGTT test)</b>	<7.8 mmol/L	<7.8 mmol/L	7.8-11.1 mmol/L	≥11.1 mmol/L