

Features of Changes in Lipid and Carbohydrate Metabolism in Patients with Coronary Heart Disease and Diabetes Mellitus

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Abstract: The presence of type 2 diabetes mellitus (DM) causes a high risk of cardiovascular complications; in most cases, this disease is combined with other pathologies of the cardiovascular system, such as arterial hypertension, coronary heart disease and hypercholesterolemia. Diseases caused by atherosclerosis in patients with diabetes The mortality rate from cardiovascular diseases in patients with type 2 diabetes is 3 times higher than in the general population.

Keywords: diabetes mellitus, coronary heart disease, lipid metabolism.

Type 2 diabetes mellitus (T2DM) is a chronic disease that occurs when the sensitivity of body tissues to insulin decreases. Thus, in non-insulin-dependent diabetes mellitus, high blood glucose levels occur due to insulin resistance. Later, the work of β -cells of the islets of Langerhans-Sobolev is also disrupted.

For a long time, diabetes was considered only as a disorder of carbohydrate metabolism, and the sole purpose of insulin was considered to maintain normal blood glucose concentrations. However, it is now obvious that this disease is accompanied by a complex metabolic disorder not only of carbohydrates, but also of lipids and proteins.

Dyslipidemia and hypertension are the most significant risk factors for the development of coronary artery disease and the earliest manifestations of metabolic disorders in patients with diabetes mellitus 2. Features of the course of coronary artery disease against the background of diabetes include its earlier occurrence, multi-vessel lesions and a high frequency of atypical and painless forms of the disease, which is determined not only by insufficient compensation of carbohydrate metabolism, but also the duration of diabetes. The effect of hyperglycemia on atherogenesis in the vascular wall is realized through the development of generalized dysfunction of the vascular endothelium, increased oxidative stress and increased concentrations of final glycosylated metabolic products. It is these processes in type 2 diabetes that sharply increase the adhesion of blood monocytes to the vascular endothelium with their subsequent penetration into the vascular wall. The process of monocyte-endothelial interaction is one of the main triggers for the formation of atherosclerotic plaque and the development of atherosclerotic lesions of the vascular wall [3].

A decrease in cell sensitivity to insulin (insulin resistance), which occurs in patients with type 2 diabetes, is associated with lipid profile disorders, including a marked increase in blood lipid levels after meals (nutritional hyperlipidemia). Characteristic of type 2 diabetes is the so-called "atherogenic triad":

1. High level of TG;
2. Low level of HDL cholesterol;
3. Presence of smaller and denser LDL particles.

Of particular importance in type 2 diabetes are lipid metabolism disorders, which persist in these patients even after correction of blood glucose levels. These disorders are called diabetic dyslipidemia. Its components are hypertriglyceridemia, a decrease in the concentration of HDL cholesterol, and an

increase in the percentage of small dense LDL particles. The lipid triad is a specific variant of atherogenic dislipoproteinemia, which contributes to the development of atherosclerosis, regardless of the increase in the levels of total cholesterol and total LDL fraction.

According to the CODE-2 study, diabetic complications in patients with type 2 diabetes were present in 59% of patients, with 23% having two and 3% having three complications of diabetes simultaneously. Features of the pathogenesis of IHD in patients with type 2 diabetes are reflected in the clinical picture of the disease, and most of the adverse effects of diabetes are realized through the impact on the cardiovascular system[5].

Risk	Definition	CU LDL cholesterol (mmol/l)
Extreme	<ul style="list-style-type: none"> – Cardiovascular complication in a patient with cardiovascular disease caused by atherosclerosis, despite optimal lipid-lowering therapy and/or achieved LDL cholesterol level ≤ 1.5 mmol/l – Cardiovascular complication in men under 55 years of age or in women under 65 years of age – Combination of clinically significant cardiovascular disease caused by atherosclerosis with type 2 diabetes 	≤ 1.5 , optimal ≤ 1.3
Very high risk	– Registered CVD. History of coronary heart disease, myocardial infarction, acute coronary syndrome, ischemic stroke; presence of significant (stenosis $\geq 50\%$) or complicated ASP of any location; diabetes with target organ damage or one of the risk factors; CKD with GFR < 30 ml/min/1.73 m ²) – 10-year risk SCORE $\geq 10\%$	$\leq 1,5$
High risk	– Significant RF, e.g. TC level > 8 mmol/l – Most other patients with diabetes – Moderate CKD (GFR 30–59 ml/min/1.73 m ²) – 10-year risk SCORE $\geq 5\%$ and $< 10\%$	$\leq 2,5$
Moderate risk	– 10-year risk SCORE $\geq 1\%$ and $< 5\%$	$\leq 3,0$
Low risk	– 10-year risk SCORE $< 1\%$	$\leq 3,0$

Categories of cardiovascular risk, taking into account the category of extreme risk. Table. 1.

Diagnosis of ischemic heart disease against the background of diabetes is often difficult. Features of diagnosing and assessing the severity of IHD against the background of diabetes include the fact that IHD in diabetes in men and women occurs at a younger age than in the absence of diabetes. Clinical

manifestations of coronary artery disease in patients with diabetes are similar to those without diabetes. These include angina, silent ischemia, myocardial infarction and heart failure. In diabetes, coronary artery disease is often painless, which makes timely diagnosis and initiation of treatment difficult. Therefore, in patients with diabetes, screening studies for coronary artery disease should be more actively used, visualizing stress tests (stress echocardiography and radionuclide methods), Holter 24-hour ECG monitoring, computed tomography, especially with concomitant risk factors - hyperlipidemia, arterial hypertension (AH), obesity.

Conclusion. Diabetes and coronary heart disease are among the most common diseases in the world. In most cases, these diseases coexist, and the prognosis for patients is not good. The main mechanism associated with the development of ischemic heart disease and diabetes is a change in the metabolism of lipids and carbohydrates in the body. Understanding the main characteristics of lipid and carbohydrate metabolism in ischemic heart diseases, due to diabetes, helps to design effective treatment methods for patients and to design preventive measures.

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