



SCIENTIFIC SUBSTANTIATION OF HISTOLOGICAL CHANGES IN THE PULMONARY ENDOTHELIUM IN DIABETES

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Annotation

This article explains the origin of diabetes, its negative and serious complications and their consequences, the prevalence of the disease in today's world, the harm to humans, histological changes in the pulmonary endothelium in diabetes.

Keywords: diabetes, disease prevalence, endocrine diseases, insulin, endothelial dysfunction of the pulmonary artery, pulmonary tuberculosis.

Introduction

Diabetes mellitus is a disease of the endocrine system caused by a complete or partial deficiency of the hormone insulin. As a result, hyperglycemia can be observed - a continuous increase in blood glucose levels. The disease is characterized by chronic course and impaired metabolic processes in the body (metabolism of carbohydrates, fats, proteins, minerals and water). Today, the prevalence of this disease in the population is 2%, of which 5-8% are children under 15 years. Evidence shows that the number of patients with diabetes is growing worldwide.

The fate of patients with diabetes has so far been very sad, as they died in a short time (weeks or months). After the release of insulin, such patients were able to live longer. The risk of the disease can be passed from generation to generation in a dominant or recessive way. If the disease is dominant, the "risk group", the characteristics of the unfavorable, negative factors prevail. b Viral infections that can damage cells, long-term eating disorders (high intake of carbohydrates and fats), various mental and physical injuries, obesity, complicated pregnancy, endocrine diseases (diffuse toxic goiter, acromegaly), caused by some somatic diseases - pancreatitis, hypertension. A non-genetically related type of diabetes mellitus - pancreatectomy - can be associated with pancreatic cancer.





The World Health Organization recommends a four-stage study of diabetes.

1. Potential diabetes,
2. Latent diabetes,
3. Asymptomatic or subclinical diabetes,
4. Overt or clinical diabetes.

Explicit diabetes is characterized by recurrent elevations in blood glucose and urine glucose.

1. Insulin-dependent diabetes mellitus (type 1), acute onset, high susceptibility to ketoacidosis and genetically based.
2. Non-insulin dependent diabetes mellitus (type 2) is characterized by minimal metabolic disorders. In patients of this type, without exogenous insulin, carbohydrate metabolism can be compensated by diet therapy and oral drugs.
3. Other types of diabetes include diabetes that occurs in other clinical pathologies:
 - a) Diseases of the pancreas;
 - b) Hormonal environment;
 - c) Diabetes mellitus caused by drugs and chemicals;
 - d) disruption of insulin receptors;
 - d) Genetic syndromes;
4. Pregnancy diabetes mellitus occurs when a violation of glucose tolerance is observed for the first-time during pregnancy or when the first symptoms of diabetes appear during pregnancy. Diabetes mellitus in the pre-pregnancy period is not included in this group. Often, pregnant women return to normal glucose tolerance after childbirth.

World Disease Statistics:

1. age group. Studies by scientists show that the actual prevalence of diabetes is 3.3 times higher than that recorded in patients aged 29-38 years, 4.3 times in patients aged 41-48 years, 2.3 times in patients aged 50 years, and for children aged 58-70 years. 2.7 times;
2. sex. Because of their physiological characteristics, women are more likely than men to have diabetes. The first type of the disease occurs in people under 30 years of age. Mostly women suffer more from it. But type 2 diabetes is almost always diagnosed in obese people. As a rule, they are sick for people over 44 years of age;
3. incidence rate. If we take into account the statistics on the territory of our country, we can conclude that from the beginning of 2000 to the end of 2009 the incidence among the population almost doubled. It is usually the second type of disease.





About 90% of all diabetics worldwide suffer from a type 2 disease related to pancreatic function [3]

If we look at the statistics, we can conclude that about 371 million people worldwide suffer from this disease. And that's one second, accounting for 7.1 percent of the entire planet's population, including 20.8 million diabetics in the United States, whose number is expected to double by 2030. [1] Diabetes mellitus can be divided into two groups; type 1 diabetes is insulin dependent and type II is not insulin dependent. Both types and both types of hyperglycemia occur, which in turn causes endothelial dysfunction by its various glycoxidation products. Type 2 diabetes causes insulin resistance, which is also responsible for endothelial dysfunction.

Because it is found late, diabetes can lead to serious complications later on, which can have a devastating effect on cardiovascular function. Organs such as the kidneys and liver also suffer. Later, such cases can also lead to disability.

The most common acute complications include: ketoacidosis, hypoglycemia, hyperosmolar coma, lactic acidosis coma, and others. Later exposure occurs several years after the disease. Their harm does not manifest itself, on the contrary, they gradually worsen the condition of the person.

Although type 1 and type 2 diabetes are strongly associated with systemic cardiovascular disease, recent epidemiological data suggest that diabetes may be a risk factor for pulmonary hypertension. The association with vascular disease is almost neglected. Recent experimental studies show that diabetes causes changes in lung function to increase lung pressure. The aim of this study was to assess the effect of diabetes on sensitivity to other risk factors for pulmonary hypertension. Therefore, we analyzed the effect of a combination of diabetes on the effects of moderate hypoxia on the classic symptoms of pulmonary hypertension. Controlled (treated with saline) and diabetic (treated with 70 mg kg⁻¹ streptozotocin) male Wistar-Kyoto rats were observed for 4 weeks and were exposed to normoxia or moderate normobaric hypoxia (14%) for another 2 weeks. Hypoxia, but not diabetes, dramatically reduces tense potassium flows, and diabetes, not hypoxia, causes endothelial dysfunction of the pulmonary artery. Both factors independently stimulated pulmonary vascular remodeling and regulated the type of morphogenetic protein receptors in the lung bone, but diabetes, but not hypoxia, resulted in pulmonary infiltration of macrophages, which increased significantly when the two factors were combined. Diabetes mellitus and hypoxia led to a moderate increase in diastolic and moderate pulmonary artery pressure and right ventricular weight, both of which were not significantly affected. The pattern of change in markers of pulmonary hypertension was different for moderate hypoxia and diabetes, did not have a synergistic effect



other than the involvement of macrophages, and it was necessary to ensure a moderate increase in pulmonary blood pressure.

A patient with diabetes is unable to metabolize carbohydrates, proteins, or fats due to improper production of insulin, blood glucose regulator, or insulin resistance. Insulin helps cells use glucose as their primary energy source. However, the cells of diabetic patients do not use blood glucose due to abnormal insulin metabolism, resulting in elevated blood glucose levels or hyperglycemia. Over time, high glucose levels in the bloodstream can lead to serious complications such as vision loss, cardiovascular disease, kidney damage, and nerve damage [4].

Diabetes has become an epidemic in the population in recent decades: by 2040, according to IDF experts, the number of people with this pathology in the world is expected to increase to 642 million, more than 90% of whom are type 2 diabetes [1]. The main cause of death in patients with diabetes is the development of macrovascular complications (damage to the coronary, cerebral and peripheral arteries). Myocardial infarction (MI) (55%) and stroke (29%) play a major role in the mortality structure of patients with diabetes.

With a combination of diabetes mellitus and pulmonary tuberculosis, in most cases (up to 90%) diabetes is a pre-existing disease, against which tuberculosis develops at different times. If both diseases are diagnosed at the same time, there is no doubt that latent diabetes has worsened under the influence of joint tuberculosis.

There is no consensus on the causes of the high incidence of tuberculosis in patients with diabetes. Tuberculosis develops under conditions of decreased resistance to infection in the body, which is characterized by a decline in patients with certain forms of diabetes, changes in immunobiological properties, in particular, a decrease in the ability of a patient with diabetes to produce antibodies and antitoxins. In such cases, uncompensated or untreated diabetes contributes to the development of tuberculosis. Tuberculosis clinic in patients with diabetes. If tuberculosis is detected at an early stage, a more positive development of the disease can be achieved even in combination with diabetes. The severe stage of the disease, the rapid development and progression of tuberculosis, is mainly accompanied by improper treatment of diabetes or late detection of tuberculosis.





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