A Clinical Study Of The Method Of Early Diagnosis Of Coronary Heart Disease

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ABSTRACT

Recently, the issue of early diagnosis of coronary heart disease (CHD) remains the most urgent task of cardiology. The gas analytical method for the analysis of exhaled air (EA) is a new approach to solving this problem [1,5,11]. Our clinical studies of this technique, used to develop a non-invasive method for the diagnosis of coronary heart disease, have led to the following main results: CHD is accompanied by impaired metabolism of biogenic amines [6], volatile biogenic amines are found in the composition of explosives in patients with CHD [1, 2], the content of diethylamine in explosives increases most significantly in patients with postinfarction cardiosclerosis (PICS) [7], secondary amines (SA) can be formed as a result of the reduction of Schiff bases (SHO) under acidosis conditions in the cellular sarcosomes of the cardiac muscle [8,9].

However, the nature of the dependence of the kinetic parameters of SA formation on the degree and scale of ischemic myocardial zones remains unclear.

Keywords: Coronary heart disease

The purpose of the study. The purpose of this work is to build a semi-empirical model for studying the processes of cardiosclerosis development and to obtain similarity of kinetic constants of metabolic rates of SA from some geometric parameters of ischemic zones on the surface of the myocardium.

Material and methods. We previously [7] found a statistically significant difference in the content of volatile amines in explosives in patients with coronary heart disease. Stable angina pectoris compared to healthy ones. To study SA in EA in patients with coronary heart disease during treatment, we used a gas-analytical method. To obtain BB samples in stationary conditions, 26 men with a diagnosis of coronary heart disease. PICS aged 39-64 years were examined and BB tests were performed 2 times a day daily for 10 days. The diagnosis in all patients was made on the basis of data from clinical observation, laboratory analysis and functional diagnosis of the patient. For 3-10 years, patients underwent inpatient and outpatient treatment for coronary heart disease. BB samples for the study were obtained using special traps using bidistilled water in a volume of 200 ml as an absorber.

Research results. Based on statistical analyses of the measurement result of the content of SA in explosives, the following values of gas analytical parameters were obtained: M1; M2; m1; m2.

M1 is the average value of the amine content in the first half of the observation of patients (260 observations).

M2 is the same, only in the second half of the day (260 observations).

m1 and m2 are the dispersions of the gas analytical index in the first and second halves of the observation period of patients. Accordingly: M1=602; M2=255 m1=80; m2=20. These values are given in units of 10-9g/l.

According to the Student's criterion, t=2.3.

The results obtained show that during the treatment of patients with BB, the content of amines decreases statistically significantly (t>2).

The statistically significant difference in the concentration of SA in EA in patients with PICS, which we found in our work, shows that during treatment, the metabolism of biogenic amines in EA changes significantly. Volatile metabolites of biogenic amines are formed during the reduction of Schiff bases, which are the main products of LIP [3]. As we know, SB can be formed by the interaction of aldehydes with primary amines. Such a mechanism, proposed by Mannich, was discovered in the study of plants, called the Mannich reaction. In the human body, in conditions of gender disorders, there is a qualitative change in the activity of monoamine oxidase (MAO). A decrease in the functional activity of MAO in relation to the deamination of primary amines, and vice versa, an increase in its activity to diamines, leading to the accumulation of primary amines and various dialdehydes. Therefore, in the conditions of GENDER, there is an accumulation of SB. The reduction of SB leads to the formation of volatile metabolites of amines in the form of secondary amines. Thus, we have proposed a new mechanism for the formation of secondary amines in the human body under the conditions of gender. It was previously shown that SB can be restored during their interaction with adrenaline, and clinical observations of the content of volatile biogenic amines in explosives in patients prove the possibility of such a mechanism. Therefore, the activation of the sympatho-adrenal system should stimulate the recovery process of SB. This is exactly what happens in the initial stage of NQMI development, which was also revealed by us on the basis of clinical studies. Since the treatment of coronary heart disease is carried out by us in combination with antioxidant and standard therapy, it can be concluded that the suppression of LIP led to the restoration of metabolic disorders of biogenic amines [7]. This is evidenced by the dynamics of a decrease in volatile metabolites of biogenic amines in explosives in patients with PICS during treatment with antioxidants. To study the kinetics of SA formation at the interface between intact tissue and ischemic tissue, we propose a model for studying cardiosclerosis.

A model for studying the process of cardiosclerosis. To determine the features of the development of cardiosclerosis, the following modeling algorithm based on the Monte Carlo method has been developed.

1. Selection of an intact surface of cardiac tissue with an area of S.
2. On an intact surface S, a random selection of the origin coordinate of a localized ischemic zone (LIZ) with an area of S0.
3. Determination of the amount of LIZ-ng appearing at the interface between intact and ischemic tissue.
4. Calculation of p=ng/n, where n is the total number of LIZ.
5. Calculation of B =S0/Shp.
6. Construction of the dependence p =F(B).

Thus, in case of accidental generation of LIZ on the surface of intact cardiac muscle, there is a critical value – B = Bc at which LIZ, overlapping, forms the most developed interface surface between the intact and ischemic zone of cardiac tissue. This universal dependence makes it possible to divide the process of developing cardiosclerosis into several stages.

1. In <Vs, the reversible stage of acute dystrophic changes.
2. B = Vs is the critical stage of the transition from reversible to irreversible changes.
3. In > Vs, the irreversible stage of acute dystrophic changes.

Thus, the favorable outcome of treatment of coronary heart disease depends largely on the possibility of diagnosing it at the first stage, when <Vs.

Kinetics of secondary amine formation. SB formation occurs in ischemic areas of the myocardium [1,7,10]. Violation of microcirculation in these areas leads to a deterioration of blood flow from the ischemic area and their further excretion from the body. From this, it can be assumed that SB accumulate at the boundary between normal and ischemic tissue. But their further restoration and outflow into the microcirculation of intact tissue leads to the appearance of SA in EA.

Therefore, for the development of MI, the intensity of LIP must cross the border V = Vc. This boundary depends on x and as x increases, the threshold value of Vc increases. Based on the

results of this theoretical analysis, it can be called the X kinetic coefficient of resistance of a living organism to LIP factors.

Discussion of the results.

Theoretical analysis shows that the LIZ connecting with each other form larger islets of myocardial ischemia. There is a critical value of parameter B, at which there is a qualitative change in the course of coronary heart disease, characterized by the transition of reversible dystrophic changes of the myocardium into irreversible ones. The ischemic – normal tissue interface increases and is well described by parameter B.

If the frequency of nucleation of V is associated with the intensity of LIP, then the relationship of SA depends on the geometry of the location of the LIZ on the surface of the myocardium. Clinical observation of amines in the composition of explosives in patients with coronary heart disease shows that this indicator is quite sensitive to the condition of patients with coronary heart disease. The relative change in not only the average value, but also the dispersion of the amine content in EA indicates that the geometry of the interface between normal intact tissue and ischemic tissue plays an essential role in the mechanism of formation of SA.

Thus, the number of LIZ increases with an increase in the intensity of SEX and a decrease in x, that is, a decrease in k1 or an increase in K_2. However, there is a critical value of n constant for any variations in the parameters S, S0, V, k1 and k2. therefore, at a critical degree of ischemia and at given values S0 and S, an increase in V is also accompanied by an increase in x, i.e. k1. Since k1 depends on the recovery process of SB, it can be assumed that all processes stimulating the processes The restorations contribute to the transition to the irreversible stage of acute dystrophic changes of the myocardium. This conclusion is consistent with the fact of the development of cardiosclerosis in conditions of activation of the sympathetic-adrenal system.

Conclusions:

1. We have derived a universal parameter characterizing the degree of cardiosclerosis.
2. Using a universal parameter, postinfarction cardiosclerosis was differentiated according to its geometric characteristics.
3. A relationship has been established between the parameter characterizing the degree of myocardial ischemia and the kinetic constants of secondary amine formation.
4. Clinical observation of patients with coronary heart disease in the dynamics of the development of cardiosclerosis was carried out and gas-analytical indicators characterizing the state of cardiosclerosis were found.

Literature

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