

## MYOGLOBIN DYNAMICS IN SERUM IN PATIENTS WITH CORONARY HEART DISEASE BEFORE AND AFTER OF CORONARY STENTING

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The article presents the results of a survey dynamics of a myocardial damage marker – myoglobin in the serum of 30 patients with coronary heart disease: stable stenocardia of II–III functional classes, which are held percutaneous coronary intervention and coronary artery stenting.

**Keywords:** myoglobin, troponin T, creatine phosphokinase-MB, stenting, damage to the myocardium, coronary artery

**Actuality:** Cardiovascular diseases, including coronary heart disease (CHD), occupy an important role in the structure of morbidity and mortality in most developed countries including Russia. [2] Currently, the prevalence of coronary heart disease in the general population of Russia is  $13,5 \pm 0,1\%$ , among men –  $14,3 \pm 0,3\%$ , women –  $13,0 \pm 0,2\%$  [6]. This trend of disease development in the population poses in front of a modern cardiology the problem of early diagnosis, risk assessment, with the necessity of timely initiation of therapeutic measures.

Despite the intensive development of non-invasive methods of treatment, coronary artery stenting or coronary artery bypass grafting. Each year there are performed about two million percutaneous coronary intervention (PCI) in the world, more than 90% of which are of coronary stenting [1, 8].

In the literature, it has been recently appeared the term “minor myocardial damage” that arise in the PCI and is identified only by the definition for cardiac markers.

One of cardio-specific markers is myoglobin – low molecular heme-containing protein that is found in all muscle cells. Its molecular weight is 18 kDa [3, 7]. Therefore, damaged myocardium myoglobin readily diffuses through cell membranes of damaged muscle. Its content in the serum of patients with myocardial infarction increase in 2 hours after onset of symptoms [4, 5]. Thus, myoglobin is an early enough sensitive marker.

Researches, devoted to the studies, we have not seen in the literature thus the aim of research has been formulated.

**The aim of research:** To determine the degree of ischemic and reperfusion myocardial injury during percutaneous coronary intervention by studying the dynamics of myoglobin in the blood serum of patients with coronary heart disease: stable stenocardia of II-III functional classes.

### Materials and methods of research

There have been included 24 patients in the study (18 men (75%), 6 women (25%)) with coronary heart

disease: stable stenocardia of II–III functional classes that were examined and were treated at the FGA “FCOCS Astrakhan” in the period from 2009 to 2011. The middle age was  $61,5 \pm 1,24$  years. There have been performed coronary angiography with the further implementation to all patients for diagnosis. The study group consisted of patients with coronary heart disease: stable stenocardia of II–III functional classes in the 1st day after the small myocardial damage, in the comparison group – the same patients before coronary intervention.

As a control group there have been included in the study 50 healthy donors (25 (50%) of men, 25 (50%) of women) aged from 25 to 55 years. The middle age was  $42,72 \pm 1,5$  years.

The diagnosis of coronary artery disease was confirmed by clinical-instrumental and laboratory data and was installed in accordance with the WHO classification (2005). Among patients with a diagnosis of ischemic heart disease: exertional stenocardia of functional class II – 13 (54,2%); Coronary heart disease: exertional stenocardia of functional class III – 11 (45,8%). Symptoms of chronic heart failure (CHF) of I stage by 20 (83,3%) patients, heart failure II of A stage – 4 (16,7%). Patients with CHF on NIHA were divided into the following functional classes: functional class I – 2 (8,3%), functional class II – 18 (75%) functional class III – 4 (16,7%).

The object of laboratory studies were serum in patients with coronary heart disease: stable stenocardia of II–III functional classes. The concentration of myoglobin in the blood serum of patients were determined in dynamics: on admission to the hospital, on 1 day after coronary artery stenting. Patients were discharged on average  $3,6 \pm 0,3$  hours.

Blood for serum preparation was obtained by puncture of the cubital vein. Serum was separated from blood cells by centrifugation at 3000 rev / min for 10 min to 2 hours after the first blood sampling, canned 1% sodium azide and stored before the test at  $-180$  C.

Myoglobin concentration (ng/ml) was determined by electrochemiluminescence method using reagent kits Elecsys of firm “Roche” on the Elecsys 2010 immunochemical analyzer of firm “Roche” (Switzerland, Germany, Japan). Reference level of myoglobin was 25,0 – 72,0 ng/ml.

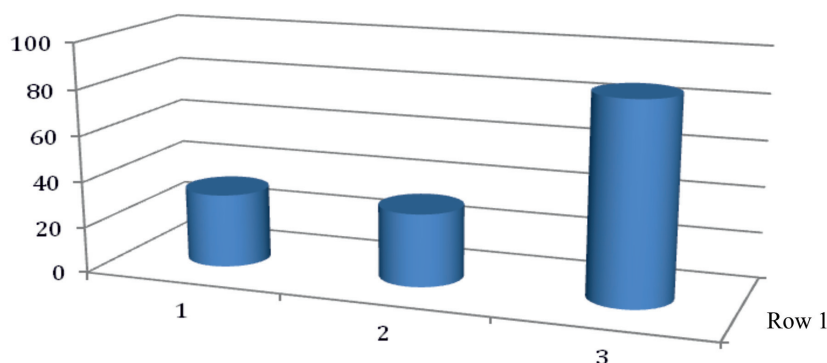
On getting the written consent and pre-sedation of the patient in terms of roentgen operating room there was performed: coronary artery stenting of 30 patients (100%). During stenting there were used stents of Xience V.

All data collected during the study, were processed by methods of parametric statistics Statistica for Windows V. 7.0 with a help of Microsoft Excel program. There were calculated mean values (M), standard deviation ( $\delta$ ) and the error of the mean (m).

Myoglobin indicators in donors and patients before and after percutaneous coronary intervention (ng/ml)

| Investigated acute phase protein | Research groups |                     |                        |
|----------------------------------|-----------------|---------------------|------------------------|
|                                  | Control group   | Group of comparison | Group of research work |
| The level of myoglobin           | 32,1 ± 3,8      | 31,67 ± 1,99        | 86,1 ± 3,8             |

Note: the control group – healthy donors; comparison group – patients with coronary artery disease, stable stenocardia of II–III functional classes to coronary stenting; study group – patients with coronary artery disease on 1 day after transluminal balloon angioplasty and stenting of the coronary arteries.



Myoglobin dynamics before and after coronary artery stenting. Note: 1 control Group – healthy donors; 2nd comparison group – patients with coronary heart disease: stable stenocardia of II–III functional classes to coronary stenting; 3rd study group – patients with coronary artery disease on 1 day after percutaneous coronary intervention

### Results of research and their discussion

The dynamics of myoglobin in the blood serum in healthy donors and patients with coronary heart disease was surveyed: stenocardia of II–III functional classes before PCI, as well as on 1 day after coronary intervention.

Reference limit of myoglobin in serum for immunochemical analyzer Elecsys 2010 of “Roche” firm was 25,0–72,0 ng/ml.

Myoglobin values in the control group did not extend beyond the reference level, it was 32,1 ± 3,8 ng/ml. Patients with coronary heart disease: stable stenocardia of II–III functional classes before percutaneous coronary intervention, included in the comparison group, the concentration of myoglobin in serum 31,67 ± 1,99 ng/ml.

On the 1st day after percutaneous coronary intervention and coronary artery stenting in patients, included in a group of studies, it was found the myoglobin increase in serum, its level was 86,1 ± 3,8 ng/ml. This indicates that the concentration of myoglobin in the serum is increased in 2,72 times in patients undergone PCI. The marker concentration of myocardial necrosis myoglobin in the serum is more in the study group than in the control group as well as exceeds the upper limit of the reference level (picture).

Thus, to summarize the results of our study based on an assessment of myoglobin indicators,

one can conclude that after percutaneous coronary intervention and coronary artery stenting in patients with coronary heart disease: stable stenocardia of II–III functional classes it is recorded increase markers of myoglobin myocardial damage that may indicate a small myocardial injury.

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