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The role of cystatin-C and KIM-1 in chronic renal failure

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Annotation: Chronic heart failure (CHF) is a disease in which the heart is unable to pump enough blood to supply the body with oxygen. It can occur as a result of many diseases of the cardiovascular system, among which the most common are coronary heart disease, hypertension, rheumatoid heart defects, and endocarditis.

Key words: Chronic heart failure, cystatin C, KIM-1.

Relevance. Chronic heart failure (CHF) is a disease in which the heart is unable to pump enough blood to supply the body with oxygen. It can occur as a result of many diseases of the cardiovascular system, among which the most common are coronary heart disease, hypertension, rheumatoid heart defects, and endocarditis. A weakened heart muscle is unable to pump blood, releasing less and less of it into the vessels.

Heart failure develops slowly and in the initial stages appears only during physical activity. Characteristic symptoms at rest indicate a severe stage of the disease. As CHF progresses, it significantly worsens the patient's condition, leading to decreased performance and disability. The result can be chronic liver and kidney failure, blood clots, and strokes.

Timely diagnosis and treatment can slow down the development of the disease and prevent dangerous complications. An important role in stabilizing the condition is given to a correct lifestyle: weight loss, low-salt diet, limiting physical and emotional stress.

Clinical manifestations of heart failure depend on its duration and severity and are quite varied. The development of the disease is slow and takes several years. If left untreated, the patient's condition may worsen.

The main symptoms of chronic heart failure include: shortness of breath during exercise, when moving to a horizontal position, and then at rest; dizziness, fatigue and weakness; lack of appetite and nausea; swelling of the legs; accumulation of fluid in the abdominal cavity (ascites); weight gain due to swelling; fast or irregular heartbeat; dry cough with pinkish sputum; decreased attention and intelligence. Depending on which phase of cardiac activity disrupts its functioning, we speak of systolic or diastolic heart failure.

• Systolic heart failure is a consequence of weakness of the heart muscle and is characterized by insufficient ejection of blood from the chambers of the heart. Its most common causes are coronary heart disease and dilated myocardiopathy. More often observed in men.

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• Diastolic heart failure occurs when the heart muscle loses its ability to stretch. As a result, much less blood enters the atria. The most common causes: arterial hypertension, hypertrophic myocardiopathy and stenotic pericarditis.

The human heart can be roughly divided into right and left halves. Pumping blood into the lungs and saturating it with oxygen is ensured by the work of the right parts of the heart, and the left ones are responsible for delivering blood to the tissues. Depending on which departments fail to cope with their task, they speak of right ventricular or left ventricular heart failure. When the functioning of the left sections is impaired, shortness of breath and cough come to the fore. Right-sided failure manifests itself as systemic edema.To select the necessary medications, it is very important to determine the mechanism of heart failure and its type.

The presence of at least one of the following risk factors is sufficient for the development of chronic heart failure. The combination of two or more factors significantly increases the likelihood of disease.

The risk group includes patients with: high blood pressure; coronary heart disease; myocardial infarction in the past; heart rhythm disturbances; diabetes mellitus; congenital heart defect; frequent viral diseases throughout life; chronic renal failure; alcohol addiction.

In recent years, a number of observations have confirmed that impaired renal function, accompanied by an increase in serum creatinine and a decrease in glomerular filtration rate (GFR), worsens the outcome of chronic heart failure. Therefore, this condition is considered a risk factor for worsening the progression of chronic heart failure.

Epidemiological and population studies have confirmed that early, even subclinical, renal dysfunction leads to a sharp deterioration in the condition of patients with chronic renal failure. According to a number of authors, renal dysfunction in chronic renal failure is determined in 32-60% of cases using criteria such as creatinine, creatinine clearance, GFR, cystatin C, microalbinuria.

In recent years, several observations have emerged on the use of cystatin-C as an alternative marker for assessing renal functional status and cardiovascular disease risk. Cystatin-C was first discovered in 1961 in cerebrospinal fluid, later in urine during tubular proteinuria, and in 1962 in blood serum and other biological fluids. Cystatin-C is a polypeptide consisting of 120 amino acid residues with a molecular weight of 13.4 kDa.

In recent years, the use of the transmembrane protein Kiney Injury Molecule-1 (KIM-1), containing mucin and immunoglobulin domains, has been recommended for early assessment of changes in the renal tubules. Experimental models have shown that increases in KIM-1 are associated with ischemic effects on the kidney and are not always accompanied by increases in blood creatinine levels. Based on a number of observations, this protein is considered an early and reliable marker of renal tubular damage. Femke Vanaders et al reported that in patients without diabetes but with proteinuria, compared with controls, it was directly correlated with proteinuria scores and that this association was attenuated by angiotensin-converting enzyme inhibitors (ACEIs). Based on the above, the determination of IMT-1 can be considered as a reliable marker of cardiorenal changes and a test method that has additional prognostic value.

A number of studies have noted that, along with coronary heart disease (CHD) and arterial hypertension (AH), rheumatic heart defects also play an important role in the development of CHF. According to various sources, the incidence of chronic heart failure in this group of patients ranges from 4% to 14%. In particular, in an observation conducted by J. McMurray, a famous scientist working on the problems of chronic heart failure in Scotland, and co-authors, it was found that in 8% of patients CHF developed due to rheumatic heart defects.

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