

NATRIURETIC PEPTIDES IN THE CLINIC FOR THE DIAGNOSIS AND PROGNOSIS OF THE COURSE OF HEART FAILURE

Shamsutdinova G.B

*Assistant of the Department of "Propaedeutics of Internal Diseases" of the Fergana
Medical Institute of Public Health*

Abstract: *Natriuretic peptides (NPS) are key diagnostic and prognostic biomarkers for patients with heart failure (HF). The main mechanism for increasing the levels of NUP in the blood serum, which is typical for HF, is secretion in response to stretching of the myocardial wall. This article discusses the mechanisms of increasing NUP and their diagnostic value in HF, as well as a number of other conditions, such as acute coronary syndrome and coronary heart disease, atrial fibrillation, physical exertion, renal failure, taking medications with cardiotoxicity (chemotherapy drugs), and sacubitril/valsartan.*

Key words: *Natriuretic peptides, biomarker, heart failure.*

INTRODUCTION

Heart failure is a syndrome caused by decompensated myocardial dysfunction. It is manifested by an increase in the volume of intercellular fluid and a decrease in perfusion of organs and tissues. The pathophysiological basis of this syndrome is that the heart cannot provide the metabolic needs of the body due to a violation of the pumping function or does so by increasing the end-diastolic pressure in the ventricles. In some patients with heart failure, there is no violation of pumping function, and clinical manifestations occur due to impaired filling or emptying of the chambers of the heart. Myocardial dysfunction (systolic or diastolic) is initially asymptomatic and only then can heart failure manifest itself. Laboratory diagnostics of cardiovascular diseases (CVD) is an integral component of a therapeutic and preventive strategy aimed at early diagnosis, improving the duration and quality of life of patients. The search for new laboratory biomarkers of CVD and the refinement of the diagnostic capabilities of the old ones are still among the priority research areas [1]. The modern key biomarkers of CVD used in routine clinical practice include cardiospecific isoforms of troponins and natriuretic peptides (NPS). For the first time, NPS and their properties became known in 1981 thanks to the work of de Bold AJ, et al. The peptide they found in the atrial myocardium had endocrine properties — natriuretic effect on the urinary system, as a result of which it was given the name atrial NUP (ANUP) or type A NUP. Another historical name of this peptide, auriculin (auricula — ear), was assigned due to the fact that this peptide was found in the auricle of the atrium. These studies marked the beginning of a close study of the hormonal role of the heart. Subsequently, in 1989, a cerebral NUP (MNUP) or type B NUP was found in ventricular cardiomyocytes. It received its name due to the fact that it corresponded in structure to a peptide previously found in the brain of a pig. And finally,

the third type C NUP was identified in 1991 also in pig brain extracts [2]. Thanks to molecular genetic studies, it became clear that NPS are a family of genetically distinct, but structurally related peptides. They have a similar structural conformation, characterized by a peptide ring with a cysteine bridge, which is well preserved throughout evolution, being part of a chain binding to the NUP receptor located in target organ cells. PNUP and MNUP are predominantly expressed and secreted by cardiomyocytes (mainly atria), and therefore are of interest as biomarkers in patients with CVD. At the same time, type C NUP is mainly produced in the central nervous system, endothelium, bone tissue and reproductive system, and its value for specialists dealing with the problems of diagnosis and treatment of CVD has not yet been established [2][3]. According to modern concepts, NPS have hormonal/endocrine (vasodilation, natriuresis, suppression of aldosterone and endothelin) and autocrine/paracrine (antihypertrophic, antifibrotic and proangiogenic) effects [3]. NPS are synthesized as pre-prohormones on the ribosomes of the endoplasmic reticulum, after which they undergo a number of posttranslational changes and turn into mature peptide molecules (hormones). One of the interesting areas of modern research is the study of the level of cardiomarkers in other biological fluids, primarily in urine and oral fluid [1]. In this regard, the study of NUP in the oral fluid may be of some interest for non-invasive diagnosis of HF. It has been shown that the average level of MNUP in the oral fluid of patients with HF is significantly higher than in healthy patients. Determination of MNUP in saliva can be a useful method for the diagnosis and follow-up of patients with HF, especially in emergency care [10].

NUP in acute and chronic forms of coronary heart disease: Myocardial ischemia leads to the development of systolic and diastolic dysfunction of the left ventricle (LV), which leads to an increase in the level of NUP in the blood. In addition, with the death of heart muscle cells, the NUP will also be released into the bloodstream. Thus, it should be expected that the greater the degree of ischemia, the greater the increase in the level of NUP. It is logical to expect that the NUP will prove to be a valuable prognostic biomarker in both the short and long term in patients with acute coronary syndrome. In patients with ST-segment elevation myocardial infarction (STEMI) who, upon admission, have serum MNUP levels >80 pg/ml, there is a 7.2-fold increase in 30-day mortality. In ASSENT-2 and ASSENTPLUS studies, it was reported that the level of NT-proMNUP at admission was an independent marker of one-year mortality in patients with STeMI receiving thrombolytic therapy. The same was noted in patients with STeMI who underwent primary percutaneous coronary intervention [2]. In patients with myocardial infarction without ST segment elevation, the level of NUP also has a high prognostic value in terms of predicting hospital and six-month mortality [6][7][8]. In chronic coronary heart disease, even the development of minor myocardial ischemia led to an increase in NUP in blood serum, while the prognostic value of NT-proMNUP exceeded MNUP in predicting the risk of adverse events [2,9]

Conclusion: NPS are valuable biomarkers widely used in the clinic for the diagnosis and prognosis of a number of CVD. An increase in the level of NUP in HF occurs due to stretching of the wall of the heart muscle, which stimulates the secretion of NUP by cardiomyocytes. In addition to HF, there are a number of other reasons for the increase in NUP, which may be based on many other mechanisms unrelated to myocardial stretching. According to some reports, in addition to blood serum, NPS are present in oral fluid and urine. Further study and refinement of these mechanisms is of both clinical and research interest.

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Oliy ta'limdagi muammolar va uning yechimlari

Annotatsiya: ushbu maqolada ta'lim muassasalarida o'quv sifatini oshirish jarayoni, ota bobolarimiz kim bo'lgan? Dunyoning rivojlangan mamlakatlaridagi universitetlar