

## Heart Failure and its Forms

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### Abstract

**Heart failure is a dysfunction of the heart in effective blood circulation, which imposes a large economic burden on the global health system. The article provides detailed information on the main causes and risk factors of heart failure, mechanisms of disease development, as well as modern diagnostic and treatment methods, including pharmacological therapy, mechanical aids and regenerative therapy, and more. The article also considers two forms of heart failure.**

**Keywords: Heart failure, acute heart failure, chronic heart failure, etiology, pathophysiology, diagnosis, pharmacological treatment, mechanical support devices, regenerative therapy, biomarkers.**

### Introduction

Heart failure is one of the most complex and widespread clinical conditions in the world health system. This disease is characterized by a violation of the function of the heart in providing blood circulation. This disorder can be caused by various reasons: pathologies of the heart's muscles, valvular system, or electrical conductivity, excessive activation of the neuro humoral system, dysfunctions related to metabolic and genetic factors. The development of the disease often leads to imbalance in various organs and systems of the body. In this case, the patient's quality of life and life expectancy decrease significantly.

Heart failure has different clinical forms, systolic (impaired heart contraction) and diastolic (impaired heart filling) forms are distinguished. Systolic dysfunction occurs with a decrease in the ejection fraction, and in diastolic dysfunction, although the ejection fraction is at a normal level, the filling and elasticity of the heart is disturbed. The main cause of these pathological mechanisms is hypertrophy of the heart, fibrosis processes and excessive activation of the neurohumoral system. Overactivation of the neurohumoral system includes activation of the sympathetic nervous system and the renin-angiotensin-aldosterone system, which leads to fluid retention, increased blood pressure, and increased myocardial energy demands. During these mechanisms, the production of ATP in the heart muscle is disrupted, which causes further deterioration of the heart's function.

Heart failure is a major economic burden for the global health system, costing billions annually for treatment and prevention. In developed countries, HF occurs mainly in the elderly population, since most cardiovascular diseases are associated with old age. In these countries, ischemic heart disease, hypertension and diabetes are the main etiological factors. Rheumatic fever and infectious

diseases play an important role in developing countries. At the same time, due to economic constraints, patients in these countries receive medical care in late stages of the disease.

Diagnostics has developed significantly in recent years. Methods such as echocardiography and magnetic resonance imaging are important in determining the structural and functional changes of the myocardium. Meanwhile, biomarkers such as NT-proBNP and galectin-3 are widely used for early detection and prognosis of YY. In addition to imaging technologies, innovative approaches to image analysis and remote monitoring using artificial intelligence have made patient management much easier. There are two main forms of heart failure: acute heart failure and chronic heart failure. Acute heart failure is a rapidly developing condition that occurs as a result of a sudden decrease in the heart's ability to contract. Chronic heart failure is a disease that develops slowly and gradually, gradually reducing the effective functioning of the heart.

Acute Heart Failure is a condition in which blood flow stops and organs are deprived of oxygen as a result of a sudden decrease in the contractility of the heart muscle. Acute heart failure is often caused by myocardial infarction, cardiac arrhythmias, or cardiac overload. In most cases, the disease is a dangerous condition that requires immediate medical attention.

Symptoms of acute heart failure include shortness of breath, chest pain, swelling, low blood pressure, rapid heartbeat, and in some cases, fainting. Due to the accumulation of blood in the left ventricle of the heart, difficulties in breathing and swelling of the arms and legs are observed in OY. In the treatment of acute heart failure, intensive medical care should be provided immediately. The main treatments include drugs (eg, diuretics, ACE inhibitors), oxygen therapy, mechanical assist devices, and, if necessary, surgery to repair the heart.

For the effective treatment of acute heart failure, it is necessary to make a quick diagnosis and correctly evaluate the course of the disease. Diagnosis is often made using electrocardiogram (ECG), echocardiogram, and biomarkers. Biomarkers, in particular, help to determine the degree of heart failure.

Chronic heart failure is a slow and gradual deterioration of the heart's ability to circulate blood. Cardiac insufficiency often develops over a long period of time, gradually reducing the ability of the heart muscle to work. The most common causes of chronic heart failure include hypertension, ischemic heart disease, diabetes, cardiac arrhythmias, and cardiomyopathies. Each of these changes the structure and function of the heart muscle, leading to chronic heart failure over time.

The symptoms of chronic heart failure are usually mild at first, but the symptoms worsen as the disease progresses. Headaches, shortness of breath, chronic fatigue, leg swelling, enlarged liver, and fatigue are the main clinical symptoms of chronic heart failure. Activation of the neuro humoral system, including the renin-angiotensin-aldosterone system and the sympathetic nervous system, plays an important role in the development of chronic heart failure.

Pharmacologic approaches are widely used in the treatment of chronic heart failure, including ACE inhibitors, beta-blockers, SGLT2 inhibitors, aldosterone antagonists, and diuretics. These drugs help restore the heart's efficient functioning, reduce symptoms, and improve the patient's quality of life. Also, mechanical aids such as LVAD (left ventricular assist device) and regenerative therapies, including stem cells and gene therapy, may provide new opportunities for the treatment of chronic heart failure in the future.

Several new innovative approaches are also being used in the treatment of chronic heart failure (CHF). In particular, scientific research in the field of gene therapy and regenerative medicine is

creating new opportunities in the treatment of this disease. With the help of gene therapy, it is possible to improve the recovery process of the heart muscle, create new cells and regenerate the heart. For example, some studies are investigating reversing the harmful processes associated with cardiomyopathy by inserting genes to repair the heart. However, it is possible to repair damaged parts of the heart using stem cells or cell therapy.

Innovations and technologies in treatment: Although modern methods of treatment for chronic heart failure are based on traditional approaches, the development of new treatments and technologies is opening new horizons in the management of this disease. SGLT2 inhibitors (sodium-glucose cotransporter-2 inhibitors), such as empagliflozin and dapagliflozin, have been proven by clinical studies to be effective not only in the treatment of diabetes, but also heart failure. These drugs help improve the function of the heart and kidneys, as well as prolong the life of patients.

In addition, beta-blockers and angiotensin-receptor angiotensin inhibitors (ARBs), as well as aldosterone antagonists, are used in the effective treatment of chronic heart failure. These drugs help improve the patient's quality of life by improving the performance of the heart and reducing over activation of the neuro humoral system. In particular, ARNI (angiotensin receptor-neprilysin inhibitors), new drugs such as sacubitril/valsartan, offer a new approach to the treatment of chronic heart failure. These drugs reduce the angiotensin system and improve heart rate and performance.

Mechanical assist devices and artificial heart technologies also provide important medical support for patients with chronic heart failure. An LVAD (left ventricular assist device) is a mechanical device that helps support the left ventricle of the heart and improve its circulation. With the help of modified mechanical devices, it is possible to restore the function of the heart and prolong the patient's life. Artificial hearts are specially developed on the basis of advanced technologies and are being introduced as an alternative treatment method for patients who need a heart transplant.

Heart failure remains a major challenge for the global health system, with its acute and chronic forms causing high mortality and morbidity worldwide. Comprehensive and innovative approaches are used in modern medicine to effectively treat this disease. Acute heart failure is a condition that requires immediate medical attention and is often caused by myocardial infarction, cardiac arrhythmias, and other dangerous conditions. Chronic heart failure develops over a long period of time and causes a slow decline in heart function.

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