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FUNCTIONAL DIAGNOSIS OF THE CARDIOVASCULAR SYSTEM IN AMBULATORY PRACTICE

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Abstract : The concept of "functional diagnostics" includes various methods of studying and evaluating the functions of body organs and systems, both at rest (electrocardiography, electroencephalography, echocardiography) and during exercise (bicycle ergometry). and treadmill test, transesophageal) can be performed. heart rate, breathing test during electroencephalography, etc.). Loading refers to the creation of artificial conditions for the operation of the studied organ or system under "extreme" conditions, which allows the detection of hidden pathological changes. In some cases, stress tests with various drugs are used, where the triggering factor is chemicals. The most common example is a test with drugs that expand the bronchi in the study of the function of the respiratory system. A separate class should be allocated for long-term studies (24-hour Holter electrocardiogram monitoring, 24-hour blood pressure monitoring, etc.).

Key words: Electrocardiography (ECG); Echocardiography (ECHO-CG); 24-hour Holter ECG monitoring (CMECG); 24-hour blood pressure monitoring (ABPM), Electrocardiography (ECG)

Heart disease (heart disease) is a group of pathologies related to the cardiovascular system, manifested by a violation of the normal activity of the heart. Such diseases may be caused by damage to the epicardium, pericardium, myocardium, endocardium, valvular apparatus of the heart, and blood vessels. Heart diseases can be hidden for a long time, without any clinical picture. Along with various tumors, it is one of the main causes of premature death in developed countries today.

The continuous operation of the blood circulation system, consisting of the heart and blood vessels, which acts as a pump, is a necessary condition for the normal functioning of the body.

According to Framingham National Heart, Lung and Blood Institute (USA) studies, the most important factors in the development of cardiovascular diseases in people are obesity, sedentary lifestyle and smoking.

Heart diseases can be conditionally divided into three large groups according to the focus of damage:

Diseases affecting the valve apparatus of the heart. Includes various acquired and congenital heart defects.

Diseases affecting blood vessels of the heart and their consequences. This includes ischemic heart disease, myocardial infarction, angina pectoris, etc.

Diseases that directly affect the tissue of the heart shell, including pericarditis, endocarditis, myocarditis. The causes of these diseases include a wide range of factors, from lifestyle to genetic defects.

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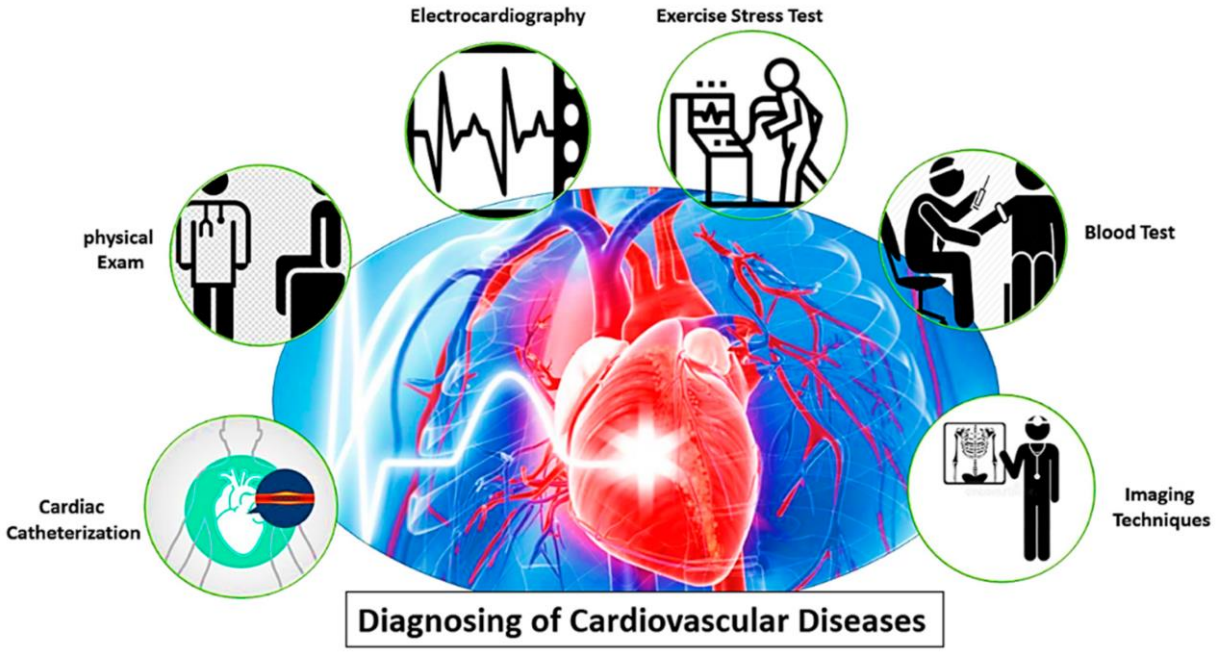

Types

a. Rhythm and conduction disorders
b. Heart arrhythmia;
c. Tachycardia;
d. Myocardial conduction disorder
e. Atrioventricular blockade
f. Gis ligament leg block
g. Fibrillation;
h. Extrasystole.
i. Inflammatory diseases of the heart
j. Endocarditis;
k. Myocarditis;
l. Pericarditis.
m. Valve defects
n. Acquired heart defects

Among the most common are heart valve defects. Dysfunction of the heart valves means that they move blood backwards or do not open enough. Heart valve diseases are often the result of infectious damage or autoimmune reactions.

Congenital heart defects

Congenital heart defects occur due to various genetic diseases or damage to the fetus during dysembryogenesis.

Tetrad of Fallo

Among them, the most serious form is tetrad of Fallot. In this case, hemodynamics is disturbed, blood flow to the lungs decreases, and venous blood passes from the right ventricle to the aorta. Four factors play a role in its development:

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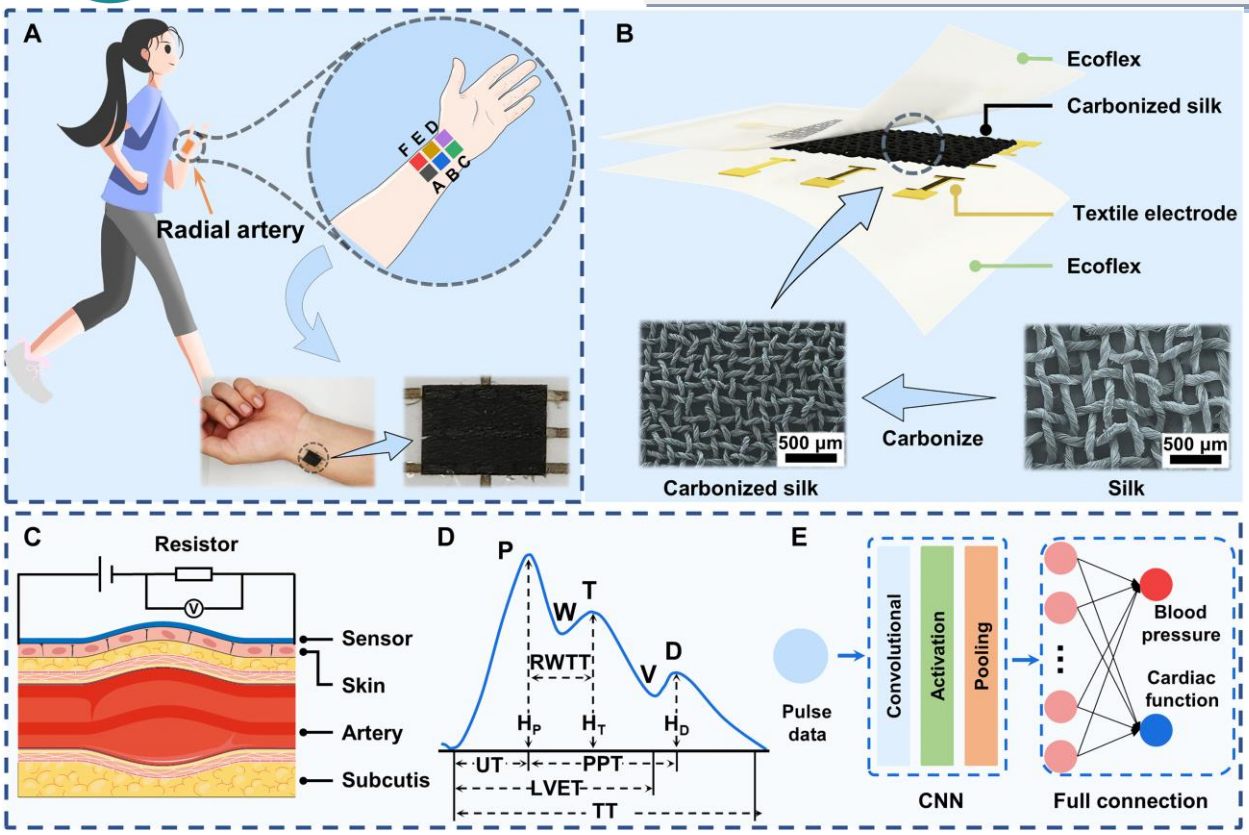

Ventriculoseptal defect — ventricular septal defect (VSD) — unites the right and left parts of the heart. In tetrad of Fallot, QATN is always large and non-restrictive. As a rule, this is perimembranous CAD, muscular CAD or supraarterial CAD.

Right ventricular outflow tract obstruction is caused by one or a combination of the following anatomical components. These include infundibular (subvalvular) stenosis of the right ventricular outflow tract, pulmonary artery stenosis, obstruction due to hypertrophied right ventricular myocardium, and hypoplasia of the pulmonary artery core and/or branches.

Dextraposition of the aorta - the aorta is partially displaced from the right ventricle or the blood flow in it is maintained dominantly due to the activity of the left ventricle.

Right ventricular hypertrophy — hypertrophy of the muscular component of the right ventricle develops with age.

Other congenital heart defects

Interventricular and intercompartmental barrier defects, valve narrowing (stenosis), patent ductus arteriosus (blood bypasses the lungs), etc. Most of these conditions can be treated with surgery. The time of surgery depends on the nature of the defect, symptoms and severity of the condition.

1. Mitral stenosis;
2. Mitral valve insufficiency;
3. Mitral valve prolapse;
4. Aortic stenosis;
5. Aortic valve insufficiency;
6. Combined valve defects.

Arterial hypertension

Arterial hypertension, or high blood pressure, is a serious condition that increases the risk of heart attacks and strokes. During the contraction of the heart, the pressure in the arteries of an adult is 120-140 mm. sim. is 80-90 mm during expansion. sim. falls on ust. If these indicators increase, this indicates high blood pressure and can have very serious consequences.

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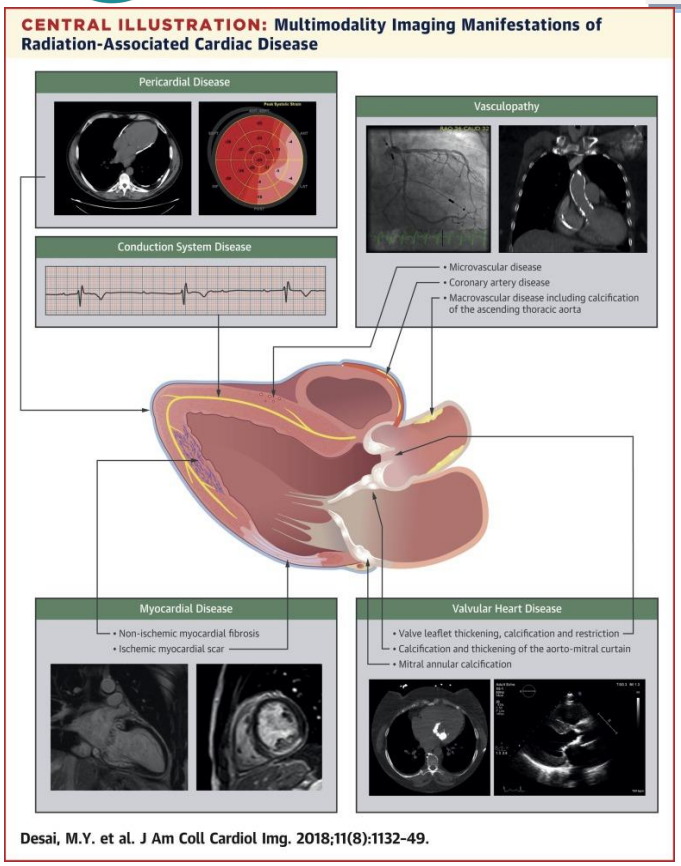

In developed countries, the number of people suffering from hypertension is much higher. In 90% of cases, this disease does not occur due to an easily eliminated cause, therefore, a comprehensive approach to treatment is necessary.

Ischemic injuries

Myocardial infarction

An acute condition, a clinical form of ischemic heart disease, is caused by necrosis of heart muscle tissue (myocardium) as a result of complete or partial blood insufficiency. This leads to disruption of the entire cardiovascular system and endangers the patient's life.

The main and most common cause of myocardial infarction is a violation of blood flow in the coronary arteries, which supply the heart muscle with blood and, accordingly, oxygen. Often, such a disorder occurs against the background of atherosclerosis of the arteries, in which atherosclerotic plaques (plaques) appear on the walls of the vessels.

Ischemic heart disease

This disease is characterized by a decrease in blood flow to the heart muscle. The heart works intensively, and lack of blood immediately affects its condition. Coronary arteries surrounding its muscles are responsible for feeding the heart. Symptoms of this disease can be shortness of breath and heart attack.

In almost 90% of cases, coronary artery disease is a result of damage to the walls of the arteries - atherosclerosis. Previously, this process was considered to be related to the natural aging of the body, but now it is known that even children can suffer from atherosclerosis.

The main methods of functional diagnostics in ambulatory practice are standard studies of the functions of the cardiovascular system, which are equally necessary both for primary diagnosis and for further monitoring of the condition of the heart and blood vessels. These methods include:

a. Electrocardiography (ECG);
b. Echocardiography (ECHO-CG);
c. 24-hour Holter ECG monitoring (CMECG);

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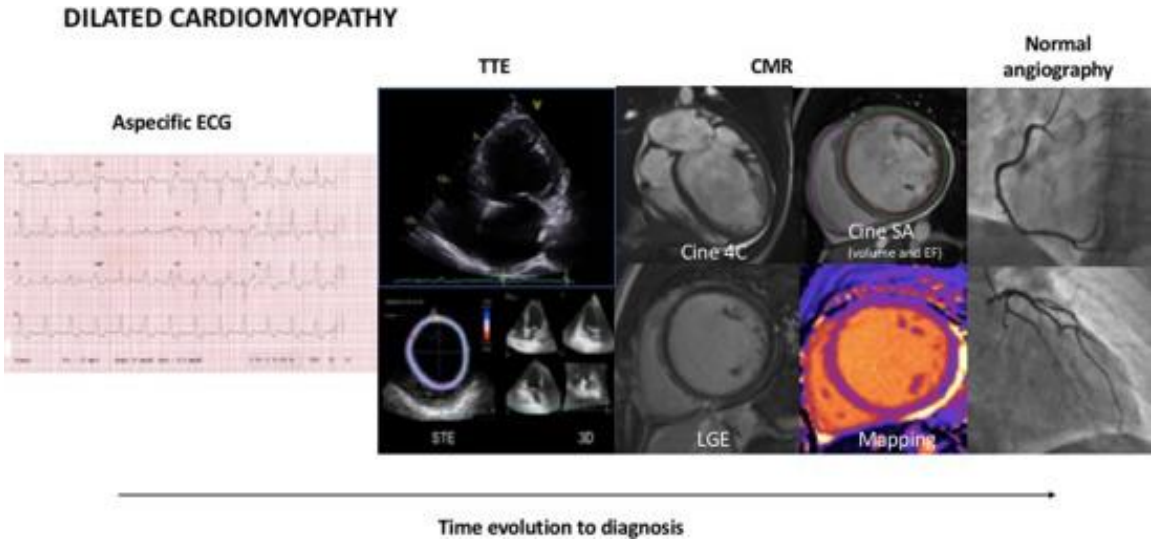
d. 24-hour blood pressure monitoring (ABPM).
e. Electrocardiography (ECG)
f. Electrocardiography (ECG) is the main, most common and frequently prescribed method of examining the heart.

An EKG is a recording of the electrical activity of the heart at rest, at a given time, on paper or electronic carriers.



EKG

ECG is the main method of diagnosing heart pathology in outpatient practice and allows you to diagnose: heart rhythm and heart conduction disorders;
hypertrophy of the heart muscles and overloading of various parts of the heart, for example, heart defects, hypertension, heart failure;
changes in the myocardium in cardiomyopathies, myocarditis, coronary heart disease, myocardial infarction.
It should be noted that electrocardiography is usually variable and depends on age, gender, anatomical and constitutional characteristics of a person and other factors. And this allows for the correct interpretation of the graphic representation of heart activity, analysis of ECG waves and intervals, correct clinical assessment and differential diagnosis, performed by a functional diagnostician.

ECG is often used in emergency clinical situations that require urgent treatment:
complaints of pain in the chest, under the left shoulder blade, pain in the left arm, pain in the epigastric region;
a feeling of "disorder" of the heart (interruptions in the work of the heart, palpitations, a feeling of "stopping" of the heart);
sudden shortness of breath, feeling of lack of air;
episodes of dizziness, loss of consciousness, "blackness" in the eyes to exclude the heart cause of these complaints.
ECG dispensary monitoring, initial, periodic and preventive medical examinations are included in almost all therapeutic programs.
ECG begins to examine all patients who complain of high blood pressure and who show the presence of chronic or previous acute heart diseases in their life history (anamnesis).

ECHO-cardiography (ECHO-CG)

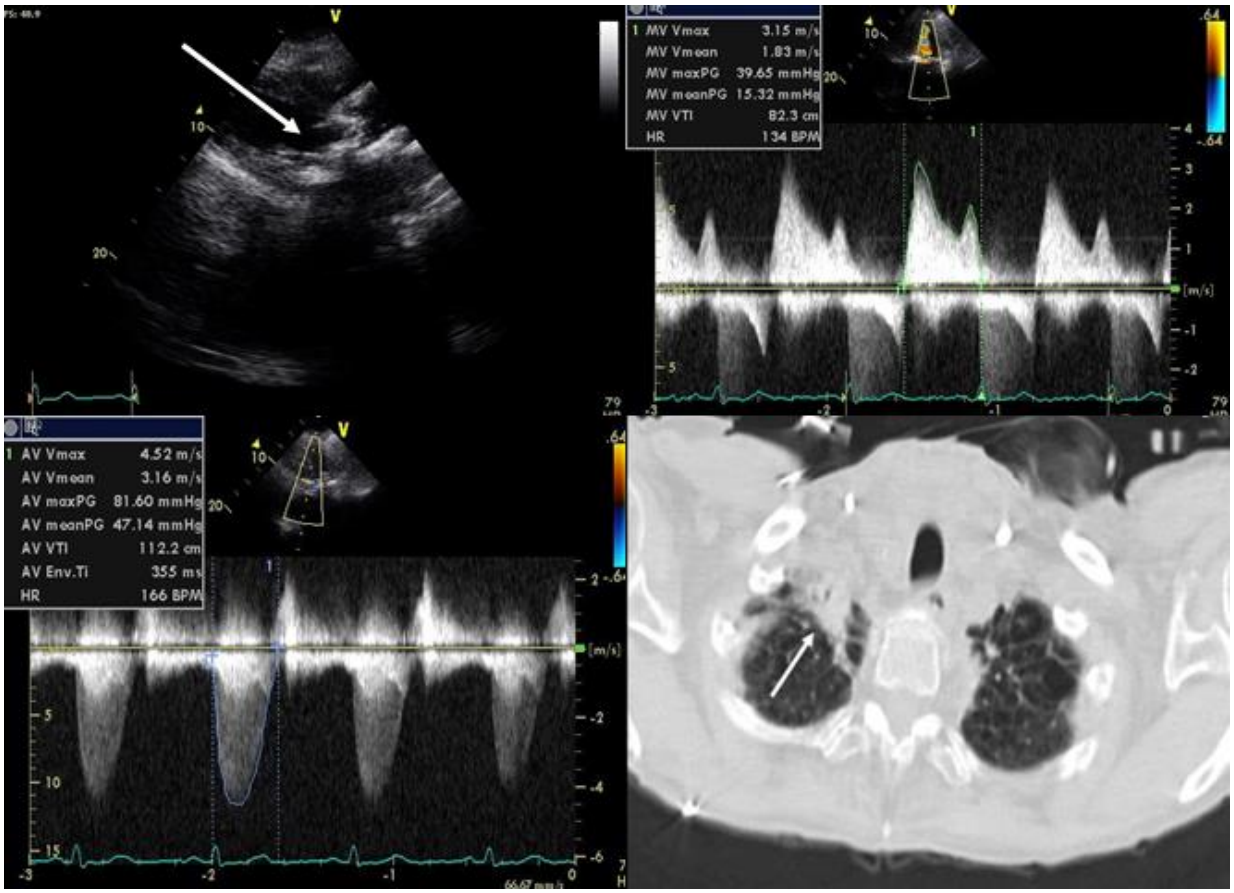
If during the examination, the patient's blood pressure is increased, the heart borders are enlarged, there are noises when listening to the heart, pathological changes are detected in the ECG, and changes in the

size and shape of the heart are visible. in the X-ray of the chest, its atypical location or altered aorta and pulmonary artery, the doctor prescribes an ultrasound examination of the heart: transthoracic echocardiography.

ECHO-KG

ECHO-cardiography (ECHO-CG, heart ultrasound) is an ultrasound method for studying the structure and function of the heart. The method is based on receiving ultrasound signals reflected from heart structures through a sensor and converting them into an image on a monitor screen. When conducting ECHO-CG, the doctor evaluates the following:

a. the size of the heart and its chambers, as well as the pressure in them;
b. condition of atria and ventricles (heart chambers) and heart valves;
c. the thickness of the heart walls, their structure and integrity;
d. contractile function of the myocardium (work of the heart muscle),
e. characteristics of the movement of blood inside the heart through the valves
f. the condition of the outer covering of the heart - the pericardium
g. the state of the pulmonary artery and aorta, the pressure in them.



ECHO-CG is the main method for diagnosing acute and chronic heart diseases: defects, inflammatory diseases of the heart valve apparatus and its membranes (endocarditis, pericarditis). This study also evaluates and determines the degree of myocardial hypertrophy, the presence of dysfunction in heart muscle damage (infarction, myocarditis) and the presence of blood clots in the heart cavities. A cardiologist or therapist connects the data obtained from ECHO-CG with the clinical picture and decides on the tactics of further treatment of the patient.

24-hour Holter ECG monitoring

Depending on the nature of the pathological process, the current clinical presentation may not provide

clear criteria for clinical diagnosis. In this case, the doctor prescribes diagnostic studies conducted at a wider time interval during the patient's daily activities, which allows not only to monitor the activity of the cardiovascular system, but also to identify the triggering factors that lead to pathological changes. This group of studies used in outpatient practice includes 24-hour Holter ECG monitoring (Holter CMECG) and 24-hour blood pressure monitoring (ABPM).

Holter EKG

A 24-hour ECG monitoring system consists of an ECG recorder (which the patient usually wears on his belt when presented) and a system of electrodes (wires) attached to the patient's body. At the end of the study, the doctor transfers the ECG data to a computer program and, after conducting a digital analysis, interprets the results and makes a medical conclusion.

Guidelines for daily ECG monitoring:

Electrocardiography (ECG);
Echocardiography (ECHO-CG);
24-hour Holter ECG monitoring (CMECG);
24-hour blood pressure monitoring (ABPM).
Electrocardiography (ECG)

To conduct the study, the skin must be properly prepared for the placement of the electrodes: the hair is shaved in the places where the wires are connected, and the skin is degreased. During the examination, the patient is advised to wear loose, comfortable clothing. Water procedures (bathing, showering) are excluded during the period of SMEKG.

During the study, the patient leads a normal lifestyle (works, plays sports, walks), records all complaints that arise during the monitoring process in a special diary. In addition, possible changes in medication and physical activity are indicated in the diary.

24-hour blood pressure monitoring (ABPM)

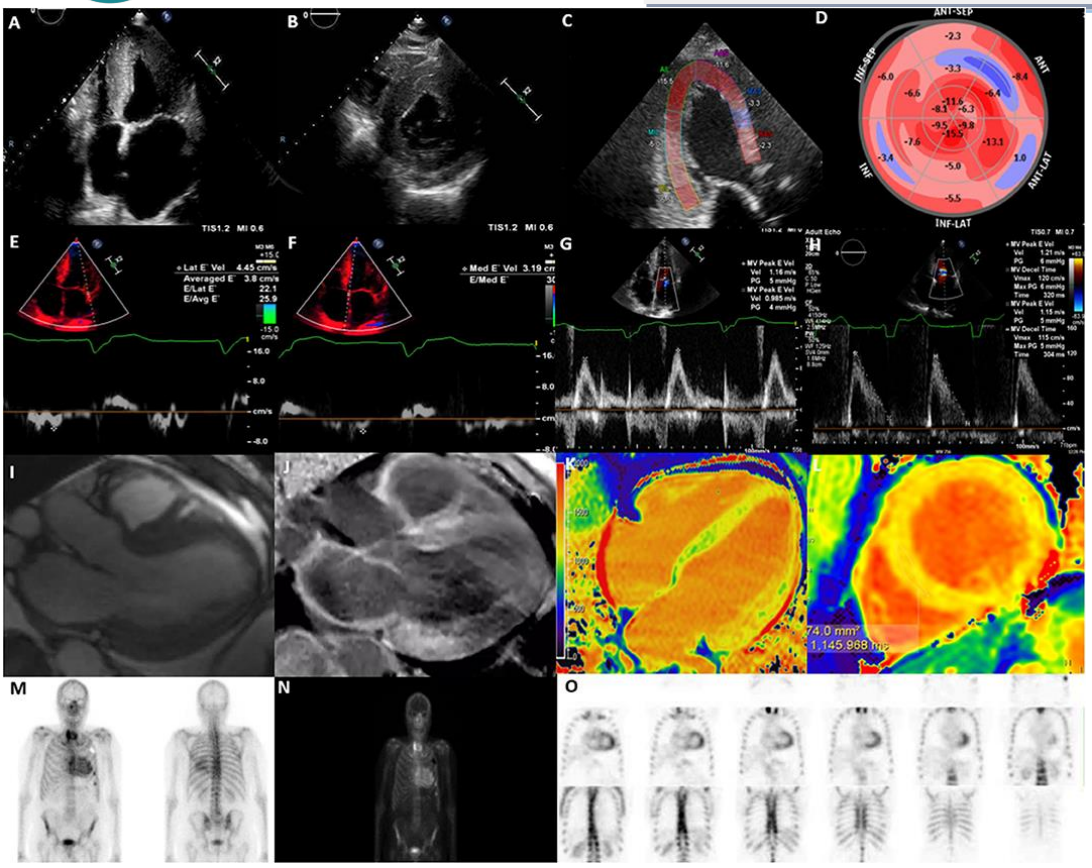
Along with 24-hour ECG monitoring, 24-hour blood pressure monitoring (ABPM) is often used in ambulatory practice.

This type of study is primarily prescribed to patients with elevated blood pressure (by the patient himself or by a doctor's appointment). The research allows us to exclude the "white coat" phenomenon, only during the doctor's appointment, the pressure increases. When ABPM determines:

a. the degree of increase in blood pressure during the day;
b. the main time of the rise in blood pressure during the day;
c. morning rise rate of blood pressure;
d. dependence of hypertension on physical activity of the patient.

All these factors affect the prognosis of the risk of developing cardiovascular complications in a patient with hypertension (myocardial infarction, stroke, etc.).

24-hour blood pressure monitoring is prescribed for patients with a fixed diagnosis and taking medication to evaluate the effectiveness of therapy.



The research is done within 24 hours. A cuff comparable to the cuff of a standard tonometer is placed on the patient's arm, a tape recorder is attached to it (the principle is the same as for monitoring the ECG). Every 15 minutes during the day and every 30 minutes at night, the device inflates the cuff, measures the patient's blood pressure, and records the data to an electronic medium inside the device. The patient keeps a diary of complaints, medications and physical activity, just as during ECG monitoring. After 24 hours, the doctor transfers the research data to the computer, interprets the results and draws a conclusion.

Often, 24-hour ECG and blood pressure monitoring are performed at the same time. There are modern devices for dual-function monitoring of ECG and blood pressure, which allow simultaneous recording of blood pressure and ECG in one device. In a practical sense, this is often justified by the fact that heart dysfunction in patients coincides with blood pressure pathology (for example, ischemic attacks against the background of increased blood pressure).

The ABPM test does not require special training. For comfort, the patient is advised to come to the examination in loose clothing. During monitoring, the patient leads a normal lifestyle.

In conclusion, it should be noted that the above methods of functional research are routine and are used in outpatient practice for the primary diagnosis of the pathology of the cardiovascular system. Further treatment of the patient is determined individually depending on the nature of the detected disorders.

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