

LVIV NATIONAL MEDICAL UNIVERSITY N.A. DANYLO HALYTSKY
Department of Physical Training and Sports Medicine

Approved at the methodical meeting of
the department of Physical training and sports medicine
Head of the department

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Protocol №1 from 30 of August 2021



GUIDELINES

in the discipline

PHYSICAL REHABILITATION AND SPORTS MEDICINE

for 4th year students

training of specialists of the second (master's) level higher education in the field of
knowledge 22 "Health" specialty 222 "Medicine" for independent work in
preparation for practical classes

Topic 8 "Physical rehabilitation in the clinic of internal diseases."

LVIV-2021

Methodical guidelines are made in accordance with the requirements of the curriculum in the discipline "Physical Rehabilitation and Sports Medicine", compiled to train specialists of the second (master's) level of higher education in the field of knowledge 22 "Health" specialty 222 "Medicine".

According to the curriculum, the study of physical rehabilitation and sports medicine at the medical faculty is carried out in the 4th year of study. The program is designed for 60 hours, of which 30 classroom hours (practical classes), 10 hours - lectures and 50 hours of independent work of students (IWS).

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Methodical recommendations were discussed and approved at the methodical meeting of the Department of Physical Education and Sports Medicine

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1. **Relevance of the topic:** In diseases of the cardiovascular system, physical rehabilitation is extremely important, because cardiac dysfunction leads to a sharp decrease in motor activity and efficiency. Cardiovascular diseases are treated comprehensively with the inclusion of drug treatment, diet, psychotherapy, appropriate motor regime, physical rehabilitation. Early motor activation of patients promotes the development of collateral circulation, affects the physical and psychological condition of patients, shortens the period of hospitalization and reduces the risk of dangerous complications.

2. **Class duration:** 4 hours.

3. **Learning objective:**

Know:

- phases of rehabilitation in MI (myocardial infarction);
- modes of motor activity in MI;
- rehabilitation programs for MI;
- forms and methods of physical rehabilitation for MI;
- indications and contraindications to the appointment of physical rehabilitation for MI.

Be able:

- to appoint modes of motor activity at MI;
- to make rehabilitation programs for MI;
- prescribe forms and methods of physical rehabilitation for MI;
- transfer the patient from one mode to another.

Learn practical skills:

- to determine the mode of motor activity depending on complications;
- evaluate the effectiveness of rehabilitation programs;
- to expand the mode of motor activity in the patient;
- continuation of the motor mode in case of complications.
- assess the adequacy of physical activity

4. Interdisciplinary integration

Anatomy -knowledge of the anatomy of the musculoskeletal, cardiovascular and respiratory systems.

Biochemistry- understand the biochemical changes that occur in the heart muscle during exercise.

Normal physiology -features of the physiological state of the organism after exposure to normal physical activity. Analyze the physiological constants of muscle work, the state of the body's enzyme system. Determine the change in heart rate, blood pressure.

Pathological physiology -to evaluate the indicators of central and intracardiac geodynamics in patients with coronary heart disease and myocardial infarction. Determine the types of response of the cardiovascular system to exercise.

Internal diseases - identify the role of disorders of the cardiovascular system, diagnose diseases, identify complications, make a differential diagnosis.

5. Student advice.

5.1. Topic content:

Physical rehabilitation for coronary heart disease

Ischemic heart disease is a myocardial lesion associated with a mismatch between myocardial oxygen demand and coronary vascular delivery, which is associated with the presence of atherosclerotic plaque in the coronary vessels.

This definition indicates the mechanisms of the disease, on the background of which is directed pathogenetic treatment of coronary heart disease, including means of physical rehabilitation on the one hand to reduce myocardial oxygen demand, and on the other hand to improve coronary circulation.

Tasks of physical rehabilitation:

1. Improve coronary and peripheral blood circulation, metabolic processes in the myocardium, strengthen the contractile ability of the heart muscle.
2. Economize myocardial activity to reduce oxygen demand.
3. Stimulate extracardiac circulatory factors.
4. Prevent the progression of atherosclerosis and the development of complications such as myocardial infarction, arrhythmia and conduction, circulatory failure and others.
5. Increase tolerance to physical activity, reduce the intake of vasodilators.

Causes that increase myocardial oxygen demand:

- myocardial hypertrophy;
- increased hemodynamic load on the heart (blood pressure, heart rate);
- violation of acid-repair processes in the myocardium.

Causes that lead to decreased coronary circulation:

- stenotic atherosclerotic lesion of coronary vessels;
- vasospasm;
- formation of platelet aggregates.

Contraindications to the appointment of exercise therapy:

1. The presence of frequent angina attacks.
2. Unstable angina.
3. Acute myocardial infarction.
4. Severe arrhythmias and conduction, which are accompanied by cardiovascular failure.
5. Thromboembolic complications.
6. Negative ECG dynamics.
7. Inadequate response of the cardiovascular system to stress.
8. Acute inflammatory diseases.
9. Hypertensive crisis.

Rehabilitation classification of patients with coronary heart disease according to the results of the test with dosed exercise

Patients I FC (functional class) are allowed all housework (cleaning, cooking, repairing furniture, apartments). Patients are admitted to classes in health groups (strong group), participation in sports games (participation in competitions is prohibited), swimming, health training, skiing. Assigned dosed walking at a pace of steps per minute (moderately accelerated pace), short-term brisk walking of 120-130 steps per minute for 3-5 minutes is allowed. Therapeutic gymnastics in the training mode up to 30-40 minutes. with heart rate at a height of load up to 140 beats / min.

Patients of FC II are also shown all the work around the house, dosed walking at a rate of 100 steps per minute, short-term brisk walking (2-3 minutes at a rate of 120-130 steps per minute), therapeutic gymnastics (LH) in a gentle-training mode up to 30 minutes, heart rate at the height of the load up to 130 beats / min. Short-term jogs (1-2 minutes) are allowed at a moderate pace, participation in groups health, sports games (participation in competitions is forbidden), swimming, dosed skiing.

Patients III FC shown only light work around the house, dosed walking at a medium pace (90 steps per minute.), ThG in a gentle-training mode and | 20 min., Heart rate up to 110 beats / min. at the height of the load, participation in health groups (weak group). Sports games, running, swimming, skiing are contraindicated.

Patients IV FC are contraindicated in most of the work at home possible dosed walking in the form of walks at a rate of 70-80 steps per minute. with stops after every 100-200 meters. ThG in a gentle mode for 15-20 minutes, heart rate 90-100 beats / min. at the height of the load. Other forms of IIFI are contraindicated.

Myocardial infarction is an ischemic necrosis of the heart muscle caused by coronary insufficiency. In most cases, the leading etiological basis of myocardial infarction is coronary atherosclerosis. Along with the main factors of acute coronary insufficiency (thrombosis, spasm, narrowing of the lumen, atherosclerotic changes in the coronary arteries) play an important role in the development of myocardial infarction collateral circulatory failure in the coronary arteries, prolonged hypoxia, excess calculus and excess catechol cause prolonged ischemia of cells.

Myocardial infarction is a polyetiological disease. Undoubted role is played by risk factors, hypodynamics, overeating and weight gain, stress. The size and location of myocardial infarction depend on the caliber and topography of the clogged or narrowed artery, and therefore distinguish:

- a) Q - MI;
- b) not Q - IM;
- c) subendocardial MI.

In intramural myocardial infarction, necrosis affects the inner part of the muscle wall, and in transmural - the entire wall thickness. The site of necrosis is replaced by connective tissue, which gradually turns into a scar. Resorption of necrotic masses and the formation of scar tissue lasts 1.5 - 3 months.

The disease usually begins with the appearance of intense pain behind the chest and heart, they last for hours, and sometimes 1-3 days, subside slowly and turn into a long dull pain. They are compressive, oppressive in nature and are sometimes so intense that they cause shock accompanied by a fall blood pressure, sharp pallor, cold sweat and loss of consciousness. After the pain for half an hour (maximum 1-2 hours) develops acute cardiovascular failure. On the 2nd - 3rd day there is an increase in temperature, neutrophilic leukocytosis develops, the rate of erythrocyte coagulation (ESR) increases. Already in the first hours of development of a myocardial infarction there are characteristic changes of the electrocardiogram allowing to specify the diagnosis and localization of a heart attack. Drug treatment in this period is aimed primarily at pain, in the fight against cardiovascular failure, as well as the prevention of recurrent coronary thrombosis.

Early motor activation of patients promotes the development of collateral circulation, affects the physical and psychological condition of patients, reduces the period of hospitalization and does not increase the risk of death.

The system of rehabilitation of patients with MI includes the sequential implementation of physical rehabilitation programs in the cardiac hospital, in the rehabilitation department of the local sanatorium and in the clinic and place of residence of the patient.

In this regard, in the rehabilitation of patients with MI there are 3 stages: inpatient, sanatorium and outpatient with the implementation of the main principles - complexity, continuity, consistency at all stages of rehabilitation.

Tasks of the stationary stage:

1. Prevention and elimination of complications.
2. Stabilization of basic clinical and laboratory indicators.
3. Mastering the patient climbing stairs, dosed walking for 2000-1000 meters and self-care.
4. Formation of an adequate psychological reaction.

Stages of physical rehabilitation of patients with myocardial infarction

1) Rehabilitation stage: Inpatient (hospital): elimination of acute manifestations and clinical recovery

The aim of physical rehabilitation: Mobilization of motor activity of the patient; adaptation to simple household loads; prevention of hypokinesia.

Forms of therapeutic exercise: Therapeutic gymnastics, dosed walking, walking up the stairs, massage

2) *Rehabilitation stage*: Post-hospital (readaptation): in a rehabilitation center or sanatorium, polyclinic

The aim of physical rehabilitation: Expansion of reserve capabilities of the cardiovascular system, functional and reserve capacity of the organism. Achieving maximum individual physical activity. Preparation for physical and professional activities.

Forms of therapeutic exercise: Therapeutic gymnasium. Dosed gait, gait on the stairs. Classes on general action simulators (exercise bike) Elements of sports and applied exercises and games. Massage. Occupational therapy.

3) *Rehabilitation stage*: Supportive (rehabilitation, including recovery): cardiological dispensary, polyclinic, medical dispensary.

The aim of physical rehabilitation: Support of physical working capacity and its further development. Secondary prevention.

Forms of therapeutic exercise: Physical culture and health-improving forms gymnastic exercises, sports-applied and game. Occupational therapy.

Complications of myocardial infarction

Easy:

1. Infrequent extrasystole.
1. AV blockade of the first degree, which existed before the development of MI.
2. AV blockade of the I degree at back MI.
3. Sinus bradycardia.
4. Heart failure of the first degree.
5. Epistenocardic pericarditis.
6. Blockade of the legs of the His bundle (in the absence of AV blockade).

Moderate:

1. Recurrent shock.
2. AV blockade of II-III degree at posterior MI on the background of blockade of the His beam
3. Paroxysmal or atrial fibrillation.
4. Migration of the rhythm driver.
5. Frequent polytopic extrasystole.
6. Heart failure II-A st.
7. Dressler's syndrome.
8. Hypertensive crisis.
9. Hypertension - 200/120 mm. Hg

Hard:

1. Recurrent course of MI.
2. The state of clinical death.
3. Complete AV blockade.
4. AV blockade II-IP of Art. with posterior MI.
5. Heart aneurysm.
6. Thromboembolism, thromboendocardia.
7. True cardiogenic shock.
8. Ventricular paroxysmal tachycardia.

At the inpatient stage of rehabilitation, depending on the severity of the disease, all patients with heart attack are divided into 4 classes. This distribution of patients is based on different types of combinations of such basic indicators of the course of the disease as the prevalence and depth of

myocardial infarction, the presence and nature of complications, the severity of coronary insufficiency.

Activation of motor activity and the nature of exercise therapy depend on the severity of the disease. The program of physical rehabilitation of patients with MI in the hospital phase is based on the patient's belonging to one of the 4 classes of severity. Severity class conditions are determined on the 2-3rd day of the disease after the elimination of the pain syndrome and complications such as cardiogenic shock, pulmonary edema, severe arrhythmias.

This program provides for the appointment of the patient of a particular nature of household activities, methods of therapeutic gymnastics and acceptable form of leisure. The inpatient stage of rehabilitation is divided into 4 stages with the division of each into steps "a" and "b", and the 4th - also into "c".

SANATORIUM STAGE OF PATIENT REHABILITATION

In the rehabilitation of patients who have suffered MI in the second (sanatorium) stage, the primary role is given to therapeutic gymnastics and other forms of exercise therapy. Tasks at this stage: restoration of physical working capacity of patients; psychological readaptation of patients; preparation of patients for independent life and production activities. All measures at the sanatorium stage are carried out differently depending on the patient's condition, the peculiarities of the clinical course of the disease, the presence of comorbidities and pathological syndromes. This program is a natural continuation of the hospital rehabilitation phase; which involves a gradual increase in training and household loads, starting from the 4th degree of activity (the last hospital) to the final - 7th. The main content of physical rehabilitation programs at the inpatient stage is therapeutic gymnastics and walking training. In addition, depending on the experience of the sanatorium and its conditions, swimming, skiing, dosed running, training on simulators (bicycle ergometer, treadmill), sports games, rowing, etc. can be used here.

Therapeutic gymnastics in the sanatorium is performed in a group method. Classes include exercises for all muscle groups and joints in combination with rhythmic breathing, exercises for balance, attention, coordination of movements and relaxation. The complexity and intensity of the exercises used increases from degree to degree. Exercise can be increased by including exercises with objects (gymnastic sticks, maces, rubber and stuffed balls, hoops, dumbbells, etc.), exercises on tools (gymnastic wall, bench), use of cyclic movements (various types of walking, jogging) and elements of moving games. After the final section of the classes, the elements of autogenic training are shown, which promote gradual rest, calmness and purposeful self-suggestion.

At the 5th stage of activity, patients are prescribed dosed training walking (up to 1 km) with an approximate walking pace of 80 - 100 steps / min. In addition to dosed by the pace and distance of training walking, patients are recommended walking (2-3 receptions) with a total duration of up to 2 - 2.5 hours. Peak heart rate at loads - 100 beats / min, peak duration - 3-5 minutes 3-4 times a day.

With a satisfactory response to the load of the 5th degree of activity, the absence of aggravation of the phenomena of coronary and heart failure, they switch to the regime of the 6th degree of activity. The mode of motor activity expands due to the intensification of training and household loads, the duration of ThG classes increases to 30 - 40 minutes, heart rate can reach 110 beats / min. The duration of each such peak heart rate - exercise is 3 - 6 minutes. The number of such peak periods during the day should reach 4- 6 when performing the ThG complex, training walking on level ground and when climbing stairs.

DISPENSARY - POLYCLINICAL STAGE OF REHABILITATION OF PATIENTS.

Patients who have suffered MI, at the dispensary and outpatient stage belongs to the category of persons suffering from chronic coronary heart disease with postinfarction atherosclerosis. The tasks of physical rehabilitation at this stage are as follows: restoration of the function of the cardiovascular system by including mechanisms of compensation of cardiac and extracardiac nature;

increasing tolerance to physical activity; secondary prevention of coronary heart disease; restoration of working capacity and return to professional work, preservation of restored working capacity; the possibility of partial or complete withdrawal of drugs; improving the quality of life of the patient.

The polyclinic stage of rehabilitation is divided by 3 authors into 3 periods: gentle, gentle-training and training. Some add a fourth-supporting one. The best form is long training loads. They are contraindicated only in: left ventricular aneurysm, frequent attacks of angina pectoris and rest, severe cardiac arrhythmias (atrial fibrillation, frequent polytopic or group extrasystole, paroxysmal tachycardia, hypertension with persistently elevated diastolic pressure), predisposition to thromboembolic complications.

Prolonged physical activity for patients who have suffered MI is allowed to begin in 3 - 4 months after its occurrence. According to the functional capabilities determined by bicycle ergometry, spiroergometry or clinical data, patients belong to 1- 2nd functional classes - a strong group, or 3rd - a weak group. If classes (group, individual) are conducted under the supervision of an exercise therapy instructor, medical staff, they are called controlled or partially controlled, conducted at home according to an individual plan.

In the preparatory period, classes are held in a group method in the hall 3 times a week for 30 - 60 minutes. The optimal number of patients in the group of 12 - 15 people. In the course of employment the methodologist should watch a condition of the engaged: on external signs of fatigue, on subjective sensations, heart rate, respiratory rate, etc. With positive reactions to these loads, patients are transferred to the main period lasting 9 - 10 months. It consists of stages. The first stage of the main period lasts 2 - 2.5 months. Classes at this stage include:

1. Exercises in the training mode, with the number of repetitions of individual exercises up to 6-8 times, performed at a medium pace.
2. Complicated walking (on toes, heels, on the inside and outside of the foot for 15 - 20 seconds).
3. Dosed walking at a medium pace in the introductory and final parts of the lesson; at a fast pace (120 steps / min), twice in the main part (4 min.).
4. Dosed running at a pace of 120 - 130 steps / min or difficult walking ("ski step", walking with a high rise of the knees for 1 minute).
5. Training on a bicycle ergometer with dosing of physical activity in time (5 - 10 min) and power (75% of individual maximum power). In the absence of a bicycle ergometer it is possible to appoint ascent on steps of the same duration.
6. Elements of sports games.

Heart rate during exercise may be 55 - 60% of the limit in patients with III FC (weak group) and 65 - 70% - in patients with I FC ("strong group"). The peak heart rate can reach 135 beats / min, with fluctuations from 120 to 155 beats / min.

During heart rate training "plateau" can reach 100 - 105 beats / min in weak and 105 - 110 - in strong subgroups. The duration of the load on this pulse is 7 - 10 minutes.

In the second stage (duration of 5 months) the training program becomes more complicated, weight and duration of loadings increase. Dosed running at a slow and medium pace (up to 3 minutes), work on a bicycle ergometer (up to 10 minutes) with a capacity of up to 90% of the individual limit level, playing volleyball through the net (8-12 minutes) with a ban jumps and a one-minute rest every 4 minutes. Heart rate at type loads "Plateau" reaches 75% of the limit in the weak group and 85% - in the strong. The peak heart rate reaches 130 - 140 beats / min. The role of LH decreases and the value of cyclic exercises and games increases.

At the third stage lasting 3 months there is an intensification of loads not so much due to the increase of "peak" loads, but due to the prolongation of physical activity, such as "plateau" (up to 15 - 20 minutes). Heart rate at peak load reaches 135 beats / min in weak and 145 - in strong subgroups;

the increase in heart rate is more than 90% relative to resting heart rate and 95 - 100% relative to the maximum heart rate.

5.2. Theoretical questions for the lesson:

1. Stages of rehabilitation in myocardial infarction;
2. Modes of motor activity in MI at the stationary stage;
3. Modes of motor activity in MI at the sanatorium stage
4. Modes of motor activity in MI at the outpatient stage
5. Rehabilitation programs for MI;
6. Forms and methods of exercise therapy for MI;
7. Contraindications to the appointment of exercise therapy for MI.

5.3. Materials for self-control:

A. Questions for self-control:

1. Indications for physical rehabilitation in MI.
2. Contraindications to physical rehabilitation in MI.
3. Severity classes in MI.

B. Tasks for self-control: See appendix №1

C. Tests for self-control: See appendix №2

See Appendix №1

1. Patient A., 54 years old, suffers from coronary heart disease, angina pectoris. Angina attacks occur when walking up to 100m. Determine which functional class corresponds to the physical capabilities of the patient

- A. I FC
- B. II FC
- C. III FC
- D. IV FC

2. Patient D., 56 years old, suffers from coronary heart disease. Two years ago he suffered a small heart attack. The recovery period passed without complications. During the year the patient visits the swimming pool. Choose a test that can be used to determine the patient's physical capacity

- A. PWC Test 170
- B. PWC Test 150
- C. Harvard step test
- D. Novakki test
- E. Cooper's 12-minute test

3. Patient F., 44 years old, has an acute transmural myocardial infarction of the posterior wall of the left ventricle. Fifth day of illness, the course is not complicated. Heart rate - 94 beats. per minute, AT - 105/70 mm Hg. Art., body temperature 36.8°

Determine the motor mode of the patient.

- A. Strict bed
- B. Extended bed
- C. Semi-bed
- D. Ward
- D. Free

4. Patient T., 57 years old, is being treated for 6 days for acute myocardial infarction. The course of the disease is not complicated. . The patient is prescribed exercise therapy. The advanced bed mode. Identify the main tasks of exercise therapy for the patient in this mode

- A. Prevention of complications and preparation of the patient for transfer to the next mode
- B. Preparation of the patient for transfer to the next mode, stimulation of peripheral blood circulation
- C. Stimulation of blood circulation and metabolism in the myocardium
- D. Prevention of complications, improvement of psycho-emotional state
- E. Improving the psycho-emotional state and stimulating peripheral circulation

5. Patient I., 56 years old, was admitted to the cardiology department with a hypertensive crisis. AT 220/140 mm Hg. Art., in urine protein on the fundus edema of the papilla of the optic nerve. On the ECG - a decrease in the amplitude of the QRS complex, signs of a previous myocardial infarction. In the last six months, hypertensive crises have become more frequent and more intense. After 2 weeks of treatment, AT decreased to 170/110 mm Hg. Art.

Determine the severity of the disease in this patient.

- A. Hypertensive disease IIIst
- B. Hypertensive disease IIb st
- C. Hypertensive disease II a st
- D. Hypertensive disease I st

See Appendix №2

Tests to the methodical instruction on a theme: "Physical rehabilitation at diseases of cardiovascular system"

1). The severity class of myocardial infarction at the inpatient stage of rehabilitation depends on:

- 1. Depth and extent of the lesion, comorbidities, age of the patient.
- 2. Depth and extent of the lesion, age of the patient, coronary insufficiency.
- 3. Depth and extent of lesions, complications, coronary insufficiency.
- 4. Complications of coronary insufficiency, age of the patient, comorbidities.
- 5. Subjective condition of the patient.

2) In bed mode with myocardial infarction ThG is aimed at:

- 1. Improving coronary and peripheral blood circulation, stimulating metabolism.
- 2. Training in climbing stairs.
- 3. Increasing the body's tolerance to physical activity.
- 4. Terenkur classes.
- 5. Increasing the level of physical condition of the patient.

3) Electrocardiogram of athletes with stage I myocardial dystrophy is characterized by:

- 1. Decreased amplitude of the T wave, the appearance of the syndrome $Tv1 > Tv6$.
- 2. Decrease in amplitude of a tooth R.
- 3. Increasing the amplitude of the T wave, the appearance of the syndrome $Tv1 > Tv6$.
- 4. Decrease in voltage of all teeth of an ECG.
- 5. Increasing the voltage of all the teeth of the ECG.

4) To identify pathogenetic mechanisms and characteristics of dystrophic processes in the myocardium ECG is recorded during:

- 1. Respiratory functional tests.
- 2. Tests with physical activity.
- 3. Pharmacological tests.
- 4. All answers are correct.
- 5. There are incorrect answers.

5) The main tasks of physical rehabilitation for patients with coronary heart disease are:

1. Improving coronary and peripheral blood circulation, reducing myocardial oxygen demand.
2. Increasing tolerance to physical activity.
3. Restoration of normal breathing stereotype.
4. All answers are correct.
5. There are incorrect answers.
- 6) In patients with myocardial infarction there are the following number of severity classes:
 1. One.
 2. Two.
 3. Three.
 4. Four.
 5. Five.
- 7) The main tasks of exercise therapy in the rehabilitation of a patient with myocardial infarction (MI) on a strict bed rest:
 1. Expansion of motor activity, increasing adaptation to increasing loads of a domestic nature.
 2. Stimulation of extracardiac circulatory factors, strengthening of reparative processes in the myocardium, gradual expansion of motor activity.
 3. Development of compensatory capabilities of the cardiovascular system, secondary prevention of exacerbations of coronary heart disease (CHD).
 4. Improving peripheral blood circulation, increasing adaptation to increasing physical activity, recovery.
 5. Prevention of complications, improvement of peripheral blood circulation, stimulation of extracardiac factors of blood circulation and metabolism in the myocardium.
- 8) Diastolic blood pressure of athletes at rest:
 1. Increases to 90 mm Hg.
 2. Increases to 95 mm Hg.
 3. Significantly different from the pressure in the untrained.
 4. Decreases to 60 - 70 mm Hg.
 5. Decreases to 50 - 55 mm Hg.
- 9) In athletes, muffled heart sounds during auscultation is considered physiological if it is due to:
 1. Severe myocardial hypertrophy due to exercise.
 2. Increasing the tone of the sympathetic division of the autonomic nervous system.
 3. Significant muscle development in the areas where the heart is listened to.
 4. Decreased tone of the sympathetic division of the autonomic nervous system.
 5. Decreased heart rate.
- 10) Pulse blood pressure indirectly reflects:
 1. Coronary blood flow.
 2. Stroke volume of the heart
 3. The minute volume of the heart.
 4. Total peripheral resistance.
 5. End-diastolic volume of the left ventricle of the heart.

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