CRIMEAN STATE MEDICAL UNIVERSITY NAMED AFTER S.I. GEORGIEVSKY

BASES OF SPORTS MEDICINE AND MEDICAL REHABILITATION

CONTENTS

INTRODUCTION

The sports medicine is a science which is a constituent of system of health protection in sphere of physical training, sports and is called to define a level of health, physical development and the functional state of an organism of athletes and sportsmen, and also to carry out prophylaxis, diagnostics and treatment of diseases and the damages related to employment by physical culture and sports. The sports medicine studies positive and negative influence of exercise stresses of various intensity (from a hypokinesia up to a hyperkinesia) on an organism of the able-bodied and sick person with the purpose to define optimum physical activity for enriching and hardenings of health, pinch of a level of the functional state, body height of achievements in sport, and also prophylaxes and treatments of diseases.

The basic directions are: the medical check of an engaged physical training and sports, a blanket and special pathology at sports and sports activity, physiology and hygiene of sports, the functional sports morphology, sports biological chemistry, traumatology and a cardiology, endocrinology, pharmacology, sports medicine of children and teenagers, etc.

The physical rehabilitation is used with the medical and preventive purpose of physical exercises and natural factors in complex regenerative process of health, physical condition and a working capacity of patients and invalids. It is the important amounting medical rehabilitation and is applied on its all continuances stages in a social and professional rehabilitation. Among methods of a physical rehabilitation by its basic part is the medical physical training. Medical physical training – is the self-maintained scientific medical discipline using resorts of physical training for treatment, prophylaxis and rehabilitation of patients with various diseases.

In a basis of the theory of exercise therapy achievements of physiology, biology, biophysics, biochemistry, hygiene and clinical medicine (I.A. Sechenov, I.P. Pavlov, A.A. Uhtomsky, N.E. Vedensky, S.P. Botkin, I.J. Mudrov, G.A. Zaharyan, G.F. Lang et al.) are figured. It has allowed More deeply to approach{suit} to comprehension of therapeutic importance of physical exercises and promoted a substantiation of their use in a clinical practice.

Original positions and procedure of exercise therapy are developed by domestic scientists V.N. Moshkov, S.M. Ivanov, A.A. Leporsky, M.M. Sarkizov-Seraziny et al. The greatest therapeutic effect is observed at use of exercise therapy at various functional disturbances, and also in incipient states of pathological process.

The dosed aging by physical exercises fits cardiovascular system and all organism of the patient for increasing physical activity, spends correction of physiological mechanisms that result ins the functional acclimatization of the patient. During aging there are the functional and

morphological changes in an organism. Physical exercises activate physiological processes, boost regenerative ability, essentially influence current of morphological processes.

As the medical method exercise therapy can be used at various pathology for reception of the best therapeutic effect. Use of exercise therapy in medical establishments will allow to reduce a disrupture between clinical convalescence and the functional recovery of the patient.

The present manual puts the problem to help students of medical faculty to acquire a necessary minimum of knowledge, skills on sports medicine, a physical rehabilitation and exercise therapy.

BASES OF SPORTS MEDICINE

Definition of sports medicine as clinical discipline. History and the basic directions of sports medicine. Actual questions of optimization of motor activity of the person at the present stage. Concept about the medical control.

The physical training (PhT) is the component of the general culture of a society representing the whole complex of material and cultural wealth, created by mankind during public historical development.

Components of physical training are: the big sport, health-improvement physical training, exercise therapy.

One of problems of the 20th centuries is still remained hypokinesia, being the reason of many diseases of the person. It essentially reduces stability of an organism to harmful influences of environment. It is known from data of age physiology and biochemistry that the level of exchange processes in everyone age the period is determined by features of work of skeletal muscles. The organism which is more in movement, possesses also greater functional to opportunities. It is necessary to use more widely physical training for increase of resistance in relation to adverse factors of environment, for expansion of protective and adaptable abilities of an organism.

Attempts to use physical exercises for strengthening of the person's health and treatment of diseases concern to an extreme antiquity. There are mentions about it in references of ancient cultures of the East, Greece and Rome. Sights at value of movements for health of the person and treatment of diseases depended from a level of development of national medicine, representations about health and illness, preventive maintenance and even philosophical positions of thinkers and doctors of various socioeconomic structures.

In India elements of physical training were a component of religious-philosophical and hygienic representations. One of the most ancient systems of physical training of India hatha-yoga is based on performance of original static exercises and the poses designated as a pose of a lotus, a cobra, a locust, an onions etc. Muscular effort or a relaxation of muscles in yoga is combined with development of the certain psychological installations in which basis lay a self-concentration, down to development of a condition of a trance. The Greek culture gave great value to physical perfection of the person and physical training of children and soldiers (V-IV century up to B.C.). In the Ancient Greece Olympic Games (776 up to B.C. for the first time have been lead.). In Greece there was also a medical gymnastics which founder considers Gerodic (V century up to B.C.). Later Hypocrites (460-377 years up to B.C.) has introduced in the Greek gymnastics the certain hygienic knowledge and understanding of a medical doze of physical exercises for the sick person. The following large stage of historical knowledge on physical training is connected with a name of the Tadjik doctor and scientific Middle Ages Avicenna (980-1037). He has become famous in the East and the West owing to creation of the "Canon of medical sciences" in which his representations about value of physical exercises in preservation of health of the person during all his life are reflected.

Historical preconditions have played the certain role in formation of the disciplines studying medical aspects of physical culture and sport which beginning already concerns to 20 century. The beginning of sports medicine of the modern world can be related to 1911 when in Europe at the world hygienic exhibition the section of hygiene of physical exercises for the first time has appeared. The international association of doctors on sports medicine has been created in 1928 in Amsterdam on the 1-st international congress, taking place during Olympic games. The association put task assistance to scientific researches in this area, cooperation with the organizations by kinds of sports.

Medical control (MC) represents the independent medical discipline studying influence of physical exercises and sport on health, physical development and functionalities of athletes and sportsmen.

MC together with physiology, biochemistry and hygiene of physical exercises and sport, with sports traumatology and sports cardiology makes rather new branch of knowledge – sports medicine (SM).

History of MC is closely bound to development of physical training and sports, a medical science. Founders of MC in our country were professors P.F. Lesgaft (1837-1901), V.E .Ignatyev (1867-1927) and V.V. Gorinevsky. P.F. Lesgaft is the anatomist, the biologist, the teacher and the public figure. His works in the field of history and techniques of physical training have great value for development of a science about physical training. V.E. Ignatyev is the doctor, the figure in the field of physical training. He has written many works on care of a body, physical training and hardening. V.V. Gorinevsky is the professor, the doctor, the teacher, the pupil, and the continuer of Lesgaft's ideas about unity of physical, mental and moral education, the author of many scientific works concerning physical training, hardening and hygiene of children. In 1922 at the main military school of physical education Gorinevsky has framed courses on physical training for doctors, then in Moskow institute of physical training, has framed the first faculty of the medical control and a scientific department, in a consequence on his base the Scientific research institute of physical training has been framed. In the further problems of MC developed P. Letunov, R.E. Motylyanskaya, A.G. Dembo, N.G. Graevskaya, D.F. Deshin, et. al.

A greate role for development of sports medicine activity of known scientists of Ukraine has played, which else prior to the beginning of Great Patriotic War developed pressing questions of the medical control over employment by physical exercises and sports. So professor Koncharovskaya O.V. in the Kiev institute of physical culture, and then professor Stovbun V.T. in the Kiev institute of improvement of doctors have revealed the important features of the sportsman's heart activity by means of new methods electrophono and sectorocardiography. Professor I.P. Kalistov has revealed the important features of sportsmen' traumatism, and senior lecturer M.E. Teslenko in Kharkov has offered the elementary functional test for mass researches. Far outside Ukraine researches of academician G.V. Folbort, his pupils on physiology of recovery period and physiological mechanisms of conditions of training and over-training (academician V.V. Frolkis, professors O.V. Koncharovskaya, M.Ya.Troyan, L.Ya. Evgenyeva) are known.

Works of cademician N.M. Amosov and professor I.V. Muravov have given an appreciable push to researches of an improving direction of physical training and sports and promoted development of methods of quantitative diagnostics of health which allow to estimate objectively productivity of any health-improvement methods (professors G.L. Apanasenko, S.A. Dushanin, L.Ya. Ivaschenko, V.V. Klapchuk, O.Ya. Pirogov, V.A. Shapovalov).

Important meaning for a system of improving physical training of children – as healthy, and with deviations in a condition of health – had long-term researches of professors E.S. Vilchkovsky, O.D. Dubogay, V.S. Yazlovetsky et. al.

Tasks of Sports Medicine

1. Identification, assessment and control of a dynamic state of health at all stages of athletic training.

2. Organization of hygienic control conditions of employment by physical training and of a system of measures aimed at eliminating the factors that adversely affect the person in the course of employment of physical culture and sports .

3. Identification and assessment of physical development and functional state of the body for the selection , orientation and sports indi vidual physical activity in the training process .

4. Diagnosis, treatment , rehabilitation and prevention of diseases and injuries in the athletes , ' including those caused eratio tional training.

5. Medical support of training and competitions , including the organization of doping control and con trol of athlete.

6. Developing new methods of medical control over athletes , promoting the growth of their sportsmanship.

7. Scientific-methodological and scientific research , training and retraining of doctors , trainers and teachers .

Primary task of MC – is the organization of the sanitary-and-hygienic and treatment-and-prophylactic actions providing wide use of physical training and sport in interests of an all-around development and strengthening of health of the population. It is an integral part of health services of the population and each doctor should have necessary knowledge on questions of MC.

MC provides medical-sports clinics and under their organizational-methodical management – cabinets and departments of MC of all treatment-and-prophylactic establishments, sanitary-and-epidemiologic stations, and also cabinets and departments of sports volunteer societies and departments.

Over medical maintenance PhT and sports bodies of public health services supervise at active participation and the help of the sports organizations, for carrying out medical inspections the doctor is responsible for performance of its recommendations and sportsmen' appearance on examination – teachers, the trainers and heads of the sports organizations.

People engaged actively by PhC and sports take place medical examination no less than once in a year, the qualified and juvenile sportsmen pupils of children's and youthful sports schools (ChYuSS), also people of advanced age - no less than two times yearly.

The organization of service of sports medicine. Forms of doctor's work.

Medical maintenance is carried out by two ways: specialized medical-sports service (cabinets and dispensaries) and the general net of treatment-and-prophylactic establishments of organs of health protection by a territorial and industrial principle.

Cabinets of the medical control is a local part of medical-sports service and are created at out-patient departments, educational institutions, collectives of physical culture, sports constructions in medical-sanitary parts of enterprises, on health centers. Tasks of cabinet of MC are examination of engaged by sports, the control over them, the decision of questions of the admission to employment and competitions, distribution of engaged by sports on medical groups, the sanitary control over places of trainings and competitions, medical maintenance of competitions, rendering of an emergency medical care at a trauma and disease and the organization of treatment if necessary by means of medical establishments of the general net.

Medical physical culture dispensary (MPhCD) – is the most perfect form of the organization of the medical maintenance, engaged by PhT and the sports, providing constant active supervision over them, early revealing of deviations in a state of health and their prophylaxis, the control over dynamics of a functional condition and working capacity during training, assistance to achievement of high sports results.

MPhCD carry out medical maintenance of the attached sportsmen of combined teams of republic, city of the region, pupils of CYSS (Children's youthful sports school) and boarding schools of a sports structure, persons with deviations in a state of health, and also consultations for all requiring and a scientific-methodical management of cabinets of MC and work of the general network of treatment-and-prophylactic establishments in the field of physical training and sport.

Sportsmen and the athletes engaged in collectives of physical culture, sports sections, groups of health, pass examinations in cabinets of MC, in polyclinics on a residence or the work, pupils of comprehensive schools, technical training college, secondary and higher educational institutions – at doctors of these educational institutions or in polyclinics serving them.

For occupations under the curriculum pupils are distributed on three ***medical groups: the basic, preparatory, special*** (look table 1).

Peculiarities of medical examinations of persons engaged in physical training and sports. Kinds of medical observations. Medical examinations and prophylactic medical

examinations of persons engaged by physical culture and sports are carried out in the following order:

- Children of preschool age are examined by doctors of children's preschool establishments;
- Pupils of general educational and secondary special and higher educational institutions, schools of professional training and other educational institutions engaged under the state programs of a physical education – are examined not less often than 1 time within one academic year at the doctors serving these institutions. On the basis of data on a state of health and physical development they are distributed for occupations on groups (***the basic, preparatory and special***);
- Members of sports collectives are examined not less than 1 time in 6 months at the doctors serving the given collectives or on a residence. The persons who have entered on a way of sports perfection, do not divide into groups, the individual instruction about character and a mode of trainings is gave for them;
- Persons of middle and elderly age are examined in polyclinics on a residence or works not less often than 1 time in 6 months, for the organization of ccupations by physical culture they are distributed on groups depending on a state of health and physical training;
- Leading sportsmen of regions of cities, pupils of youthful and children's sports schools, and also pupils and the students related to special medical group are subjected for prophylactic medical examination in a medical- sports clinic and cabinets of the medical control of treatment-and-prophylactic establishments.

MPhCD depending on capacity can have: cabinets of the medical control over physical training of adult population, children and teenagers, cabinets of physiotherapy exercises, cabinets – radiological, physiotherapeutic, functional diagnostics of electrocardiography, clinico-diagnostic laboratory, a hospital, cabinets of specialists (the otolaryngologist, the neuropathologist, the surgeon-traumatologist, the obstetrist-gynecologist, the oculist, the dentist).

MPhCD has functions:

- In every possible way promotes an improving orientation of occupations by physical culture and sport;
- Carries out an organizational-methodical management and renders the advisory help to treatment-and-prophylactic establishments on MC and exercise therapy;
- Carries out prophylactic medical examination of masters of sports, sportsmen of the 1st category, pupils of CSS and provides for them the treatment-and-prophylactic help;
- Organizes and provides health services of sports-mass actions;

- Carries out MPO**;**
- Studies the reasons of a sports traumatism;
- Renders the methodical help in the organization of physical training of children' of schools, kindergartens, etc.;
- Organizes introduction and the account of exercise therapy efficiency;
- Spends propagation of hygienic bases of FT and conducts sanitary-educational work;
- Organizes improvement of professional skill of medical staff of a clinic;
- Studies and introduces the advanced methods of work on MC and exercise therapy;
- Spends all work in close contact to the sports organizations and sports committee.

The contents of work on MC:

- Medical examination of the persons engaged in physical training and sports;
- prophylactic medical examination over separate groups of sportsmen and the population;
- medical consultation on questions of physical training and sports;
- MPO occupations, gathering, competitions;
- the current sanitary inspection behind a place and conditions of training and competitions;
- medico-sanitary maintenance of competitions;
- prophylaxis of a sports traumatism;
- sanitary-educational work;
- propaganda and propagation of improving physical culture, sports.
- from 1993 on regional UPhD functions of the centers of sports medicine are assigned.

Thus, the state creates a net of medical-sports establishments which carry out the medical control over all categories of persons, which are engaged in physical training and sports, promotes development to scientific researches in the field of medical problems of physical culture and sports (a sports rehabilitation, traumatology, anti-doped control,) introduces sports medicine as a subject matter in plans of corresponding educational institutions.

Medical-pedagogical observations.

Medical-pedagogical observations are the researches spent in common with a doctor and a trainer with the purpose of an estimation of influence on anengaged person's organism physical loads, establishments of a level of adaptation to increasing training loads.

Tasks of medical-pedagogical observations: studying of conformity of conditions of employment to hygienic and physiological norms; definition of influence of employment or competition on an organism; the analysis of a level of the general readiness and special training;

the help to the teacher in correct planning of employment during physical training and sports training. With the purpose of finding-out of these influences it is accepted to study the urgent, set aside and cumulative training effect.

Urgent training effect - are the changes occuring in an organism immediately during performance of an physical load and in the nearest rest period.

The set aside effect - are the changes noted in late phases of recovery (in a day, or some days).

Cumulative effect - are changes in an organism, occuring during the long period of training, as a result of summation of the urgent and set aside effects of the general number of separate trainings.

Medical-pedagogical observations spend during stage (every 2-3 current month), current (daily) and operative (to day of training in the morning and in the evening) researches.

During medical-pedagogical observations use following methodical receptions:

1. Definition of employment density by chronometry actions engaged persons is defined the general time spent for physical exercises. The density it is a relation of time of performance of exercises to general time of employment in %.

2. Definition of a physiological curve of employment by a pulse recording and a BP in dynamics of training and construction of the diagram. Analyzing a curve it is possible to estimate efficiency of an introduction, basic and final part of training and a degree of recovering of investigated parameters.

3. An estimation of a degree of fatigue to external attributes - to color of integuments, a sweating and accuracy of movements.

Repeated controls (effect)from physical training exercises are divided into : operational , current and landmark

.1. Operational control - performed during physical exercise , defines direct (immediate) effect of physical activity to address issues of conformity ¬ owls used in the lesson loads pedal ¬ gogical problems (lesson plans) and functional possibility of individuals engaged in physical exercises . Thus analyzed :

1). Structure of classes :

• introduction part - prepares the body to the main load is 10-15 % of the time classes , activates at less 50 % of chronotrophic reserve.

• the main part - decides to specific tasks scheduled , is up to 70 % of the time and activates up to 80% chronotrophic reserve.

• the final part - allows eliminate fatigue , is 10-15 % of the total time,activise , less than 50% chronotrohpic reserve.

2). The distribution of intensity of exercise in class - the peak or peaks of physical activity should be in the middle of the main part of the class . If they shift to theintroduse or final parts - need to correct the intensity distribution .

3). Density classes - the percentage of the active part of the class (used physical load) to its full duration : small - up to 50 %, average * - 51-75% and large - more than 75%.

4). Adequacy of physical activity determine on data of anamnesis , somatoskopy , pulsometry , tonometry and electrocardiography . With adequate load :

- • there are absence complain ;
- • no pallor , severe hyperemia of skin covers the athlete
- ;• there is no expression on the face of suffering athlete
- ;•absense profuse sweating and uncoordinated motions of athlete
- ;• the pulse at the end of the introductory part of the lesson before constitutes amount heart rate at rest and 40 % chronotrophic reserve of hearts, on top of load - 50-90 %its volume
- ;.2 .current control - held for 24 hours after physical exercise , can use all the necessary (and possible at the same time) methods of medical control determines : the effect of delayed physi cal loads, level of recovery of the body after physical load , the opportunity to repea tion training and dose of physical activity
- .3 . Phasing control - performed after a certain stage of train (micro - , meso- macrocycle) are being used (as in the primary control) methods of medical control , defined cumulative effect of physical training , results of solving the educational tasks.

The sanitary-and-hygienic control over places of trainings and competitions.

Sanitary-and-hygienic conditions of employment and trainings define effect of influence of physical loads on an organism engaged person and they are developed from current (observation over a sanitary condition of sports constructions, meteorological conditions, over a condition of the sports equipment, inventory, clothes, footwear of sportsmen, protective adaptations) and precautionary, which is assigned to organs of sanitary inspection.

Technique of complex medical examination of athletes and sportsmen. Features of examination of athletes

The technique of complex medical examination includes: the general and sports anamnesis, external examination, studying of physical development, research of organs and systems, application of functional tests of cardiovascular, vegetative nervous and respiratory systems, tool, laboratory, etc. methods, examination by the otolaryngologist, the oculist, the surgeon, the neuropathologist, etc. Forming of the form 061 and 061y.

Peculiarities of the collecting of the general and sports anamnesis.

The doctor finds out about employment by physical exercises and sports during all previous period of life, what employment, their volume, intensity, a place and independence of employment, productivity, whether has been harmed to health. A special attention should be turned on the present motor regimen, as loads are transferred (whether there are unpleasant sensations). Find out as the present employment are organized, their system, and also subjective value of their influence on a state of health of examined person.

The analysis and estimation of data of a percussion and auscultation of the sportsman's heart. Physiological criteria of training.

In medical examination methods of a percussion and auscultation of heart in a combination with other methods have special meaning. With their help it is possible to reveal a

presence of a heart hypertrophy (a percussion and roentgenography), and also occurrence of the murmurs bound to activity of heart (auscultation, a cardiophonography). Using auscultation of heart together with functional tests with physical load and change of a body position of, it is possible to distinguish functional murmur from organic one.

Definition of the term «physical development », the factors defining physical development of the person

Physical development - it is a set of morphological and functional parameters, which define physical working capacity and a level of age biological development of an individual during the moment of examination. It reflects processes of body height and development of an organism in separate stages of postnatal ontogenesis, when there is a transformation of a genotype to a phenotype.

Genotype - it is individual morpho-functional peculiarities of an organism inherited from parents. Under influence of environment factors the genotype will be transformed to a phenotype. The phenotype is changed during all life, reflecting age dynamics of physical development.

Habitus – it is a ratio of the sizes, forms, proportions of a body, peculiarities of development of an osteal, fatty and muscular tissue.

Peculiarities of physical development and body build of the person appreciably depend on the constitution.

The constitution is a set of functional and morphological features of the organism, which has developed on the basis of hereditary and got properties, which define an originality of organism response to external and internal stimulus's. From factors of environment, under which influence there are constitutional features essential meaning have employment of PhT and sports, especially at children's age. In our country in a medical practice the scheme of constitutional types of M.V. Chernorutsky (normosthenic - with the proportional sizes of a body and harmonious development of osteomuscular system is applied; asthenic – a harmonous body, weak development of muscular system, prevalence of the longitudinal sizes of a body hypersthenic type - with prevalence of the cross-section sizes of a body.

Process of physical development proceeds irregularly. The bright proof of influence of a complex genetic and medial factors on physical development of modern people are: **axeleration and epochal progress.**

The acceleration – it is an acceleration of rates of growth observable by last 100-150 years and development, increase in the sizes of a body, earlier terms of approach of puberty in comparison with the previous generations.

Epochal progress – covers all complex of morpho-functional changes of the modern person: increase in the sizes of a body, reduction in age of puberty, acceleration of rates of development, reduction of the growth period, increase in duration of life, the period of work capacity. They can be considered as the positive phenomena objectively reflecting influence of favorable social and medical and biologic factors on an organism of modern people. In a sports life it results in increase of a level of physical work capacity and growth of achievements in sport.

Methods of research of physical development (PD)

The basic methods of research of PD are: external examination – somatoscopy, measurement of morphological and functional parameters (anthropometry, a photo, roentgenography, measurement with the help of devices (kyphoscoliosometers) physiological dorsal flexure, gonioscopy – measurement of corners of movement in joints.

1. Somatoscopy – external examination begins with examination of a posture – it is a habitual person's pose, the manner to keep standing and sitting. It can be correct (the head and a trunk are on one vertical, shoulders are unrolled, slightly unwrapped, scapulae are pressed, physiological dorsal flexure is normally expressed, an abdomen is pull up, legs are unbent in knees and hip joints). Cervical both lumbar lordosis, and chest and sacral kyphosis are well expressed. It is distinguished plane, round, round-concave and plano-concave back. Lateral curvatures of the spine – is named scoliosis. It is distinguished right-side, left-side and S-shaped scoliosis depending on a department of the spine, and it may be also the I-st, II-nd, and III-rd degrees. The thorax can be cylindrical, conic and impressed forms in norm. Obesity is distinguished: the normal, reduced and increased fatness. At examination of skin pay attention to humidity, painting, presence of eruption, injuries, cutaneous callosity, intertrigo.

2. Legs – can be: normal, O- and X-shaped form. It is distinguished normal, impressed (if pigmented part of stops is more than ⅓) and flat. Platypodia is frequently accompanied by painful sensations during long walking or sports exercises.

Development of muscles is: good, satisfactory, weak.

At somatoscopy the type of constitution, a proportion of a body and the constitutional type are defined.

Recommendations on harmonization or corrections of physical development depending on its peculiarities

The doctor is obliged considering peculiarities of physical development, to recommend examined person this or that kind of sports. Two basic principles define these recommendations:

use of natural data in physical development and a functional condition of an organism, which increase productivity of employment by the specific kind of sports; use of such employment by physical exercises, which harmonize physical development, liquidate danger of the chosen specialization.

The characteristic of a functional condition of an organism of the sportsman.

For research of functional conditions of nervous and other systems of an organism of the sportsman (cardiovascular, respiratory, system of blood, digestive, excretory, endocrine systems) a wide complex of medical methods is applied.

First of all medical and sports anamnesis are gathered. Then the doctor examines integuments, mucous at the sportsman, carries out procedures of reflexes research, palpation, percussion and auscultation. The information received at it allows making judgment about a state of health of the sportsman and about presence of prepathological and pathological symptoms of disease or overtraining. Materials of such clinical examination can be used for an estimation of features of a functional condition of this or that system. However the greater volume of the helpful information can be received with the help of instrumental methods of research.

At functional research engaged persons by physical culture and sports the greatest distribution have received:

- Research of cardiovascular system – pulsimetry, measurements of the BP, sphygmography, electrocardiography, echocardiography, phonocardiography, rheovasography, polycardiography, intervalocardiometry.

- Research of respiratory system – spirometry, definition of the maximal ventilation of lungs, pulmonary volumes, forces of respiratory muscles, frequencies and depths of breath.

- Research of CNS – chronoreflexometry, tremography, definition of EEG.

- Research of nervous-muscular apparatus – myotonometry, electromyography, definition of time of a pressure and a relaxation of muscles, chronoximetry, electric stimulation of muscles.

- Research of the internal media of an organism (clinico-biochemical analyses of blood, urine) – definition of the contents of hemoglobin, erythrocytes, hematocrit, leukocytic formulas, contents of protein and uniform elements in urine. Parameters of a carbohydrate metabolism (glucose, lactic, pyruvic acids), a fatty metabolism (glycerin, ketonic bodies,) albuminous (urea of blood), creatine phosphatic mechanism (creatine, creatinine, inorganic phosphorus)., parameters of reactivity sympatho-adrenal system (adrenaline, noradrenaline, catecholamines) and hypophysial-adrenocortecal part of regulation (hydrocortisone).

In functional diagnostics the important role belongs to the information received with the help of various functional tests. Tests allow estimating a functional condition of an organism as a whole, its readiness for competitive activity, a level of its physical work capacity, etc. All results

of functional tests are considered not separately, and in a complex with other medical criteria. Only the complex estimation of the data of medical examination, results of application of instrumental methods of research allows to give an objective estimation of readiness of an organism engaged to physical loadings and competitive activity.

Functional tests have started to be applied in sports medicine in the beginning of the XX century. So the first test became a test with a load in 60 jumpings up on a place, offered by D.F. Shabashev and A.P. Egorov in 1925.

Classification of functional tests.

1. Respiratory tests (Shtange, Genchy, Serkin)
2. Tests with a change of position of a body (ortho-and clino-static, clino-orthostatic).
3. Tests with standard loading (test of Martin-Kushelevsky, test of Letunov, etc.
4. MPK, PWC170 (standard loadings - the step-test, tradmill, cycleergometer)
5. Tests with change of gas structure of inhaled air -hypoxymic test, which in sports medicine are used for studying of stability to hypoxia in conditions of high mountains and middle mountains.
6. Medicamentous tests are used with the purpose of differential diagnostics between a norm and a pathology.

Classification of functional tests :
I.Tests from changing environmental conditions
1) respiratory tests(Shtange , Genchi , Serkin);
2) the temperature tests(cold , heat) ;
3) tests with a change in body position in space (ortho and klinostaticheskaya);
4) tests with straining (Valsalva , Fleck and Burger) .
II. Tests with physical load
1) tests with dosed with isometric exertion;
2) tests with a standard dynamic exercise (Martine Kushelevsky , Letunova tests , etc.).
III. Medicamentouse tests (kalii chloride , α- adrenostimulyators , β- blockers) are used for the differential diagnosis between norm and pathology .
IV. Food tests (nutritional)
1) the glucose tolerance ;
2) by removing (fluid) etc.
Tests with medicaments: , b-blockers, b1-b2-adrenostimulyators, a-adrenostimulyators, nitroglycerin, dipyridamole, and others. are evaluated by ECG changes on the rest that helps to differentiate the causes of variations in the amplitude of the T wave (due to coronary insufficiency or metabolic disorders).

Functional tests with a delay of breath, loadly-respiratory tests

Test of Shtange.

At carrying out of Shtanger's test time of a delay of breath after a deep breath is measured. In healthy people this time, on the average, makes 40-50 sec. In sportsmen of high qualification – up to 5 minutes, in sportswomen – 1,5-2,5 minutes. With increase of training, as a

result of adaptation to motor hypoxia, time of a delay of breath increases. Increase in this parameter in dynamics is estimated as increase of a training level.

Test of Genchy.

Time of a delay of breath after the maximal exhalation executed on a background of quiet breath is measured. At healthy people time of a delay of breath makes 25-30 sec., in sportsmen – 60-90 sec. At chronic fatigue and diseases time of a delay of breath is sharply decreased.

Test of Serkin.

Serkin's test consists from three phases. First time of a delay of breath on an inhalation in a position of sitting is defined. Then carry out 20 knee-bends for 30 sec. also repeat a delay of breath on an inhalation, then rest within a minute follows and again hold the breath on an inhalation in a position of sitting.

Criteria of estimation: a good condition of cardio-respiratory system - the first phase – 60 sec. and more; satisfactory – 40-55 sec; 15-25 sec.; 5-55 sec.; an unsatisfactory condition – 20-35 sec.; 12 sec. and less, 24 sec. and less.

Functional tests with change of a body position in space.

Orthostatic test – test with change of a body position in space. At change of a body position from horizontal in vertical there is a redistribution of blood, which directs downwards, it causes inclusion of the reflexes regulating blood circulation of organs. Deterioration of venous return to heart is compensated due to increase of RHB (rate of the heart's beat). In healthy persons increase of RHB – on 10-20 beat/min. up to 20 and more it is possible to speak about prevalence in regulation of a sympathetic department of vegetative nervous system.

Clino-orthostatic test – transition from position of standing in a prone position. In a norm delay of pulse does not exceed 6-10 beat/min. Sharper delay of pulse specifies on prevalence in regulation of cardiovascular system of a parasympathetic department of vegetative nervous system.

Functional tests with standard loading

Functional tests with dosage physical load are mainly used to assess functional ability and adaptation of the cardiovascular system
.Tests with isometric exercise
Conducted according to the method : a) securing the straightened legs of the foot at a height within 1 minute laying on a back ;
b) compressing the hand
dynamometer with effort 50% of the maximum possible for 1 minute
. Type of reaction is determined by the blood circulation system about changes in blood pressure during physical load,normal and hypertonic .
During provide of functional tests , especially with physical load, you need to follow the scheme :
- Identification and evaluation of the initial (in rest condition) of these indicators , which are investigated ;

- The study of the nature and level of changes in these parameters under the influence of the functional test ;
- Analysis of the duration and nature of the restored period during which the studied parameters returned to start level.

Should pay particular attention to the registration of certain indicators , mainly concerned the pulse rate during functional tests. To determine reaction rate, it is not counted for one minute and for a shorter time intervals , usually 10 or 15 seconds.

Martin-Kushlevsky's test – it is a test with 20 knee-bends. Before loading calculation of RHB is carried out and the BP in rest is measured. After 20 knee-bends during 30 sec. define increase of RHB under the formula: RHB after loading. – RHB before loading / RHB before loading. x 100 %. Criteria of an estimation: Increase of RHB on 25 % – a condition of cardiovascular system is good, on 50-75 % – satisfactory, more than on 75 % – unsetisfactory. Reaction of BP on loading are analyzed also and time of recovery 5 minutes should not exceed.

Types of reaction of cardiovascular system on standard loading

Character of reaction to loading is expressed one of five types:

1. **Normotonic type** of reaction alongside with increase of pulse is characterized by distinct increase of systolic pressure (no more than 150 % from initial); diastolic pressure does not vary or is slightly decreased; pulsed pressure is increased and time of recovery of parameters within the limits of 3-5 minutes.

2. Hypotonic (asthenic) type of reaction is characterized by more significant increase of pulse; systolic pressure poorly or isn't increased at all, and sometimes is also decreased; pulsed pressure is decreased. The increase of minute volume of blood is provided due to increase of RHB, time of recovery is more than 3-5 minutes.

3. Hypertonic type of reaction is characterized by more expressed increase of pulse and sharp rise of systolic pressure (more than 160-180 %) and diastolic more than on 10 мм. of mercury column. Time of restoration is more than 3-5 minutes.

4. **Dystonic type** of reaction is characterized by occurrence of a phenomenon of "infinite tone» and by lengthening of time of recovery is more than 3-5 min.

5. Step type of reaction is characterized by that systolic pressure reaches of a maximum not right after a loading, and on the 2^{nd}-3^{rd} minute of the regenerative period; it is characteristic for over-fatigue and overtraining. Time of recovery of RHB and the BP is more than 3-5 min.

The analysis of results of complex medical inspection. Medical groups.

By results of annual medical examination pupils and students depending on a state of health, physical development and functionalities are distributed: **on the basic, preparatory and special medical groups** (table 1).

Table 1.

Medical groups for employment by physical training.

Groups	Medical characteristics	Admissible physical loading
Basic	Persons without deviations in a state of health; the persons having insignificant deviations in a state of health at sufficient physical development.	Employment under curriculums of physical training in full, employment in sports section, participation in competitions.
Preparatory	Persons with insufficient physical development and weak physical preparation without deviations and insignificant deviations in a state of health.	Employment under curriculums of physical training under condition of more gradual development of a complex of impellent skills and the skills especially connected with presentation to an organism of increased requirements. Additional employment for increase of a level of physical readiness.
Special	The persons having deviations in a state of health of constant or temporary character, demanding restrictions of the physical activities allowed to performance of study work.	Employment under special curriculums.

Transfer from group in group is made after the next and additional complex examination.

Table 2.

Age norms of the beginning of employment and specialization by separate kinds of sports.

Kind of sports	Age of initial preparation in years	Age of specialization in years
Aerobics	8-9	10-11
Badminton	10-12	12-14
Basketball	10-12	12-14
Boxing	12-14	14-15
Struggle	10-12	12-14
Cycling	12-13	14-15
Gymnastics	7-8	9-11
Rowing	11-13	13-15
Track and field athletics	10-12	13-14
Skiing	8-10	10-12
Mountain-skiing	8-10	10-12
Sailing	9-11	11-13
Navigation	7-8	8-10
Handball	10-12	12-14
Shooting manual	11-13	13-15
Modern pentathlon	10-12	12-14
Tennis	7-9	9-11
Weightlifting	13	14-15
Fencing	10-12	12-14
Figure skating	7-9	9-11
Football and ice hockey	10-11	11-12
Bandy	10-11	11-14
Chess and draughts	9-12	11-14

Temporary exemption from physical culture or some limitations of physical load are necessary in the case of acute or transferring infectious diseases , acute exacerbation of chronic disease , trauma, injury , surgery , etc. Terms resumption of exercise in such cases should be determined individually taking into account the state of health , functional abilities of the major systems and the whole organism of the musculoskeletal system.(Table 3)

Table 3.

Rough terms of renewal of employment by physical training and sports after diseases.

Diseases	Terms of the beginning of visiting of educational employment	Note
Angina	2-4 weeks	To be protected of overcoolings
Bronchitis, ARVI	1-3 weeks	-
Acute otitis	2-4 weeks	-
Pneumonia	1-2 months	-
Flu	2-4 weeks	-
Acute infectious disease	1-2 months	At presence of satisfactory results of test of 20 knee-bends
Acute pyelonephritis	2 months	-
Viral hepatitis	8-12 months	-
Appendicitis	1-2 months	-
Fracture of bones	1-3 months	With obligatory continuation of exercise therapy
Brain concussion	2-12 months	Depending on character of a trauma and a condition

Questions of visiting of playing sports and especially participations in competitions after the transferred disease are solved by the doctor after detailed and general additional examination.

Concept of the general physical working capacity and tolerance to physical activities.

Physical working capacity is shown in various forms of muscular activity and depends from physical "form" or readiness (suitability) for physical efforts.

WHO definitions of physical work capacity (PWC) – potential ability of the person to show a maximum of physical effort in the static, dynamic and mixed work.

There are data, that on physical working capacity of examined persons it is possible to judge a state of health, about socially-hygienic and social and economic conditions of a life of

people, about results of preparation for labour, sports and military conditions. In practice of a doctor of sports medicine quantitative definition of physical working capacity is necessary:

1. At organization of physical training of the population of various age and sexual groups for an estimation of functional reserves of an organism and differential diagnostics of separate cardiac diseases in mass sports and sports of the highest achievements;

2. At selection, planning and prognosing of educational-training loadings of sportsmen;

3. At the organization of motor regimen of patients in clinics and the centers of rehabilitation, at carrying out of medical labour examination.

Physical working capacity is integrative expression of the person's opportunities and enters into concept of his health and is characterized by a number of objective factors.

To them is concerned: 1) a constitution and anthropometrical parameters;

2) power, capacity and efficiency of mechanisms of energic production by aerobic and anaerobic way; 3) strength and endurance of muscles; 4) neuro-muscular coordination; 5) a condition of the locomotor system; 6) neuro-endocrin regulation as processes of power-resources and power-formations;

7) a mental condition.

It is considered to be a quantitative measure of physical working capacity kgm, watt, joules, newtons.

1watt = 6,12 kgm/min.; 1joule = kgm/sec2; 1newton =1kg/sec^2 (Newton – it is force, which a body in weight of 1kg informs acceleration of 1 m/sec^2)

At different people development of separate components of physical working capacity is sharply differed. It depends on a heredity and external conditions, a profession, a level or character of physical activity, a kind of sports.

Correlation between separate factors varies over a wide range.

Influence on physical working capacity and the person's state of health, resistibility in relation to damaging factors is doubtless renders also. The maximal display of physical working capacity appreciably depends on motivation of an individual. Displays of aerobic and ana-aerobic powers are interconnected also. However connection between physical qualities, for example flexibility and muscular force from one side and aerobic power with another one can not be found out.

In narrow sense physical working capacity is considered as a functional condition of cardio-respiratory system. And it is justified, as in a daily life intensity of physical activity low and has the expressed aerobic character (it is limited by a system of transport of oxygen, external breath, cardiovascular system, a condition of blood).

Therefore at mass researches are often limited by definition of a maximum of aerobic power (VO2max). During testing of physical working capacity different standard loadings on cycle-ergometer, tredmile or the step-test are used: gradual increase in loading with the periods of rest; gradual increase in loading; uninterrupted increase of load to a necessary level; one-stage continuous uniform load.

Clinical and functional signs of tolerance to physical loads. Contra-indications for carrying out of loading tests.

Systematically influence of adequate physical load on the person's organism leads to the structurally-functional reorganization characterized by economization of physiological functions (decrease of breath frequency, cardiac contractions and arterial pressure; to inclusion of the ballast fats in a metabolism, giving twice greater power consumption, than assimilation with food of expensive proteins and carbohydrates, that at adiposity is accompanied by gradual growing thin) in rest and at the dosed out physical influences, to expansion of physiological reserves (increase in vital capacity of lungs, beat volume of heart and saturation of an organism by oxygen, to increase of a tone of an organism, immunity, endurance, physical and intellectual working capacity, reduction of diseases from catarrhal, cardiovascular and somatic inflammatory processes), to increase of stability of an organism to pathogenic influences of adverse ecological factors of an environment (radiation, intoxications, salts heavy metals), to delay of processes of ageing and increase of biological age. It is more expressed under influence of physical cyclic exercises and trainings (slow run, fast walking, a bicycle, skis, skates, sweaming, etc.), than under influence of acyclic gymnastic, game, high-speed, high-speed-power and power exercises and trainings. But presence of hypokinesia (hypodynamia) is especially harmful to general and cardiovascular disease causing above listed display, occurrence of adiposity and infringements of the locomotors system, also reduction of life duration.

Decrease of physical working capacity below the average level (1,5 Vt/min/kg of a body mass) at practically healthy person forms symptomo-complex, characterized by dyspnea at the moderate physical load, decrease in professional working capacity and fast fatigue, various nervously-somatic both vegetal-vascular disorders and early signs of ageing.

For definition of tolerance to physical load its intensity gradually increase under the control of a condition of an organism and presence of first signs of inadequate reaction – it is named a threshold of tolerance and loading stop. Achievement of a threshold of tolerance to physical load is better to define by means of an electrocardiogram: decrease or increase of segment ST on 0,1-0,2 мV; increase or decrease voltage of wave T in chest assignments on 25 %, decrease of voltage of wave R on 50 %: occurrence of arrhythmia and disorder of function of conductivity, extrasystole.

Contra-indications for carrying out of functional tests: acute feverish conditions, system-organic decompansations, malignant tumors, threat of a bleeding, thromboembolia, active pulmonary tuberculosis, tachycardia from above 100 pulse beat in a minute, the BP over 180/100 mm of mercurial column, various changes of electrocardiogram (paroxysmal tachycardia, ciliary arrhythmia, blockades, syndrome WPW), thrombophlebitis.

Technique of carrying out and principles of calculations of physical working capacity at performance of submaximal test PWC_{170} (at cycle-ergometry and step-ergometry)

PWC_{170} – an abbreviation made from the first letters of expression Physical Working Capacity. The test is recommended by WHO for definition of physical working capacity of sportsmen and athletes. Physical working capacity in test PWC_{170} is expressed by size of power of load, which the examined person can make at RHB, equal 170 beat/min. The choice of this frequency is based that the zone of optimum functioning of cardiovascular system is in a range of 170-190 beat/min.

Thus, by means of this test it is possible to define that power of loadi at which optimum performance of cardiovascular system is still kept. The second physiological law underlying the test is consisted that interrelation between RHB and power of carried out physical load has linear character down to RHB, which is equal 170 beat/min. In practice of MC two variants of test PWC_{170} are applied: cycle-ergometric and the test in which load is carried out in the form of ascent on a step.

Course of carrying out of the test. To the examined person two loads of different power (W_1 and W_2) suggest to carry out: on cycle-ergometer and an ascent on a step, duration on 5 min. everyone with a 3-minute break. In the end of each load RHB (accordingly f_1 and f_2) is defined. For calculation of a pulse rate to use objective ways of registration (pulsotachometry, electrocardiography, etc.) is recommended. On the basis of the received data build the diagram, where on an axis abscissa postpone power of load (W_1 and W_2), on an axis of ordinates – corresponding RHB (fig. 2.6). On crossing of the perpendiculars lowered in corresponding points of axes of the diagram, find coordinates 1 and 2. Considering, that between RHB and power of physical load there is a linear dependence, through coordinates 1 and 2 conduct a straight line down to its crossing with a perpendicular restored from point RHB, corresponding 170 beat/min. (coordinate 3). From it a perpendicular on an axis abscissa, receiving thus power of load at RHB, equal 170 beat/min. For simplification of procedure of finding PWC_{170} the formula is offered:

$$PWC_{170} = W_1 + (W_2 - W_1) \times (170 - f_1 / f_2 - f_1),$$

Where: PWC_{170} – power of physical load at RHB, equal 170 beat/min.;

W_1 and W_2 – power of the first and the second load (Vt or kgm/min.);
f_1 and f_2 – RHB in the end of the first and second load.

At healthy young without trained men the sizes of PWC170 are changed within the limits of 120-180 Vt (on the average 2,8 Vt/kg), and at women – 75-125 (2,0 Vt/kg). This parameter is higher in two and more times in sportsmen .

Method of definition of the maximal consumption of oxygen (MCO). Calculation of parameter of MCO on Astranda's nomogram and a size of PWC_{170}

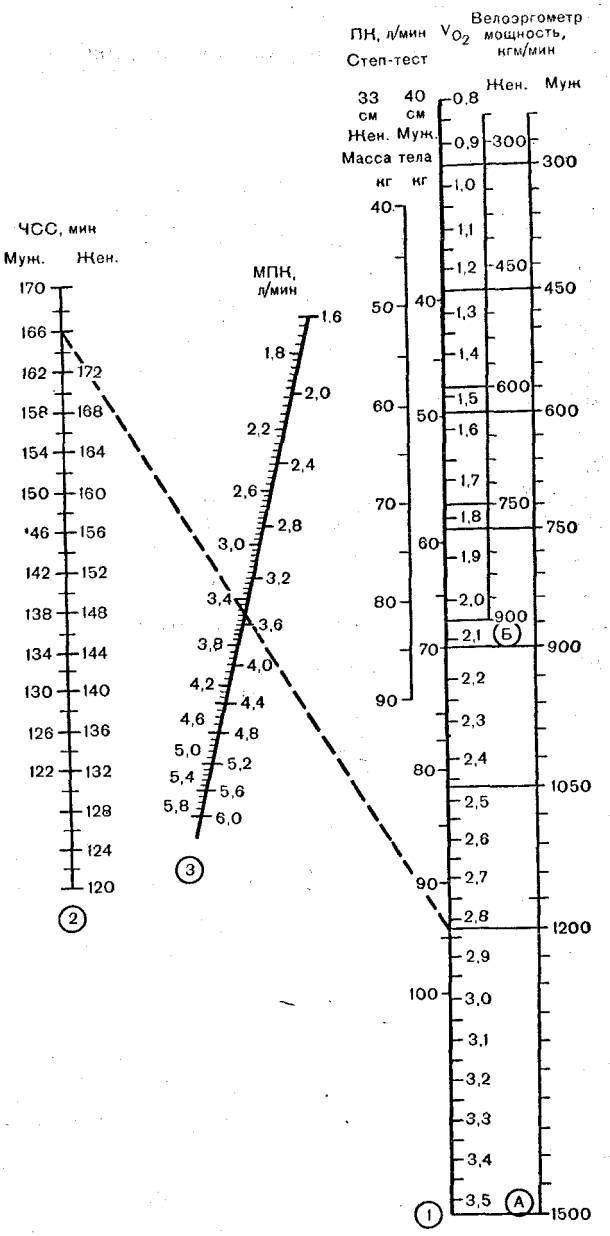
Size of MCO is the major parameter characterizing the maximal productivity of system of oxygen transport, physical working capacity, limiting opportunities (power) aerobic power-formation (the maximal aerobic ability). High parameters of MCO are the reliable certificate of high cardiac, respiratory, endocrine and other physiological reserves of an organism, differently – a high level of somatic health of the individual.

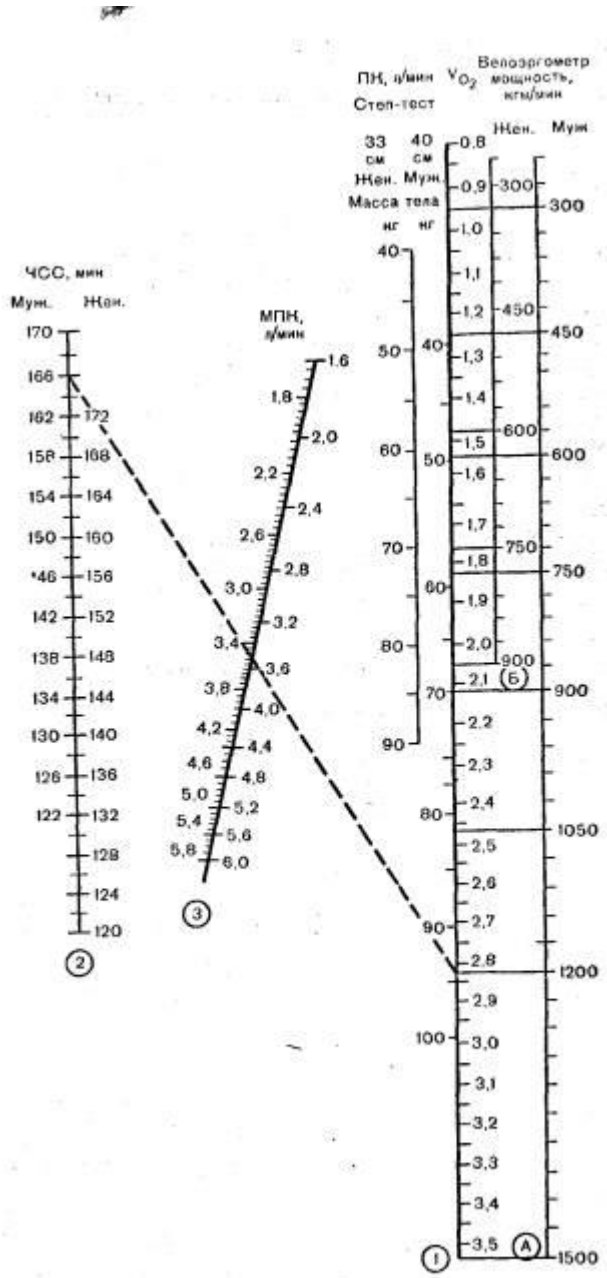
Direct definition of MCO. The examined person carries out physical load, which power increases stepped down to impossibility to continue work. Load is dosed out by means of cycle-ergometer or a running path; thus by means of a gas- analyzer size of consumption of oxygen is defined. Size of MCO depends not only from power of physical load, but also the muscular mass involved in the work at carrying out of a test. For example, if the work is carried out by hands, a size of MCO below a real. Direct definition of MCO is used only at the control over sportsmen of the top qualification.

Indirect definition of MCO. In improving physical training and mass sports the method of indirect definition of MCO to the examined person is used, it is suggested to carry out unitary load on cycle-ergometer or by rise on a step in height of 40 sm for men and 33 sm for women during no less than 5 min.; define RHB. Calculation of MCO is carried out on a special nomogram (fig. 2.7) in which the sex is considered, achieved RHB at physical load, its power (in case of step-ergometry – of a body mass). As a power unit of work in nomogram 1 kg/m/mines is used that makes 0,167 Vt. Connecting points on nomogram how it is shown on fig. 2.6, we shall receive MCO, equal 3,6 l/min. Accuracy of nomographic definition of MCO on Astrand - Riming quite satisfactory. It is increased, if to the examined person set the load causing increase of pulse over 140 beat/min. The correction coefficients are developed also, allowing to consider age of examined persons (tab. 3). For children and teenagers are more younger than 15 years is developed special nomogram (Gurtler). Mass researches with use of nomograms have allowed establishing a normative estimation of MCO level for practically healthy persons of various sex and age. It has allowed to distribute of examined persons on so-called *functional classes of*

aerobic ability: FC I – low; FC II – below an average; FC III – average; FC IV – above an average; FC V – high.

On a scale A and B Astrand's nomograms (depending on a sex of examined person) the size of load of submaximal power is marked. The found point of a direct line is joined with a scale 1 on which values of O_2 consumption are presented, and then with a scale 2 reflecting RHB for the given sex at a carried out work. The point of a crossing line with a scale 3 corresponds to value of MCO.


ПК, л/мин
Степ-тест
V_{O_2}
Велоэргометр мощность, кгм/мин
33 см Жен.
40 см Муж.
Масса тела кг
Жен.
Муж
ЧСС, мин
Муж.
Жен.
МПК, л/мин
Б
А
1
2
3



Age				Coefficients at calculation of MCO on I. Astrand's nomogram				
Age, years	15	25	35	40	45	50	60	65
Coefficient	1,10	1,0	0,87	0,83	0,75	0,75	0,68	0,65

Tests of Rufye, Navakky, the Harward step-test, Cooper's tests, a technique of carrying out and an estimation of results of testing

Rufye's test

Index of Rufye (IR) is counted under the formula:

$$IR = [4 (P1+P2 + P3)-200]: 10,$$

Where: P_1 – pulse on a beam artery of examined person for 15 sec. in a position of sitting;
P_2 – pulse in a position of sitting at once after caring out of 20 knee-bends for 45 sec. with emission of hands forward;
P_3 – pulse for 15 sec. in a minute.

At a score zero and less a level of physical health is estimated as low, 0,1-5 – below an average, 5,1-10 – average, 10,1-15 – above of an average, 15.1-20 – high, above 20 points – as very high.

Navakky's test

Original version of the maximal test with registration of only "critical" power without data of gas-analysis is Navakky's test. Its advantages – informant, simplicity, an opportunity to unify results of research. The test is recommended by WHO for wide use. For carrying out of the test it is necessary only cycle-ergometer. Load is individualized depending on a body mass of the examined person. The test begins from initial load of 1 Vt/kg of a body mass and through every 2 min. increase for the same size. The maximal reached power and time of its within the limits of 2 min. is registered. During the moment of "refusal" consumption O_2 at the examined person close to maximal, RHB also reaches the maximal values. The test is suitable for research both trained, and untrained persons; it is possible used and in recovery treatment for dosage of load in procedure of MG and estimation of efficiency of rehabilitation process. It is necessary to begin a test from a load of 0,25 Vt/kg of a body mass of examined person in the final case .

Normal working capacity at untrained persons (the power of 3 Vt/kg kept during 2 min.) corresponds to the maximal consumption of oxygen (MCO) 42-44 ml/kg/min., i. e. to an average functional class (FC) of aerobic ability on Astrand for men in the age of 20-50 years. Selective researches show, that among men of the European part of the UIS by a similar level of physical capacity only 5-8 % possess (G.L. Apanasenko) .

The estimation of results of Navakky's test for healthy persons is brought in the table.

Power loads, Vt/kg	Time of work On every step min.	Evaluation of physical capacity
2	1	Low physical capacity in untrained persons
3	1	Satisfactory physical capacity in untrained persons

3	2	Normal physical capacity in untrained persons
4	1	Satisfactory physical capacity in sportsmen
4	2	Good physical capacity in sportsmen
5	1-2	High physical capacity in sportsmen
6	1	Very high physical capacity in sportsmen

The Harward step-test

The Harward step-test is based on registration of RHB after the dosed out physical load and allows quantitatively estimating a course of regenerative processes. Physical load represents an ascent on a step (fig. 2.5) by height 50 sm for men and 43 sm for women. Time of an ascent is 5 min., frequency of rises with change of legs – 30 times in 1 min. If the examined person isn't in a condition to carry out a load during 5 min., time of actually done work is registered. A pulse rate is registered in position of sitting in the first 30 sec. of the 2^{nd}-4^{th} min. of the recovery period.

Results of testing express in the form of an index of the Harward step-test (IHST): t x 100 / (f1+f2+f3) x 2

Where: t – time of an ascent for a step in the set rate (300 sec. at completely carried out of a test);

f1, f2 and f3 – a pulse rate for the first 30 sec. accordingly to the 2^{nd}, 3^{rd} and 4^{th} min. of the recovery period.

As a rule, increase of a level physical training is accompanied by increase IHST, detraining – by decrease and impossibility to carry out a load completely. It is necessary to consider, that the general load at carrying out of the step-test is great enough, therefore test can be recommended only healthy persons.

Index of the Harward step-test and estimation physical training: less than 55 – is bad; 55-64 – is below an average; 65-79 – is average; 80-89 – is good; 90 and more – is excellent.

Cooper's test

For the persons, regularly engaged by improving physical training or mass kinds of sports (no less than 6 months), with the purpose of definition FC of aerobic ability and reception of a trustworthy information about MOC, it is possible to spend testing of the general endurance.

Between parameters of MOC and a level of development of the general endurance there is a high degree of connection – a coefficient of correlation is more than 0,8.

Correlation between results of Cooper's 12-minute racing test (km) and MOC (ml/kg/min.), accordingly, makes:

Less than 1,6 km – less than 25,0 ml/mkg/min.; 2,01-2,0 km – 25-33,7; 2,01-2,4; 2,41-2,8 – 42,6-51,5; more than 2,8 km - 51,6 and more of MOC ml/kg/min.

Correlation between results of 12-minute test and MCO

The distance (km) overcome for 12 minutes	MOC, ml/kg/min.
Less than 1,6	Less than 25,0
1,6-2,0	25-33,7
2,01-2,40	33,8-42,5
2,41-2,8	42,6-51,5
More than 2,8	51,6 and more

On this basis Cooper had been offered racing tests (1,5-mile and 12-minute) by results of which a functional class of aerobic ability is defined. The similar rating scale of aerobic abilities was developed for children and teenagers.

Gradation of the maximal aerobic ability (functional classes) depending on the distance run for 12 minutes (km) on Cooper are presented in the table:

Functional class of aerobic ability and physical condition	Age, years							
	Younger than 30		30-39		40-49		50 years and older	
	M	F	M	F	M	F	M	F
FC I – very bad	Less than 1,6	1,5	Less than 1,5	1,4	Less than 1,4	1,2	Less than 1,3	1,0
FC II – bad	1,6-2,0	1,5-1,8	1,5-1,8	1,4-1,7	1,4-1,7	1,2-1,5	1,3-1,6	1,0-1,3
FC III – satisfactory	2,01-2,4	1,81-2,1	1,81-2,2	1,71-2,0	1,71-2,1	1,51-1,8	1,61-2,0	1,31-1,7
FC IV – good	2,41-2,8	2,11-2,6	2,21-2,6	2,01-2,5	2,11-2,5	1,81-2,3	2,01-2,4	1,71-2,2

FC V – excellent	More than 2,8	More than 2,6	More than 2,6	More than 2,5	More than 2,5	More than 2,3	More than 2,4	More than 2,2

Classes of a physical condition

At an estimation of a functional condition of an organism, its separate organs and systems, especially working capacity should be guided not only by sizes of "norm", but also by representations about an optimum of functions. Now for the present the optimum level of working capacity of the basic functional systems of an organism of the person is not established. Therefore one of the major problems of preventive medicine is development of specifications of an optimum of "dynamic" health and working capacity of the person.

Power maintenance of physical cyclic exercises and trainings is carried out due to aerobic mechanisms. They are divided on exercises of maximal (95-100 % MOC), circum-maximal (80-90 % MOC), submaximal (70-80 % MOC), average (55-60 % MOC) and small (less than 50 % MOC) aerobic power. In improving training advantage is given for cyclic aerobic exercises of the submaximal and average power.

Mass researches of a MOC level at practically healthy persons of a different sex and age have allowed to distribute of examined persons on so-called functional classes of aerobic ability: FC 1 – is low; FC II – is below average (satisfactory); FC III – is average; FC IV – is above average (good); FC V – is high.

Concept about quantity of the person's physical (somatic) health. "Adaptable" and "power" concepts of definition of quantity of health. Connection of physical working capacity with parameters of health.

«The safe level» of physical (somatic) health is understood quantitatively certain reserve of health, which doesn't admit formation of endogenous risk factors of diseases development or their demonstration (G.L. Apanasenko, 1988, 1992). Such approach is based on revealings of a level of physical (somatic) health by a method of an estimation of biosystems power-potential on G.L. Apanasenko, adaptable opportunities (R.M. Baevsky, 1973), a homeostasis (Yu.M.Mazurin, et. al., 1991), reactivity (L.K. Garkavy, et. al., 1996). At use of various ways of a quantitative estimation of a level of physical health on the basis of the received information it is possible to distinguish borders of "a safe level" of physical (somatic) health of the individual. It is characterized by G.L. Apanasenko by the maximal consumption of oxygen of 40-42 ml/min./kg (11-12 metabolic units1) for men and 33-35 ml/min./kg (10-11 metabolic units) for women – it is a little above average gradation on a scale of a express-estimation (metabolic unit is measured by consumption of oxygen (power-expenditures) in conditions of the basic metabolism). In this case men can carry out cycle-ergometric load of 3 Vt/kg or to run a distance of 3 km more quicker

than 14 min.-14 min. 30 sec., and women – 2 Vt/kg or to run 2 km more quicker than 11 min.-11 min. 30 sec. Persons who have these parameters lower, make "group of risk" more often – it testifies about that examined persons already have or they have the high risk of development of somatic diseases, illnesses of internal organs. Thus, the interrelation between parameters of a level of health and physical working capacity is revealed and quantitatively certain – the higher value of a parameter of physical working capacity, the better health at the individual and on the contrary.

Table 4.

Level of physical health (aerobic opportunities) of depending from the maximal consumption of oxygen (ml/min./kg).

Level of health	M e n				F e m a l e			
	younger than 30	30-39 years	40-49 years	50 years and older	younger than 30	30-39 years	40-49 years	50 years and older
1	2	3	4	5	6	7	8	9
Low	< 25,0	< 25,0	25,0	–	< 20,5	< 20,2	< 21,1	–
Lower of the average	25,0-33,7	25,0-30,1	25,0-26,4	< 25,0	20,5-27,6	20,2-24,4	21,1-22,3	< 20,1
Average	33,8-42,5	30,2-39,1	26,5-35,4	25,0-33,7	27,7-34,8	24,5-31,6	22,4-29,9	20,1-27,1
Higher than average	42,6-51,5	39,2-48,0	35,5-45,0	33,8-43,0	34,9-42,1	31,7-38,9	30,0-38,1	27,2-34,6
High	> 51,5	> 48,0	> 45,0	> 43,0	> 42,1	> 38,9	> 38,1	> 34,6

Concept about «person's biological age»

. The biological age (БА) is an absolute measure of viability of an organism (quantity of health), it predicts duration of a forthcoming life (provided that the death comes from the natural reasons). Definition of BA is necessary to reflect specificity of ageing: its interlinking in due time (age) and its destructiveness. Basically such estimation of quantity of health at which on set of informative parameters time from the moment of inspection to natural death of the individual is predicted is possible. For definition of BA different researchers use sets from 5-15 parameters (in the literature they have received the name of "batteries of tests»). However the logic scheme of aging estimations does not depend on a choice of tests and includes following stages: 1) calculation of valid value of BA of the given individual (on a set of clinico-physiological parameters), 2) calculation of due value of BA for the given individual, 3) comparison of the valid and due size (on how many years or in how many time examined person advances the

contemporaries or lies behind them on rate of ageing). The received estimations are relative; as a point of the account population serves the standard – average size of a degree of ageing in the given calendar age for the given population. Nevertheless, the inspector on a stock of health allows to range such approach of two persons of one calendar age on a degree of age "deterioration" and to follow on a stock of health.

Express-estimation of the population a level of physical health

In this system at examination of adults five simple morpho-functional parameters (indexes) are used.

For calculation of parameters and indexes in the beginning it is necessary to measure by the standard techniques stature (standing), a body mass, a pulse rate (PR) for one minute and to know systolic arterial pressure in a condition of rest. Then by means of a hand dynamometer to measure force of muscles of a brush (it is used a parameter of a stronger brush) and by means of a spirometer – vital capacity of lungs (VCL) for calculation in the equation of regress of value $\boldsymbol{PWC_{170}}$ (the general physical working capacity). Spending dynamometry and spyrometry on 2-3 times, the best result is considered. In the end in position of sitting count up a pulse rate on a beam artery in examined person for 15 sec. $(P1)$, and it carries out 20 knee-bends for 45 sec., throwing out hands forward. Right after knee-bends and in a minute at it in position standing again count up pulse for 15 sec. (P_2, P_3). On the basis of the received data count Rufye's index (IR) under the formula:

$$IR = [4 (P1+P2 + P_3) – 200] : 10$$

Further the list of parameters (indexes), formulas for their calculation and gradation for a ball estimation is resulted, which are developed by (V.V. Klapchuk, V.V. Samoshkin, 2005) on the basis of the correlation, regressive and factorial analysis.

1. Mass - index of stature = a body mass (g): stature (standing) (sm), g/sm

M e n	Point	F e m a l e s
> 500	- 3	> 450
451-500	- 2	401-450
400-450	- 1	375-400
< 400	0	< 375

2. Force index = force of brush (kg) x 100 : body mass (kg), %

M e n	Points	F e m a l e s

< 60	1	< 40
60-69	2	40-49
70-75	3	50-55
76-80	4	56-60
> 80	5	> 60

3. Double product = pulse rate (min.) x BP systl. : 100, cond. Unit

M e n and f e m a l e s	Points
> 100	0
95-100	1
85-94	3
70-84	4
< 70	6

4. PWC_{170} = 37VCL (l) + 36 : body mass (kg), Vt/kg

M e n	Points	F e m a l e s
< 2,0	1	< 1,5
2, 0-2,3	2	1, 5-1,6
2, 4-2,5	3	1, 7-1,8
2, 6-2,8	4	1, 9-2,0
> 2,8	5	> 2,0

5. Index of Rufye (IR) : = 4[(P_1 +P_2 + P_3) – 200] : 10, cond. unit

M e n and f e m a l e s	Points
15, 1-20	-2
10, 1-15	-1
5, 1-10	3
0, 1-5	5
< 0	7

Note: if an examined person cannot carries out a test, from the sum 3 points are took away .

***The general estimation**:* at a score in 5 or less the level of physical health is estimated as a low, 6-9 – is lower average, 10-14 – is average, 15-18 – is higher than average, 19 points and higher – is as high.

It is practically important, that having defined a level of physical health, the teacher of physical training has given the recommendations how to increase reserves of health, and could estimate this gain by means of one of the offered techniques. It is necessary to allocate «groups of risk» among cadets and students, a level of physical health in which is lower of average and low, with the purpose of carrying out of preventive physical rehabilitation for escalating of reserves of health and prophylaxis of somatic diseases in view of propensity to them. In this process it is necessary to recommend an individual recreational-improving regimen and to check its performance.

The choice of the most accessible method from the number of the described methods of a quantitative estimation of physical health is carried out in view of the purpose, tasks, a contingent of examined persons, qualifications of the personnel of faculty and real opportunities. All the brought methods informative enough, therefore one of them, the most accessible is selected.

Recreational-improving regimens at prophylaxis physical rehabilitation. Features of purpose of regimens.

After a quantitative estimation of a level of physical health with help of one described methods on the basis of the received information is possible to develop an individual recreational-improving regimen.

The recreation – it is a recovery with help of active rest. Such approach answers to the tasks of preventive (precautionary) Public health. Specific difference of recreational activity consists in the simultaneous decision of tasks of development of intellectual and physical components of the person (V.V. Prihodko).

The recreational-improving «improving regimen appoint in view of a level of health (low, lower of average, average, higher of average and high) and medical (medical-sports) groups: the basic, preparatory and special.

To the basic medical group carry persons with insignificant deviations in a state of health at physical development not below an average and sufficient physical readiness. In a preparatory group are included persons with weak physical readiness and with small deviations of a state of health, but without the important functional dissonances. The special medical group is made by persons who have a deviation of a state of health of constant or temporary character, which are

accompanied by functional disorders and consequently demand significant restrictions of physical loads. However, as a rule, they are supposed to performance of the curriculum behind the special techniques closed to exercise therapy. This medical group also can be temporarily appointed after the transferred diseases, traumas and operations.

Solving the problem on a choice of optimum recreational-improving regime is applied table 5.

Table 5.

Variants of recreational-improving regimen (number) depending on a level of physical health in medical group.

Medical group	Level of physical health				
	low	lower of average	average	higher than average	high
Basic	–	2	2-3	3-2	3
Preparatory	1	1-2	2-1	2-1	2-3
Special	–	1	1	1	–

At the variants of a regime specified in table 2 at the choice of (i.e. 1-2 or 2-3), selecting an optimum regime, consider motor opportunities and the previous experience of sports employment. If motor opportunities high enough and the lead previous physical preparation, prefer more loading regime.

Having selected this or that recreational improving regime, define an admissible pulse rate corresponding it at physical trainings. At a regime №1 it is defined how it is accepted at physical training in special educational branch, at a regime №2 - «180 minus age» is calculated on the formula, at a regime №3 - on the formula «170 minus 0,5 of age».

The content of recreational-improving regimens

Recreational-improving regimen №1

- Power inputs at one-trip physical training - up to 200 kcal;
- Power level of physical exercises - 2, 5-5 kcal/min., at height of a load - 6 kcal/min.;
- Improving aging 3 times for a week for 30-40 minutes; - training pulse rate to 110-120 beats/min. at ability to keep up «colloquial rate».

Devices of a motor regimen (depending on clause, age, physical-sports interests and opportunities 3-4 devices are selected):

1. Morning hygienic gymnastics 10-15 minutes, 12-15 exercises.

2. An improvingly-prophylactic gymnastic complex up to 25 minutes, 30-35 exercises on the average rate. A relation of respiratory and common-developing exercises 1:2-3.
3. The dosed walking (terrencur) 2-2,5 km in rates of 70-90 and 90-120 steps for minute.
4. Walking on stairs in rate 16-20 stairs for minutes (uprise) and 50-60 stairs for minutes (descent), 10-15 minutes with rest on the platforms.
5. Running on the spot in rate of 150-160 steps for minutes, slightly tearing away socks from a floor, 8-10 minutes.
6. Jogging - 8-10 minutes by an interval method (1-2 minutes - running, 1-2 minutes - walking).
7. The dosed swimming in a basin at temperature of water 26-28° with initial rate 17 м/min. (possible reduce and increase of diapason 12, 5-29 m/min.), 6-8 times on 1-3 min.
8. Training on a velosimulator at power of a load 0,6-1,3 Vt/kg by an interval method, 10 minutes.
9. Athletic gymnastics on 6-8 simulators with a load of 35 % from an individual maximum of repetitions (2 approaches) and 50 % (one approach).
10. Rhythmic gymnastics with magnification of an initial pulse rate at 25 %, 30-35 minutes.
11. Sports games in view of physical-sports interests (preferentially in pairs), 20-30 minutes.

Regimen of training:

1. General air baths in rest at room temperature 25-20° (40-50 minutes at 25°, 10-15 minutes at 20°) or with physical exercises of small intensity at temperature 19-16° 8-10 minutes.
2. Bathing in the river or lake at temperature of water 25-19° (3-7 minutes at 25°, 1-1,5 minutes at 19°).

Improving sauna. At temperature in thermal-room 80° 3 measures on 5-6 minutes.opportunities 3-4 devices are selected):

1. Morning hygienic gymnastics 10-15 minutes, 12-15 exercises.
2. An improvingly-prophylactic gymnastic complex up to 25 minutes, 30-35 exercises on the average rate. A relation of respiratory and common-developing exercises 1:2-3.
3. The dosed walking (terrencur) 2-2,5 km in rates of 70-90 and 90-120 steps for minute.
4. Walking on stairs in rate 16-20 stairs for minutes (uprise) and 50-60 stairs for minutes (descent), 10-15 minutes with rest on the platforms.
5. Running on the spot in rate of 150-160 steps for minutes, slightly tearing away socks from a floor, 8-10 minutes.
6. Jogging - 8-10 minutes by an interval method (1-2 minutes) – running, 1-2 minutes – walking).7. The dosed sweaming in a basin at temperature of water 26-28° with initial rate 17 м/min. (possible reduce and increase of diapason 12, 5-29 m/min.), 6-8 times on 1-3 min.

8. Training on a velosimulator at power of a load 0,6-1,3 Vt/kg by an interval method, 10 minutes.
9. Athletic gymnastics on 6-8 simulators with a load of 35 % from an individual maximum of repetitions (2 approaches) and 50 % (one approach).
10. Rhythmic gymnastics with magnification of an initial pulse rate at 25 %, 30-35 minutes.
11. Sports games in view of physical-sports interests (preferentially in pairs), 20-30 minutes.

Regimen of training:

1. General air baths in rest at room temperature 25-20° (40-50 minutes at 25°, 10-15 minutes at 20°) or with physical exercises of small intensity at temperature 19-16° 8-10 minutes
2. Bathing in the river or lake at temperature of water 25-19° (3-7 minutes at 25°, 1-1,5 minutes at 19°).

Improving sauna. At temperature in thermal-room 80° 3 measures on 5-6 minutes.

Recreational-improving regimen №2

- power-inputs at one-trip physical training - up to 300 kcal;
- energy level of physical exercises - 5-5,7 kcal/min., at height of a load - 9 kcal/min.;
- improving training 3 times for a week on 30-40 min.;
- training pulse rate «180 minus age (years)».

Devices of a motor regimen

(depending on a sex, age, physical-sports interests and opportunities 3-4 devices are selected)

1. Morning hygienic gymnastics 15 minutes, 20 exercises.
2. An improvingly-prophylactic gymnastic complex 30-35 min., 30-35 exercises in the average and accelerated rates (including with dumb-bells, stuffed balls of 2-3 kg). A relation respiratory and general-development exercises 1 : 3-4.
3. The dosed walking (terrencur) 3-4 km in rates of 90-120 and 120-140 steps for minute.
4. Walking on stairs in rate 30-35 stairs for minute (uprise), 80-90 stairs for minute (descent), 20 minutes.
5. Running on the spot in rate of 160-170 steps for minute, lifting a femur up to 45°, 10-15 minutes.
6. Jogging 10-15 min. by an interval method (2-3 minutes – running, 45-15 sec. – walking).
7. The dosed sweaming in basin at temperature of water 26-28° with initial rate 25 м/min. (possible reduction and magnification in a diapason 21-37,5 м/min.) 6-8 times on 1-3 min.
8. Training on a velosimulator at power of a load 1, 1-1,9 Vt/kg by an interval method, 15 minutes.

9. Athletic gymnastics on 8-10 simulators with a loading of 60 % from an individual maximum of repetitions (2 approaches) and 75 % (one approach).
10. Rhythmic gymnastics with magnification of an initial pulse rate at 50 %, 20-30 minutes.
11. Sports games in view of physical-sports interests (preferentially the single), 30-40 minutes.
12. Short-range tourism of of 15 km for one time on a month.

Regimen of training:

1. General air baths in rest at room temperature 25-20° (60-70 minutes at 25°, 15-20 minutes at 20°) or with physical exercises of small intensity at temperature 15-12°, 8-10 min.
2. Bathing in the river or lake at temperature of water 23-16° (6-9 minutes at 23°, 1-5,2 minutes at 16°).

Improving sauna

At temperature in thermal-room 90° 3 actions on 5-6 minutes.

Recreational-improving regimen №3

- Power inputs at one-trip physical training - up to 400 kcal;
- power level of physical exercises - 7, 5-10 kcal/min. at height of a load - 12 kcal/min.;
- improving training 3 times for a week on 30-40 minutes, in separate kindes - 45-60 minutes;
- training pulse rate «170 minus 0,5 of age (years)».

Devices of a motor regimen (depending on a sex, age, physical-sports interests and opportunities 3-4 devices are selected)

1. Morning hygienic gymnastics 20 minutes, 20-25 exercises.
2. An improvingly-preventive gymnastic complex 40 minutes of 40-45 exercises of the increased intensity, including with dumb-bells, stuffed balls of 5-6 kg, espander. A relation of respiratory and general-development exercises 1 : 4-5.
3. The dosed walking (terrencur) 5-6 km in rate up to 140 steps for min.
4. Walking on stairs in rate 50-60 stairs for min. (uprise), 110-120 (descent), up to 30 min.
5. Running on the spot in rate of 180-190 steps for minutes, lifting a femur up to 60°, 10-15 sec.
6. Jogging 15-20 sec. by an interval or variable method
with accelerations.
7. The dosed sweaming in basin at temperature of water 26-28° with initial rate 29 м/min. (possible reductions and magnification in a diapason of 25-42 m/min.), 6-8 times on 1-3 min.
8. Training on a velosimulator at power of a load 1,6-2,5 Vt/kg a continuous or variable method with accelerations, up to 20 minutes.

9. Athletic gymnastics on 10-12 simulators with a load of 75 % from an individual maximum of repetitions (2 approaches) and 100 % (one approach).
10. Rhythmic gymnastics with magnification of an initial pulse rate at 75 %, 10-20 min.
11. Sports games with physical-sports interests (including command), 45-60 minutes

Regimen of training

1. General air baths in linking with physical exercises of small intensity at room temperature 19-12 (15-20 min at 19°, 10-15 minutes at 12°) or in linking with physical exercises of medial intensity at temperature 8-11°, 8-10 min.
2. Bathing in the river or lake at temperature of water 22-15° (10-13 minutes at 22°, 2-3 minutes at 15°).

Improving sauna

At temperature in thermal-room 100° 3 actions on 5-6 minutes.

Control rules and dosage of phisical exercise. One of the main criteria for dispensing exercise and control over tren is the heart rate (HR) or pulse rate corresponding to a certain age . You can use the formula :
220 - (age in years) = (maximum pulse age)

Individual training heart rate is age :
(220 - age) x (% of maximum heart rate of age)

When training for improving physical security and training effect should be the first stage of a training course to bring your heart rate up to 55-65 % of maximum age . This pulse rate should continue to practice from 4 to 8 weeks.
When satisfactory exercise tolerance can proceed to the next - the second stage , equal to 65-75 % of maximum heart rate age .
Finally, after 15-16 weeks with adequate exercise tolerance can move on to the next - the third stage , equal 75-85 % of maximum heart rate age .
The transition from one stage to the training course depends on the sex, age , health status and individual response to stress.

The transition from one stage to the training course depends on r, age ,sex, health status and individual response on the loads !

Case study: a man 45 years old , begins regular < "^ lessons on the simulator . Its maximum age pulse : -220 - 45 = 175 beats per minute. '- ■ The first step is to bring the heart rate to 175 % x 0.65 = 113.75 or 114 .

The next step is to bring the heart rate to the level of 175 schl 0.75 = 131.25 or 131 .

Finally , the third stage : 175x0, 85 = 148.75 or 149 .

The higher the value of the pulse , the less training time

On the other hand , the smaller the value of the training rate, the more time is required to achieve the effect. Height friction ¬ ning physical qualities (strength, agility , flexibility and endurance) is provided by either increasing time dei ¬ quences load or increase the power load , or both , and others. Thus, we can raise the level of ascending fitness varying length and load capacity .

General appropriateness of changes of the functional state of an organism under influence of exercise loads of different intensity.

The positive influence of physical training is explained by action of systematic physical exercises on development of the structural and functional changes which are characterized by adaptic rearrangement.

Responses to physical loads do not transit completely: they are accompanied specific by detrusions (trophic processes) on the basis of which there is a magnification structural, energy, and, hence, and the functional resources of an organism.

It is necessary to distinguish changes of a morphological and functional state of an organism which arise immediately in conditions of an physical load and last only short time after its arrest, and such changes which are shaped owing to long employment by physical exercises and are maintained in an organism the long-term (months, years, tens of years). It is clear, that all these changes represent adaptic inherently reactions (F.Z. Meerzon, 1985). But also among them it is necessary to reveal 2 types of reactions, which adaptic "content" are essentially differed. In aspect of adaptation of organism up to conditions of an physical loads such reactions, which provide an opportunity of more effective exercise of muscular activity are especially important. Such reactions are reactions of activity economization of circulation and respiratory organs and as a result of reduction of inquiry to them from the side of neuromuscular system, which promptly renew its working capacity. Such reactions can be observed at the trained persons after performance of physical exercises. These are adaptic second-order reactions or «a negative phase» of reactions in especially physical comprehension of detrusions, which unlike from reactions during physical loads and right after it, do not reach of a before-working level.

In immediate organism reactions to a physical load it is necessary to distinguish 5 phases. First of them – is a phase of conditioned-reflex organism reactions, which precede to a load, preparing an organism to a following period of sharply growing inquiries to a metabolism, activity of circulatory and respiratory organs . The second phase – is a phase of working increase of reactions, which are observed during performance of physical load, - a level of which is reached with detrusions of functions of an organism, depends on quantity of a load and its allocation in time. The third and fourth phases – is renew of phase – cover a period from the

moment of the terminal of operation to homing detrusions of an organism to an initial level. In this period 2 recovery phases are distinguished: a phase of prompt renew and a phase of the delayed renew (we shall note, that, unlike other four phases, the border between these two phases of a recovery period is indistinctly expressed). The fifth, or negative, phase is characterized by reduction of reactions. It is an original terminating part of a recovery period and, at the same time, a phase, which means transition to a new qualitative state of an organism that leaves on a new level of functionalities.

Athletes and especially sportsmen differ from untrained persons much stronger reactions and more prompt reactions, analysis of each the phases of reactions reveal essential differences, which also depend from on a level of organism training.

The most important adaptic meaning «the negative phase» of reactions of circulation and respiratory has, and also a recovery rate strengthened during a load of reactions. These reactions shape the true differences of the functional state of an organism of sportsmen, which are maintained long time and can be observed during all life, i.e. tens of years. So, gradual, systematic "accumulation" of the negative phases of a circulation and respiration form bradycardia and hypotension in the trained persons, i.e. low frequency of systoles (FS) and low level of blood pressure.

Changes of function of circulation, respiration, system of a blood, excretion, digestion, immune and endocrine system under influence of optimum physical loads.

Systematic trainings result to opposite changes in activity of CVS. The rhythm of systoles, especially in sportsmen who are trained in the kindes of sports, which need hardiness (running, sweaming, ski and toboggan sports on the long distances), in a state of rest reaching quantities 40-50 and even 30-32 beats/min, a systolic pressure is reduced up to 95-100 мм. mercury column, diastolic till 60-70 мм. mercury column. The systolic volume of heart in sportsmen in a state of rest does not vary, or is a little increased due to a diastole that is in its turn caused by bradycardia. The minute volume of heart in a state of rest is decreased.

Systematic physical training result to magnification of VCL - from 3-4 l in untrained up to 6-7 l in sportsmen, power of an inspiration and an expiration - accordingly from 5-5,6 l/sec. up to 6-7,5 l/sec. The greatest magnification of these indexes characteristically for persons, which are trained at the long-term dynamic loads, i.e. on hardiness. At the same time frequency of respiratory motions is decreased and their depth is increased.

The volume of a circulating blood is decreased. The quantity of leucocytes and thrombocytes is increased. Blood pH is decreased. Transient loads increase a level of a glucose whereas long-term - are considerably reduced it. The long-term loads are increased a level of fatty acids and ureas in a blood.

At loads of the submaximal intensity, during which anaerobic processes of power supply predominate, removing by nephroses under-oxidated metabolic products - lactic, β-hydroxybutyric and acetoacetic acids is considerably increased.

In condition of intensity of muscle action the juice-secretory function of a stomach and an intestine is inhibited.

Under activity of systematic trainings the organism gets ability to more economical exhaust of hormones, which provide muscle activity of rather small intensity. Simultaneously power of endocrine system, which can provide a high level of catecholamines, glucocorticoids and a thyroxine in blood during of a load is increased. Trainings strengthen lipolytic activity of an adrenaline. In general, nervous-humoral regulation of an organism functions is considerably improved.

Employments by physical exercises, which spend according to functionalities of an organism are increased an immuno-biological reactivity, i.e. fortify protective powers of an organism.

Prepathological conditions and diseases at irrational occupations by physical training and sports: prophylaxis and treatment.

Occupations by physical training and sports protect health only when they are carried out rationally, with optimum loading, in corresponding hygienic conditions, etc. In other words, that the physical training and sports carried out the improving meaning, it is necessary to observe the certain conditions. These conditions consist, first of all, in absence of a physical and emotional overload, strictly individualization of physical loading and its optimality, steady observance of a regimen of day and a meal, etc. Though all these conditions are well-known to trainers, sportsmen and doctors, they are not always carried out. However, if before an error in performance of these conditions had seldom an adverse effect on sportsman’s health as training loadings were insignificant at present time in connection with high training loadings of modern sports, non-observance of these conditions can transform occupations by sports into the contrast and to become the reason of a various sort of diseases and the injuries reaching sometimes up to a degree of incompatible with life.

That's why according to data of various authors, from 20 up to 50 % of sportsmen require this or that kind of treatment. Certainly, it is not heavy chronic diseases, however even for small defects in a state of sportsman's health today is necessary to attach significance in view of modern training they are seldom the reason of development of the heavy diseases putting the sportsman out of action.

The reasons of occurrence of disease in sportsmen it is necessary to divide into two big groups: not connected to occupations by sports and connected to occupations by sports.

To the reasons which have been not connected to occupations by sports all influences of an environment – epidemics, cooling, various infections, etc. **concern**. Naturally enough, that any sportsman has influence of these factors. However reaction of sportsman's organism to these factors, taking into account peculiarities of a condition of his health, physical development and a functional condition, has known differences from reaction of the persons who are not engaged in sports. There is a certain originality as in conditions of occurrence of usual diseases in sportsmen, and in character of their current, that naturally demands also other treatment, quite often peculiar obliteration of clinical picture in sportsmen is the reason of medical mistakes. Besides the originality of occurrence and current of the most different diseases in sportsmen with a various orientation of training process is well-known.

The second, the greatest group is made with the reasons connected to occupations by sports. This group can be divided into two groups. The reasons dependent on the wrong organization of training process, irrational use of means and methods of training, absence or an insufficient individualization of a degree of the physical loading resulting in an overload and an overstrain concern **to the first group**. The reasons when diseases in sportsmen can arise and at the correct organization and a technique of training **enter into the second subgroup**, but under certain conditions.

In the first subgroup of the disease reason can be connected to disturbances of doctor's instructions and the trainer concerning a regimen. Modern training demands from the sportsman of strict and steady performance of a regimen of training, rest, a regular and sufficient meal. An essential place in this group of the reasons harmful habits – are smoking and alcohol. In the foreign sports-medical literature it is possible to find the description of cases of sportsmen' sudden death on a marathon distance after drinking of cognac on distance, occurrence of acute heart attack of myocardium at sprinter run after intensive smoking before start.

The combination of intensive training with hard work or study concerns to the same group, in particular with examinations at students that is negatively reflected in a condition of nervous system of the sportsman. It is impossible to consider sports preparation or competition during session as active rest. It is not necessary to forget, that intensive brainwork demands a

huge pressure of all organism, all its systems and organs, it is well-known, for example, that the chess player at an intense party loses some kilograms in his body mass.

In a basis of trainer's actions able to promote occurrence of disease at sportsmen, the wrong organization and the technique of training creating conditions for occurrence of an overload and an overstrain lay. To them concern: infringement of principles of didactics, i.e. sequence and availability of exercises; wrong planning of trainings when dynamics of increase of physical loading outstrips sometimes growth of a level of a functional condition; absence of gradualness after breaks in training; neglect the general physical training, monotony of loading; a wrong combination of work and rest; the early beginning of trainings after illness. The main thing is the insufficient individualization of the loadings creating conditions for an overload of sportsman's organism.

Any fatigue and especially overfatigue is a favorable background for development of various diseases, i.e. is a prepathological condition.

At sportsmen at a physical and emotional overload conditions ***of fatigue, overfatigue and overstrain*** can take place.

Fatigue **– represents physiological reaction to loading and passes after the certain rest. Distinguish three degrees of fatigue (weak, mild and expressed). It is clinically shown by hyperemia of integuments, perspiration, tremor of extremities and disturbance of movements coordination.**

Overfatigue **– represents an extreme degree of fatigue. This condition besides long rest demands use of various regenerative actions.**

Overstrain **– is shown by precise and concrete changes in various organs, and is usual separately in any one organ, and sometimes simultaneously in various organs. The overstrain of heart, kidneys, blood, bones exists and is investigated enough.**

Overtraining – is **overstrain of central nervous system (CNS) or a neurosis of various degree of expressiveness.**

The basic function of the doctor of sports medicine is maintenance of the control over a state of health of sportsmen and athletes, treatment of these diseases and preventive maintenance is possible early revealing of the prepathological conditions connected to irrational employment{occupations} by sports, overdose of loading, occurrence of somatic diseases.

Among pathological conditions we distinguish the following:

1. Overtraining is a pathological condition which clinical picture is defined with functional disorders in central nervous system (CNS).

Pathogenesis: Overtraining develops as a result of summation of repeatedly arising overfatigue. In a basis the overstrain of processes of excitation and inhibition in a cerebral cortex that allows

to decide pathogenesis of overtraining similar to pathogenesis of neurosises lays. In the process of overtraining development the neuroendocrine system has essential meaning (hypothalamus, hypophysis, adrenal cortex) in the expressed cases of reduction of their function (similar to a syndrome of stress on Selyo) results in disturbance of regulation of internal organs and visceral disorders.

Clinical picture: In clinical practice 3 stages are distinguished, and they proceed at children's and youthful age more seriously.

The 1st stage is characterized by absence of complaints or complaints to disorder of sleep, reduction in productivity.

Disturbance of the most thin coordinations of movement and deterioration of cardiovascular system adaptability to high-speed loadings (tremor of extremities, increase arterial pressure, more expressed increase of pulse by pathological types of reaction to loading) is objectively determined. The sportsman instead of rest strengthens training that aggravates position.

The 2nd stage is characterized by numerous complaints, functional changes in internal organs, reduction in sports work capacity. Apathy, flaccidity, sleepiness, nervousness, increased emotions, fear, unpleasant sensations in the region of heart are prevailed among complaints.

Objectively the pallor, the sunken eyes, bluish color of lips, disorder of sleep, appetite, symptoms of vegeto-vascular dystonia (prevalence of sympathocotonia, less often is vagotonia) are revealed. On EEG (electroechography) – decrease in amplitude of a background a-rhythm. On ECG (electrocardiogram) – acute sinusal arrhythmia, extrasistole, atrioventricular blockade of the 1st degree. At carrying out of functional tests – pathological types of reaction of cardiovascular system on loading. Reduction of VCL, the maximal pulmonary ventilation. On the side of locomotor system – reduction of elasticity of ligaments, elasticity of muscles, disturbance of coordination of movements. The basic metabolism is increased; the carbohydrate metabolism is broken due to decrease of blood sugar.

Functional disturbances in an organism result in reduction of immunity and development of infectious diseases.

The 3rd stage is characterized by sharp deterioration of sports results and can be as two forms – basedolike and addisonolike.

The first form is similar to hyperthyroidism, at the addisonolike form there are no specific features, but there is a bradycardia and installation of arterial pressure on the low borders of norm.

Treatment: Overtraining the most easy gives way to treatment in the 1st stage, it is worse in the 3rd stage that emphasizes necessity of early diagnostics. The necessity for interruption of

trainings does not present in the 1st stage, however the sportsman is removed from competitions, the regimen of trainings is facilitated till 2-4 weeks, or take up other loading, massage, sauna, vitamins are prescribed.

In the 2nd stage the regimen of trainings also is facilitated or removed from trainings for 1-2 weeks and active rest is appointed, massage, sauna, vitamins are appointed also.

In the 3rd stage of overtraining the training is necessary to stop for 1-2 months. 15 days from them are removed on full rest and treatment which should be spent in clinical conditions. After that to the sportsman active rest is appointed. Training includes gradually within 2-3 months + medicamentous treatment, vitamins, minerals water procedures, physiotherapy, massage.

Prophylaxis is under construction on elimination of the overtraining reasons. Severe individual loading, treatment of the chronic centers of an infection, mental traumas, intoxications, a regimen of study, work, rest, a meal.

The prognosis of overtraining in the 1st stage – without consequences, in the 2nd – 3rd stages can lead to long decrease in sports work capacity.

Acute and chronic physical overstrain (APO) (CPO).

The acute and chronic physical overstrain is etiological factor causing development in heart of myocardium dystrophy and necrosis in rare cases, haemorrhages in myocardium and myocarditic cardiosclerosis.

In pathogenesis of acute physical overstrain the theory in which the leading place in development of myocardium injury and dystrophic processes has BHC experimentally proved. Thus the great meaning is given to toxico-hypoxic influence of catecholamines excess on myocardial cells (G.F. Lang, 1938; I.M. Isakov, A.A. Butchenko, etc.). In pathogenesis APO and CPO has meaning the changes in CNS (central nevous system), endocrine system, and also hypoxemia, hypoglicemia, spasm of the coronary vessels, developing at overloadings.

Clinical picture of APO – acute dystrophy of myocardium is developed after physical overloading or during its performance there is acute fatigue, vertigo, dyspnea, palpitation, heavy feeling and pressure in the field of heart, muscular weakness, quite often a nausea and vomitting. In heavy cases loss of consciousness and acute cardiac insufficiency. In cases of development of haemorrhage in a cardiac musle (heart attack) – there is appeared acute pain in the field of heart, cyanosis, cold sweat, falls down arterial pressure, dyspnea and pulsation of jugular vein.

On an electrocardiogram – diffuse changes in a myocardium of ventricles, sharp arising impression of wave T, P, lengthening of an electric systole and atrioventricular conductivity, disturbance of heart rhythm: extrasystole, incomplete blockade.

Treatment: passive rest and cardiac medicines (cordiamin, caffeine, metabolic agents, vitamins). Within 1-2 weeks – absence of trainings, active rest, exercise therapy).

At *acute cardiac insufficiency is prescribed* ***0,05 % strophanin solution, glucose, 2 % promedol solution, 0,1 % atropine solution, 0,2 % platyphyllin solution + oxygenous therapy. In case of occurrence of a heart attack – it is necessary treat as a heart attack with subsequent prescription of exercise therapy.***

Disturbance of respiratory organ at APO:

Acute emphysema – arises at physical overloading on a background of cooling of an organism (in winter kinds of sport). Emphysema conducts to acute cardiopulmonary insufficiency. In some cases can develop acute spontaneous pneumothorax. Tactics is urgent hospitalization.

Disturbance of kidneys – it is appeared protein in the urine, regular elements, a red-brown deposit. The reasons of it: hematuria because of the increased permeability 0f renal epithelium in connection with toxic influence on epithelium of renal vessels of a lactic acid; haemorrhages in renal parenchyma – renal infarction; hemoglobinuria in connection with intravascular hemolysis at an overstrain or overcooling of an organism that conducts to pigmentary renal nephrosis. It is a rare pathology and it happens as at adults, and young sportsmen; myoglobinuria is at a trauma of muscles – it is characterized by an output of myoglobin in blood, occlusion of renal small channels, azotemia, nephrosis, acute renal insufficiency.

Disturbance of blood system – under influence of APO can develop intoxicational phase of myogenic leukocytosis which is shown by substantial growth of leukocytes number in peripheral blood up to 30-40 %, increase in amount of neutrophiles with shift to the left, absolute reduction of lymphocytes and full disappearance of eosinophiles. At the expressed degree of acute physical overstrain increase in leukocytes up to 15x10 in 9 degrees and sharp shift to the left with the appearance of degenerate forms reflects a high degree of a pressure of hemopoietic systems during physical overloadings, simultaneously changes in hemopoietic organs demand the immediate discontinuance of loadings before full restoration and full inspection.

The PROGNOSIS: after unitary APO of heavy or not heavy degree of work capacity expressiveness is reduced for long time.

Disturbance of heart at a chronic physical overstrain.

At CPO as a rule myocardiography or myocarditic cardiosclerosis are developed. And CPO is more often developed at sportsmen training in the kind of sports on endurance (8-11 %), than at others (4-6 %). It is distinguished the I, II and III stages of a myocardium dystrophy at sportsmen.

The I-st stage is characterized by decrease in amplitude of wave T, isoelectric, two-humped wave TV1>TV6, displacement downwards of interval ST.

The II-nd stage is characterized by terminal inversion of wave T, displacement of segment ST.

The II-rdI stage is characterized by acute coronary insufficiency with expressed increase of ST and with terminal inversion of wave T.

Thus the functional condition of cardiovascular system is changed insignificantly. Complaints of the general character to deterioration of sleep, reduction in appetite, decrease in sports work capacity.

And at 25-50 % – the foci of a chronic infection, at 75 % – signs of НЦД, at 17-21 % – disorder of a cardiac rhythm are observed.

Treatment:

The I-st stage – it is out-patient. Participation in competitions is forbidden, training loading is decreased and qualitatively changed, for 2-4 weeks force and static loadings are limited; medicines, correcting functional condition of central nevous system (contrasting shower, extract of a valerian root), carbohydrate-mineral drinks, dried apricots, raisins, baked potato, medicines are prescribed depending on medicamentous test – КС1 (1-st group x 3 times for 2-3 weeks, β-blockators – inderal on 10-20 mg 2-4 times in a day during of 7-14 days; isoptine, corinfar – 80-100 mg 3 times in a day, metabolic medicines, vitamins, exercise therapy, massage, physiotherapeutic procedure.

The II-nd – III-rd stages are treated in a hospital.

The prognosis – at the I-st stage – favorable, it will come recovery in 2-4 months, the II-nd – III-rd stages – the prognosis is individual, in some cases it is transition in cardiosclerosis and disqualification of the sportsman.

Urgent conditions in sports:

1. A syncope – acute disturbance of a tone of brain vessels, or because of short-term cardiac arrest and change of cardiac emission.
2. A gravitational shock – at a sudden stop after intensive loading (sharp change of return of blood for heart).
3. Orthostatic collapse – after sharp change of position of a body due to reduction of venous return to heart.
4. A phenomenon of static efforts (strain) – at weight lifter because of sharp increase of intrachest pressure and reduction of inflow of blood to heart that results in an asphyxia and loss of consciousness. It is still observed at boxers at a punch in a solar plexus.

5. Reflector cardiac arrest at a knockout at boxers, at football players at reception of a ball on a breast.
6. The symptom of a coronary sinus at a sharp punch in a neck in boxing, wrestling, at falling, thus reduction of arterial pressure up to zero and refletor cardiac arrest is observed.
7. A painful shock.
8. Hypoglicemic shock (in the kind of sports on endurance).
9. A heatstroke.
10. Hypnotic conditions (loss of orientation).
11. Arrhythmia.
12. Spontaneous pneumothorax conducts to a painful shock (winter kinds of sport).
13. Gastric spasms (runners – at diarrhea).
14. Tonsillo-cardiac syndrome (pains in heart).
15. Hepato-cardial syndrome (acute pains in the field of liver).
16. A hysteria.

The foci of chronic infection and their meaning in sports medicine.

FCI (a chronic tonsillitis – 50 % of sportsmen, caries of teeth – 8-46,3 %, chronic cholecystitis – 25-40 %, chronic maxillary sinusitis, otitis, sinusitis, bronchitis, adnexitis).

The chronic foci of infection render the negative influence on a state of health of the sportsman and the functional state of an organism, can result to development of a tonsillo-cardial syndrome, a reflector stenocardia, a dystrophia of a myocardium, to immunodeficiencies, extrasystole, to disturbance of a rhythm, vegeto-vascular dystonia, hepatocardial, cholesistcardial syndromes.

Except for that at decrease of immunity of the chronic foci of an infection are activated and promote to development of fatigue and overstrain, worsen acclimatization to a physical load. The Federation of sports medicine has lead a symposium and has decided:

1. At MC to reveal the chronic foci of an infection first of all, carrying out additional examinations (otholaringology, a radiographic analysis, USR, etc.).

2. At complaints of the sportsman to a growth inhibition, decrease of sports results, frequent overstrain of heart – it is necessary to find the foci of chronic infection.

3. To carry out conservative and operative treatment the chronic foci of an infection. It is impossible to suppose the sportsman to trainings.

4. Examination by the stomatologist 1 time in 4 months, an otholaringologist – 1 time in 6 months, theraputist – monthly with the check of hepatic and renal tests.

5. Prophylaxis of the chronic foci of infection (an irrigation of fauces, etc.)

6. The active treatment.

7. Prophylaxis of caries.

8. Chronic adnexitis, cholecystitis and other diseases is necessary to treat in a hospital, if it is necessary – operative treatment.

Concept about "physiological" and «pathological sports heart»

The major consequence of systematic training is an increase of heart mass – hypertrophy of a myocardium. A rate of relaxation of a myocardium after its contraction is increased, specific elongation of a diastole during which recovery processes transit especially intensively and also an energy amplification of mitochondrions of a myocardium owing to what process of a metabolism in cardiomyocytes, which get properties normally is considerably accelerated to function in conditions of ischemia and a hypoxia – all it is included into concept of "physiological sports heart».

«Pathological sports heart» – it is disturbance of a rhythm of cardiac activity in the form of sinus arrhythmia, a rigid rhythm, extrasystole and atrioventricular blockage, dystrophia of a myocardium.

Cardiac arrhythmias occur ¬ completely unequal duration of cardiac cycles, excessive increase or urethral zhenii heartbeat . Cardiac arrhythmias and include ' changes in the sequence of excitation or reduction ; of the heart .Isolated arrhythmias due to: Mr. A) violations Education pulse ; B) impulse conduction disorders ;B) combined education and violations of the pulse.Experimental studies and clinical observationsshown (Fogelson LI et al , 1981; Doschitsin VL, 1982), thatMain pathogenetic factor of cardiac arrhythmia isdefeat various departments actually conducting system| Heart. Arrhythmias and heart block occurs in lesions. sinus node , atrial beams beams connectingsinus node to the atrioventricular , cell - atrioventri' / Field perpendicular to the compound bundle branch block , his legs and branching' / * As well as the appearance of automatic foci throughoutcardiac conduction system . The reason for these changesoften a past infection , intoxication,overvoltage, endocrine and metabolic disorders .

All cardiac arrhythmias divided into " cardiac " (focal and diffuse myo carditis , myocardial dystrophy due to chronic physical overtrain 30-40% , congenital anomalies or features of the conduction system of the heart -extrasystoly, parocsizmal tachycardia genetically deterministic cardiomyophaty with arrhythmia - Ehlers - Danlos syndrome , undifferentiated connective tissue syndrômes, hereditary mitral valve prolapse) .To extracardiac factors arrhythmias include various foci of chronic infection (chronic tonsillitis , sinusitis , otitis media , dental caries , chronic cholecystitis, biliary tract dysfunction , gastritis, colitis , etc.), various disorders of the endocrine system (violation hundred of menstrual cycle), inflammatory diseases of the genitals , and allergic diseases

.In the pathogenesis of cardiac arrhythmias is important and vegetative nervous system, . the amplification effect on the vascular system of the heart simpathetic and parasympathetic parts it may occur certain arrhythmias . So according Motylyanskaya RE , 1969, a significant increase in vagus nerve tone in athletes , endurance athletes are often observed cases of ectopic arrhythmias . . Rhythm disturbances may occur during unpleasant emotions and stressful situations . .

Clinic: Clinically cardiac arrhythmias in athletes characterized by signs of general fatigue and overload , the ECG often extrasystoly, interval does not exceed 0.1 seconds (Isakov II, NA Mazur , 1978). Disappearance of arrhythmias after exercise indicates exocardiac their origin..

The least studied group of arrhythmias in athletes is new group with impaired cardiac automaticity , which according to Dembo AX is 2/ 3 of all arrhythmias. Migration pacemaker and various options atrial rhythm on an ECG with registrate different forms of P wave , as well as fluctuations in interval of PQ and severe arrhythmia (fluctuation intervals P-P and RR. Arrhythmias such as preexcitation syndrome (WP V - syndrome) , early repolarization syndrome , sick sinus syndrome are less common and is accompanied by tachycardia or bradycardia may occur or not occur clinically , but only on an electrocardiogram . When setting dia gnosis o need to focus on the full clinical data , including the life and sports anamnes , the results of various functional tests (study of the physical health of the heart) .
.It should be emphasized that athletes with arrhythmias ekonomiseted effect reduced the effect of training and often a decrease in myocardial contractility , which greatly reduces the sportsefficiency
.Prevention: to be integrated and be the prevention of exposure to the etiological factors –focus of chronical infections . It should include systematic monitoring regime for young athletes and nutrition , , preventing overload and overtrain. Strictly prohibited training and competition in a sick state .

Chronic disturbances and overstrain of a locomotor system

During playing of sports there are very often disturbances of muscles and muscular-ligamentous system: microdisturbances, a particulate disrupture, the full disrupture, an acute muscular spastic stricture, myalgie, myogelosis, myofibrosis, neuromyositis, ossifying myositis, paratenonitis, tendinitis, tendovaginitis, myoentesitis, bursitis. The most wide-spread diseases of joints, which are met in sportsmen is arthritis (synovitis), periarthritis and arthrosis.

Diseases and disturbances of nervous system.

Diseases and disturbances of the nervous system in sportsmen can be divided into organic and functional. Among functional the significant place is occupied neurosises. Organic disturbances of the nervous system include diseases and traumas of CNS. In sportsmen diseases of peripheral nervous system are more often developed.

Diseases of an ear, throat and nose.

Among diseases in sportsmen it is possible to reveal such as: 1) group of acute respiratory infection (acute catarrh of the upper respiratory tracts, acute pharyngitis, pharyngolaryngitis); 2) angina and angina-like diseases; 3) acute and chronic otitis.

Diseases of a digestive system.

Studying of the functional state of a digestive system has matters mainly for an estimation of a level of health of sportsmen. Disturbance of function of a digestive system are

observed at chronic gastritis, peptic ulcer, etc. Such diseases as the peptic ulcer of a stomach and a duodenum, chronic cholecystitis in sportsmen meet enough often.

Diagnostics of the functional state of a digestive system is based on a complex application of a clinical (anamnesis, examination, palpation, percussion, auscultation), laboratory (chemical and microscopical examinations of a stomach contained, a duodenum, a gallbladder, an intestine) and instrumental (radiological and endoscopic) research techniques. At present time there are more widely carried out intravital morphological examinations with use of a biopsy of organs (for example, a liver).

Disturbance of function of a digestive system is one of the frequent reasons of reduction of sports working capacity.

Acute gastritis is developed normally owing to an alimentary toxinfection. Disease proceeds acute and is accompanied by the strong pains in an anticardium with a nausea, vomiting and diarrhea.

Chronic gastritis is the most spread disease of a digestive system. In sportsmen it is often developed as a result of intensive trainings on a phone of disturbance of a balanced diet: the irregular reception of meal, the use of unusual nutrition, spices.

The peptic ulcer of a stomach and duodenum is the chronic relapsing disease developing in sportsmen as a result of distresses of the central nervous system and hyperfunction of system «a pituitary body – a cortex of adrenals» under influence of the major psychoemotional strains related to competitive activity.

Quite often at examination sportsmen show complaints to pains in the field of a liver during performance of physical loads that is diagnosed as exhibiting of a hepatic-painful syndrome. Pains in the field of a liver arise as a rule during performance of the long-term and intensive loads, have no harbingers and have an acute character. Quite often they happen dull or constantly aching.

Objectively at the majority of sportsmen the increase of the dimensions of a liver is revealed. Thus its edge acts from under a costal arc on 1-2,5 sm; it is obturated and painful at a palpation.

Prophylaxis of diseases of a liver, gallbladder and biliferous tracts is related in the main with observance of feeding schedule, basic positions of a regimen of trainings and an able-bodied lifestyle.

Diseases of urinary system.

Principal organ of excretory system are kidneys. Urinary tracts consist of ureters, a bladder and a urethra.

With urine from an organism are output all nonvolatile yields of a metabolism a subject removal and stranger matters, by that or other way arrived in an organism

From diseases of kidneys sportsmen have acute and chronic nephritises, nephrolithiasis, etc. Infectious diseases (angina, rheumatic disease, scarlatina, pharyngitises, etc.) normally precede diseases of kidneys and play the leading part in their development. The basic pathogen of diseases of kidneys is the hemolytic streptococcus. In sportsmen essential meaning has the factor of cooling.

Acute diffuse glomerulonephritis is characterized by edemas, disturbance of urination, pathological changes of urine (oliguria, proteinuria, hematuria) and hypertonia. The prognosis is more frequent a favorable; it depends on the early recognition and the correct treatment.

Chronic diffuse glomerulonephritis rather often is consequence of acute nephritis, which didn't cure completely. The prognosis depends on that, as far as early the chronic renal failure is developed. Therefore that who suffers by chronic diffuse glomerulonephritis, playing sports are counter-indicative, however it is authorized to be engaged in improving forms of physical culture.

The nephrolithiasis is related to formation of stones in renal pelvis, in a bladder. Disease sometimes proceeds asymptomatically, normally is accompanied by blunt or acute pains in the field of a lumbus; pains irradiate in a testicle, genital organs, an inguen, a femur on a conforming leg; one of exhibitings of disease is the hematuria. The attack of a renal colic as a rule arises at a physical strain, jolty driving; pains happen so strong, that their elimination demands injection of narcotics. The prognosis by way of sports perfection is doubtful, as physical exercises are the factor provoking a renal colic.

Hemoglobinuria – a finding in urine of the free colorant of hemoglobin – is sometimes observed at cooling and action of an excessive physical load. Eductions of a hemoglobin with urine are attached it brown colour.

Myoglobinuria – it is eduction with urine of a muscular pigment of myoglobin. Now the expressed myoglobinuria is regarded as a heavy disease.

As a reason of myoglobinuria the burning, a freezing injury, an operative measure, a poisoning with carbon monoxide can serve also. For myoglobinuria as a rule the poor state of health, weakness, increased temperature of a body, leukocytosis, brown or black urine is characteristic.

Disease and disturbance endocrine system.

Endoexocrine glands are concerned to endocrine system: a pituitary body, an epiphysis, thyroid, parathyroid, goiter, pancreatic, epinephral and genital glands. Its combine a generality of a role in a regulation of function of an organism.

The physical load demanding essential change of intensity of metabolic processes not only in heart and skeletal muscles, but also in all organisms, is accompanied by the significant changes of secretion and concentration of some hormones.

One of the first reacts to a physical load medulla of adrenals that is developed in acute increase of secretion of catecholamines – adrenaline and noradrenalin.

At a physical load changes of concentration in a blood of an adrenal hormone of Hidrocortizonum, and in urine – its metabolites are natural.

At the long-term hard work the significant role in maintenance of muscular contractions of energy play hormones participating in a regulation of metabolism of carbohydrate and fats: insulin, glucagon, Somatotropinum.

Diseases of endocrine glands are more often happened as a result of a tumoral lesion, destruction or a dystrophia of a gland and are developed by the characteristic changes in appearance of the patient and the disbolism, the caused excess or a deficiency of a conforming hormone in an organism. Less often a disease can be a result of disturbance of functioning of receptors in tissues.

Endocrine diseases are rather rare, and in the sportsmen, who are exposed to takeoff, are met extremely seldom. Nevertheless it is necessary to mean, that more often others there is a diabetes mellitis (a lesion of a pancreatic gland), Basedow's disease (a lesion of a thyroid gland), acromegalia and its variant a gigantism (a lesion of a pituitary body), hyper-and a hypocorticoidism (a lesion of a cortex of adrenals), pheochromocytoma (a lesion of a medulla of adrenals).

Originating of endocrine disease allows to suspect occurrence of the characteristic symptom-complex erected at interrogation and examination and confirmed by objective methods of research – measuring of a BP, an electrocardiography, a radiographic analysis, change of standard metabolism and in particular examination of concentration of blood of hormones, and in urine of their metabolites. The modern researches of hormones (the chromatography, a spectorphotometery, fluorometry, radioimmunoassay, an enzyme immunoassay) in a combination with loading assays enable precisely to erect a level of a primary lesion of endocrine system – subthalamic, pituitary or peripheral.

Examinations of hormones allow finding out also increase of a level of hormones of the exogenetic character, the caused injection of hormones from the outside (for example, reception of a dope). Abuse by drugs-hormones is not only disturbance of sports ethics, but also action

harmful to an organism, which can break normal functioning of endocrine system, in particular leads to a lesion of hypothalamic-pituitary-sexual mechanism.

Physiological mechanisms of recovery processes

Recovery of sports working capacity and normal functioning of an organism after training and competitive loads – the integral component of correctly organized system of sports training no less important than a rational regimen of loads.

Physical load is accompanied by the certain functional and structural changes of an organism underlying in the basis of fatigue. The fatigue – is the natural physiological phenomenon, consequence of the done work - it is characterized by development of feeling of weariness, temporary deterioration of metabolism, regulation, functioning of the basic physiological systems, reaction to load, decrease in power stocks, and the general and special working capacity.

Recovery during the work is distinguished: early recovery and later recovery. From two the most important physiological characteristics of regenerative process, which are necessary for considering at selection and a dosage of means, recovery, it is necessary to name non-uniformity of its current and heterochronia.

Ability of an organism to recovery trained: not casually speed of recovery – one of the basic diagnostic criteria of an estimation of reaction to load and a level of training. The opportunity of the active directed influence on current of regenerative processes for the fastest elimination of feeling of the weariness, of caused loads of structural and functional changes in an organism that serves by one of effective control facilities preparation of sportsmen is proved.

The basic way of optimization of regenerative processes is a rational training and a regimen, a healthy way of life, observance of rules of hygiene. Natural current of recovery to fastening and hardening of regenerative processes, increase of stability and resistibility of an organism, the prevention of overstrain is promoted by some special auxiliary means.

A meal as the factor of recovery of working capacity.

In a complex of medical means of recovery the big relative density belongs to a specialized meal of sportsmen.

A meal – is the most important natural means of completion of plastic and power expenses of an organism at physical loads, and consequently, means of its the fastest recovery.

According to the modern theory of the balanced meal, for maintenance of normal ability to live and working capacity in an organism of the person with food the quantity of energy

should act necessary, corresponding to power expenditure. It is not less important to provide thus and correct mutual relation of various components of a meal, including irreplaceable, the substances, are not developed by an organism and physiological processes necessary for normal current.

Quantity, structure and caloric content of a meal should satisfy completely power and plastic inquiries of an organism, provide normal regulation of physiological functions by means of biologically active substances according to features of a kind of sports, weight of the sportsman, a concrete regimen of training and a size of load. If caloric content of a meal below, than power consumption, the recovery period is delayed, that can lead to a gradual exhaustion of an organism. Excessive caloric content conducts to an overload of an organism, addition of weight of a body, difficulty of digestion and by that also breaks normal current of regenerative processes.

Qualitative structure of a meal is no less important, a proper correlation of its various components, flavoring properties and ways of cooking, rational frequency rate of a meal and the sufficient period of time between reception of food and physical load.

For the fastest recovery in training cycles with big loads and especially during competitions it is expedient to increase caloric content of a meal on 5-10 % and quantity of a liquid.

In the regenerative period especially important receipt in an organism with food of enough quantity of protein as a basic source of plastic maintenance of bodies and tissues.

Recovery is stimulated with amino acids a part of proteins, first of all glutaminic acid, lypoprotein-methionine, choline.

Fats and carbohydrates – are the important energy sources and consequently their rational quantity and a ratio as have very great value for normal current of regenerative processes.

For increase of glycogen stocks in a liver and muscles is very important at 24-28 hours the nearest after load to enrich a diet of the sportsman with carbohydrates.

The light-assimilable carbohydrates (honey, fresh vegetables and fruit) promote to recovery.

No smaller value for the fastest recovery of an organism after physical loads has its saturation by mineral substances, mainly calcium, phosphorus, sodium, magnesium, iron. These substances play the important role in regulation of processes of metabolism in muscles, a head brain, a myocardium, in formation of enzymes and vitamins, assimilation of proteins by an organism, transportation of oxygen, strengthening of a bone tissue.

In the nearest regenerative period it is very important to enrich an organism with substances of alkaline character, that it is possible to provide due to mineral waters (especially Borzhomy), fresh vegetables and fruit.

Medical and biologic ways of recovery and stimulation of physical working capacity.

At use of regenerative means integrated approach is important. It is necessary to pay attention to compatibility and a rational combination of used means. Thus it is necessary to consider, that some means strengthen action of others and, on the contrary, some of them weaken or at all to level effects of other means. Essential value has also a correct combination of means of the general and local influence.

Means of the general influence (bathes, shower-bathes, aeroionization, ultra-violet irradiation, massage, hyperbaric oxygenation, vitamins, medical products, a meal) possess a wide range of nonspecific common-roborent effect, and adaptations to them comes more slowly, than to local influences.

Means of local influence are appointed at primary load to the certain groups of muscles, the general – at works of great volume and intensity, when the fatigue has global or regional character.

Mutual relation between medical products also has complex character. The combination of some means can lead to essential change of pharmacological dynamics and change character of influence to an organism. There are cases and direct pharmacological incompatibility.

Speed of regenerative processes, sensitivity some means are connected with specific features of an organism of the sportsman. So, individual distinctions in ability to recovery even at an identical level of training are known. Some sportsmen even in a condition of good training are slowly restored.

It is necessary the confidence of full harmlessness of applied means concerning a metabolism and for activity of neuro-endocrine mechanisms, to metabolic activity.

Only the doctor well knowing features and a condition of each sportsman both having special preparation and sufficient experience, has the right to resolve medicinal and some physical influences on an organism.

Regenerative means should be used in full conformity with a kind of sports, tasks and a stage of training, character of the executed and forthcoming load.

By sports practice it is proved, that with a view of expansion of functionalities of an organism and achievement of a new, higher level of working capacity carrying out of the next training on a background of not completed restoration is periodically admissible.

Regenerative actions should be included in a general plan of sportsmen' preparation in close connection with a training regimen, to reflect them in diaries of self-control, to check efficiency by means of methods of the pedagogical and medical control, observations over health, state of health, working capacity, a condition of the basic functional systems and reactions of an organism to physical activity.

The characteristic of biologically active substances.

To pharmacological preparations that are used in a sports practice, preparations of the general action are concerned: coenzymes, preparations of soft action, ergotropic substances, adaptogenes and antioxidants. Separate group of pharmacological preparations of recovery are concerned preparations, which improve a function of separate organs: a liver (hepatoprotectors, hemopoietic organs and a brain (nootrops).

Cocarboxylase (similar to vitamin B1), peridoxalfophosphate (similar to vitamin B12), and others belong to coenzymes. They have high biological activity (greater than some vitamins) and stimulate a metabolism. Preparations, which are not similar to vitamins (karyotine, lipoic acid) belong also to coenzymes.

Preparations of soft action stimulate recovery of cells structures and reparation processes. Preparations of this group are especially effective at treatment and prophylaxis of a dystrophy of a myocardium, which arises at physical overloads. To preparations of this group belong potassium orotat, inosine, adenosine triphosphoric acid (ATA), adenylic acid, methyluracil, riboxine, phosphadene and others. To preparations of this group of stimulators soft processes albuminous mixes belong also.

Energotropic substances stimulate power processes in an organism, promote accumulation of stocks of energy and increase stability of an organism to hypoxia. To preparations of this group belong carnitine, lipoic, glutaminic and bushtinic acid, panangine glycerophosphate lecithin.

Adaptogenes increase stability of an organism to various extreme loads, improve metabolic processes and help to avoid of overstrain of an organism. To adaptogenes are concerned biostimulators, mainly vegetative origin (eleuterococc, ginseng, Schizandra chinesis, leuzea and etc.) and an animal origin (pancriotine – it is an extract from a deer's horns). Value of preparations of this group is conditioned by them untoxicity, soft action and inability to collect in an organism.

Tocopherol acetate, L-tocopherol and others belong to antioxidants, its neutralize substances that are formed due to increased of lipids oxidation, which the organism uses as an energy source in time of the increased physical loads.

Preparations, which improve deotoxicational function of a liver releasing it from residues, which are collected in time of increased physical loads concern to hepatoprotectors. Such representative of this group are allochole, eccenciale, corn stigmae and others.

Stimulators of hemopoiesis are used, when this function is required in increased requirements (for example, in conditions of Middle-mountains) or it is decreased (in cases of overfatigue). To stimulators hemopoiesis preparations of iron, hemostimulin, cobamamide and others belong.

Stimulators of function of a brain, so-called nootrops, improve a metabolism in cells of a brain. Result of their use is increase of intellectual and physical work capacity, and also regulative functions of CNS. Indications to use of nootrops (aminolone, pyrocitame, cerebrolysine, pyriditole and others) is overfatigue, overtraining, and also vegetative-vascular dystonia, neurosises, connected with greater training loads and feature of competitions.

Pharmacological ways of prophylaxis of overfatigue and recovery of sports working capacity.

Preparations of the genera action concern to preparations used at pharmacological ways of prophylaxis of overfatigue and recovery: coenzymes, preparations of soft action, ergotropic substances, adaptogenes and antioxidants. The separate group of pharmacological preparations of recovery is made with preparations, which improve function of separate organs: a liver (hepatoprotectors), hemoipoesis organs and a brain (nootrops).

Preparations of soft action stimulate recovery of structures of cells and processes of reparation. Preparations of this group are especially effective at treatment and prophylaxis of a dystrophy of myocardium, which arises at physical overloads. To preparations of this group belong calcium orotat, inosine, adenosine triphosphoric acid (ATA), adenilic acid, metiluracile, riboxine, phosphadene and others. Together with them to preparations of this group of processes stimulators albuminous mixes belong also.

Adaptogenes increase stability of an organism to various extreme loads, improve metabolic processes and help to avoid overstrain of an organism. Biostimulators, mainly vegetative origin (eleuterococc, ginseng, Schizandra chinesis, leuzea and etc.) and animal origin (pancriotine – it is an extract from a deer's horns). Value of preparations of this group is caused by their untoxycity, soft action and inability to collect in an organism.

Tocopherol acetate, L-tocopherol and others belongs to antioxidants, they neutralize substances that are formed due to increased oxidation of lipids, which the organism uses as an energy source in time of increased}physical loads.

Preparations, which improve deotoxicational function of a liver concern to hepatoprotectors releasing it from residues, which collect in time of increased physical loads. Such representatives of this group are allochol, essenciale, corn stigmae and others.

Stimulators of hemopoiesis are used, when this function is required in increased requirements (for example, in conditions of Middle-mountains) or it is decreased (in cases of overfatigue). To stimulators of hemopoiesis preparations of iron, hemostimulin, cobamamide and others belong.

Use of hardening for prophylaxis of diseases.

For mobilization, and then for increase of reserve opportunities of an organism and as consequence increase of nonspecific resistance, i.e. its stability to various external pathological influences is used with physical ways and natural factors.

Natural factors are natural biostimulators, which train the mechanism thermoregulation and make active a metabolism. As a result albuminous and lipid metabolism is improved, parameters of cholesterine, β-lipoproteins are decreased, quantity of heparin in blood is increased. Antitoxic and glycogenic function of a liver is increased.

Natural physical factors are subdivided on climatic, balneological and thermotherapeutic. Climatotherapy – it is dosed out use of climatic factors with therapeutic-prophylactic purpose. The basic kinds of climathotherapy are aero-, helio- and thalassotherapy.

Aerotherapy is based on an influence of fresh air on an organism in all climatic areas in all seasons of the year. Depending on sizes eqivalent-effective temperature (EET) air baths are divided on cold (below 17º C, cool (17-20º C), indeferential (21-22º C), and warm (23º C and higher).

Heliotherapy – it is climatotherapy, based on dosed out use of solar beams with the purpose of prophylaxis, treatment and rehabilitation.

Among physical procedures used at hardening as a prophylaxis of diseases hydroprocedures – showers, baths, saunas more often are used. Regulating temperature and pressure of water, it is possible to reach various hardening effect. Showers and baths are differed on temperature parameters: cold (up to 20º C), cool (21-33º C), indeferential (34-36º C), warm (37-38º C), and hot (40º C and higher). Showers in which the pressure of water can be regulated, on intensity are distributed in the next order: rising, circular, fan, stream (Charcot's, Scotch).

Classification of dopes, anabolic syndrome. Antidoped control.

At the organization of medical maintenance of official international competitions the control of participants of competitions (winners and sportsmen of the borrowed the 2^{nd}-4^{th} places), and also sportsmen-participants on a lot in cases of development of faints in them, a unconsciousness, an acute overstrain on reception of a dope is spent.

Antidoped control – it is a system of the actions directed on revealing of reception of dopes by participants of competitions to imposing on convicted use of a dope of sportsmen of corresponding sanctions.

The dope – is an introduction in an organism of the sportsman before competition or during its pharmacological substances promoting artificial increase of sports result.

Classification of doped preparations.

1. Psychomotor stimulators (amphenamine, phenamine, phenatine, phenmetrasine, pelmoline, azaxodone, rodex, zhilert, drophon-D-1, etc.)

The substances acting mainly on mental sphere. Strengthening processes of excitation, suppressing feeling of fatigue, creating sensation of the increased opportunities, possess cumulative effect that limits their repeated application. They work within 5 hours. The most difficultly caught group.

2. Sympatomimetic amines (ephedrine, norephedrine, ethyl-methyl-ephedrine, cyclapentamine, chlorphertereline, phluraline, tonedrol, pervitine).

They are especially effective in conditions of deficiency of oxygen and high temperature of environment; they are increased more than in 2 times a limit of performed work.

3. Stimulators of CNS (niketamide, koramine, strychnine, aminophenazolone, bemegride, dupdex, imizine, penomine, caffeine, methylcaffeine).

They stimulate functions of a cortex of big cerebral hemispheres, respiratory, vessel-motor centers. Stimulate emission of catecholamines (increase of BP, MOC), increase a tone of skeletal muscles, a metabolism.

4. Narcotic and sedatives (morphine-liked - distramoramide, tetraphenamine, heroin, morphine, codeine, cocaine, tecodine, alcohol, phetidine, memorane, promedole; hypnotic – hexenale, barbitole, barbamile, phenobarbital, noxirone, noludar, tetridine).

They Increase an excitation threshold of nervous cells due to reduction in permeability of their membranes for ions, prolong the period of refrectory of cells.

5. Anabolic steroids (nerabol, retabolil, androstendiol, methylandrostendiol, synobolil, inozine, testosterol). They increase the mass of skeletal muscles and muscular force, brake function of sexual glands, a hypophysis, reduce the contents of thyroxin in plasma, increase function of

lipids in serum, break a metabolism of insulin. Use of anabolics increases danger of traumas and degenerate processes of the locomotor system. Structural changes of cells of a liver, inflammatory ulcer processes in a gastroenteric tract, disturbance of a water-salt metabolism, a delay of sodium and water, psychoses, malignant tumors are observed. There is falling of working capacity at a cancelling of hormones.

6. Substances, which in an organism are turned to a dope (phyprocet, torugane, aponedrone).
7. Бета-blockers, sedative substances.
8. Adaptyogenes of adrenomimetic action (eleuterococc, ginseng etc.).
9. Autohemotransfusions (aponedrone).
11. β-blockers, sedative substances.
12. Adaptyogenes of adrenomimetic action (eleuterococc, ginseng etc.).
13. Autohemotransfusions.

BASES OF PHYSICAL REHABILITATION
Concept about rehabilitation.

Physical rehabilitation is a component of medical rehabilitation. Medical rehabilitation, since second half of the XX century, borrows one of the central places in system of world medical-social problems. For the first time the task of recovery of health and working capacity of victims persons has found the practical decision during Russian-Turkish war when in 1877 in St.-Petersburg there was a Center of regenerative treatment of wounded men. Within the First World war the similar centers open in the Great Britain (orthopedic hospitals) and Ukraine (the Kharkov medical-mechanical academy). Domestic psychiatrists the first began to apply widely work therapy in patients with psychiatric diseases.

The term "rehabilitation" has been entered into a medical practice by Maier in 1963. Experts of the World Organization of Public health services (WOH) define the following of rehabilitation. This system of the state, social and economic, psychological, medical, professional, pedagogical and other actions directed on the prevention of diseases, leading to temporary or proof disability and returning of patients, and also invalids (children and adults) in a society and to socially useful work.

Rehabilitation is always a function, first of all society. During rehabilitation there is a primary or secondary adaptation of the person to public functions in biological, social and professional aspect.

Efficiency of rehabilitation actions is determined by reduction of terms of treatment and recovery of work capacity, decrease of invalidism and financial expenses in 2-6 times, that in

particular proves to be true the researches lead on our faculty. In the USA consider, that each dollar spent for rehabilitation comes back in the tenfold size.

Following kinds of rehabilitation are allocated: medical, psychological, social (the adaptation by a daily life and a life), professional, pedagogical. Medical rehabilitation represents a complex of the interconnected prophylactic, diagnostic, medical organizational actions, the directed physiological functions of an organism of the victim person, on the prevention of development of physical inability, on development of the adaptable properties providing its adaptation to an environment. It distinguishes regenerative treatment from usual and in many respects depends on a level of the organization of medical rehabilitation on all periods (the sick-list and after hospital, a polyclinic – a hospital – sanatorium - a clinic) in strict conformity with its basic requirements: earlier the beginning of rehabilitation, simultaneous carrying out of its various kinds, complex, individual character, a continuity and succession, staging.

Medical rehabilitation includes medicamentous, operative, orthopedic, psychotherapeutic, hygienic-dietary treatment. The important place among rehabilitation actions **the physical rehabilitation** borrowes using as means of exercise therapy, and hardware physiotherapy, balneotreatment.

Indications for physical rehabilitation: children with congenital defects, consequences of the labor trauma, sick with chronic diseases, including with professional, recovered persons with the defects, suffered persons from accidents, after heavy operative interventions.

Contra-indications to physical rehabilitation: absence of threat of proof disability, invalidism; an acute phase of disease with the expressed temperature reaction, a severe condition; negative dynamics of disease as a result of rehabilitation actions.

Regenerative treatment is spent in the general centers and departments, the centers of medical rehabilitation from the first day of a finding of the patient in hospital. Spend them under individual programs during treatment in a hospital and continue after an extract in the rehabilitation center, specialized sanatorium, a polyclinic.

Tasks and the purpose of rehabilitation.

The primary tasks of rehabilitation:

- recovery functions of bodies or systems (in full or in part);
- to adapt the patient for a daily life and work;
- to prepare him for labor process;
- to carry out dispensary observation for rehabilitated persons.

The basic purpose of rehabilitation - to adapt the patient to work on a former workplace. In other cases the purpose of rehabilitation is the training for a new profession and

work at the same enterprise, and in case of impossibility – a training for a new profession in the rehabilitation center and employment accordingly to a new trade and a condition of the person.

In pediatrics the purpose of rehabilitation is not reduced only to returning the child to a condition up to illness and to returning in children's collective. It is necessary to develop in the child physical and mental abilities according to age.

Principles of rehabilitation.

Rehabilitation will be ineffective if it is not adhered to following main principles:

1. The early beginning of rehabilitation actions.
2. Continuity rehabilitation actions.
3. Integrated approach of rehabilitation.
4. Individuality.
5. Necessity of rehabilitation in collective.
6. Returning of the patient or the invalid to active work.

Kinds, periods and stages of rehabilitation.

Rehabilitation into three kinds is divided:

1. Medical.
2. Social or household.
3. Professional.

In medical rehabilitation under the recommendation of WHO two periods is distinguished : the sick-list and after hospital.

The hospital period includes 1 stage of rehabilitation-stationary. And after hospital period – policlinic and dispensary stages.

1 stage – stationary includes therapeutic, surgical methods of treatment, which are directed on liquidation of pathological process, the prevention of complications and development of temporary or constant indemnification of disease, recovery of function of organs and systems, gradual patient's activization. Thus in regenerative treatment exercise treatment, medical massage, physiotherapy, elements of work therapy is included, the functional condition of the patient, reserves of an organism and define the further program of rehabilitation.

2 stage – polyclinic or sanatorium – at this stage physical rehabilitation prevails. The basic attention is given to gradual increase in physical activities, the general training, improvement of a functional condition**,** hardening of an organism, to revealing of reserve opportunities and preparation for labor activity, mastering by invalid adaptations for self-service and ways of movement.

3 stage – dispensary on which observation for rehabilitated persons, support and improvement of their physical condition and work capacity is carried out. The program provides preventive actions and periodic stay in sanatorium, employment by physical exercises in cabinet of exercise therapy and is independent, medical examinations with carrying out of tests with loads for definition of functionalities of an organism**.**

At all stages of rehabilitation a greater role purchase by invalids of means, the introduction into associations, including sports is allocated to work of psychologists, teachers, sociologists, the lawyers, directed on adaptation of the person to his condition and decisions of questions of his professional work capacity, employment, working conditions and a life.

Physical rehabilitation – it is use with the medical and preventive purpose of physical exercises and natural factors in complex process of recovery of health, a physical condition and work capacity of patients and invalids. It is the important making medical rehabilitation and is applied on its all periods of stages in social and professional rehabilitation. Among methods of physical rehabilitation by its basic part the medical physical culture is.

Among the methods of physical rehabilitation is a main part of its medical physical culture,MPC.

MPC - a scientifically based medical discipline that uses the means of physical culture (physical exercise, natural factors, massage) for therapeutic and prophylactic purposes for a quick and full recovery of the patient's health and the prevention of complications, and to adapt to domestic and work load, prevention of complications.

MPC - is a complex functional method, which is based on the use of movement as one of the main manifestations of biological life of the human body, which determines the characteristic of the method.

Features of method MPC

1) natural biological method;
2) the method of pathogenetic therapy;
3) functional method;
4) dosed method;
5) individual method;
6) part of the complex therapy;
7) the method of active therapy;
8) non-specific treatment method;
9) the method of education, hygiene and psychological therapy.

MPC is not only therapeutic but also medical and educational process, the use of physical therapy in a patient brings a conscious attitude to the use of physical exercise with treatment purposes, instilling in him hygiene practices, it involves in the regulation of its general regime, in particular regime movements , has the right attitude to the patients body hardening natural factors.

The main tasks of MPC

1. Save and support the sick body in the best functional condition.

2. Prevent complications that can be caused by the underlying disease and forced prolonged physical inactivity.
3. Promote the improvement of the action of drugs, reduce treatment time.
4. Involve the patient to actively participate in the recovery process.
5. Encourage potential patient in his struggle with the disease.
6. Accelerate the elimination of the local manifestations of the disease.
7. Prevent negative influence of environmental factors.
8. As soon as possible to resume functional full rights, to reduce the difference between clinical and functional recovery.
9. Expedite patient return to society, socially useful work.

Indications and contraindications to MPC
Indications are extremely broad. Conventionally there are 4 groups of diseases in which shows the assignment of MPC:
Group 1: all diseases in which is shown a tonic and a symptomatic effect. This is practically all diseases except lait injury and disease with the initial and just noticeable functional disorders.
Group 2: disease, pathogenesis of which is associated with impaired function and shown normalizing and restorative effect (hyper-and hypotension, functional disorders of the nervous system, etc.).
3rd group: diseases in which required compensation of disturbed functions and increase adaptive capacity of the organism (paresis, diseases of the musculoskeletal system of various etiology, etc.).
Group 4: all diseases in which stimulation is needed tissue regeneration (the effects of different injuries, myocardial infarction, etc.).

Contraindications to MPC are divided into constant and temporary.
Constant:
• severe irreversible progressive disease (increase in cardiovascular, respiratory, hepatic insufficiensy and other types)
• malignant disease,
• diseases of the blood,
• severe mental illness and others.
Temporary:
 acute inflammatory processes accompanied by fever above subfebrile (37,5 ° C), a progressive increase in erythrocyte sedimentation rate, leukocytosis and other indicators;
 acute period (stroke, myocardial infarction, hypertensive crisis, etc.
 pain syndrome (regardless of the localization and cause);
 bleeding, the threat of bleeding, coughing up blood;
 threat of thrombosis, thromboembolism;
 the presence of foreign bodies near blood vessels and nerve weaves;
 : tachycardia (heart rate more than 100 beats / min), bradycardia (heart rate less than 50 beats / min), , AV block II-III degree; negative dynamics of the ECG;
 increase in blood pressure over 220/120 mm Hg. Art. or reduction of blood pressure less than 90/50 mm Hg. Art.;
 anemia (a decrease in RBC count less than 2.6 x 1012 / l);
 mental states which make it difficult to contact with a patient.

Means of MPC
In medical physical culture use basic and advanced means.
The principal means of gymnastics are:
1)physical exercise,
2) motor regimens

3) natural and preformed natural factors
4) therapeutic massage.

Additional include:
1) mechanotherapy,
2) occupational therapy,
3) non-traditional methods (ipoterapiya, dolphin, etc.).

Main means of MPC
Physical exercise - is an organized form of movements that are used in doses and determined in accordance with the tasks of treatment, taking into account the general condition of the patient, characteristics of the disease, dysfunction of the affected organ or system. Basis of exercise is muscle activity, the biological role of which is extremely important in human life. .

Movement regimens - the rational distribution of different types of motor activity of the patient during the all course of treatment in a certain sequence in relation to other means of complex treatment. Effect from of treatment and rehabilitation process largely depends on this mode of rational construction of motor activity of the patient.

Medical massage – means of MPC , the essence of which is dosed mechanical effects on different tissue structures of the human body with the help of special methods that execute hands of the masseur or special devices for treatment and prophylactic purposes. Medical massage is an effective means of functional therapy, which provides improved reflexes and trophic processes in the body. It is used in all stages of rehabilitation.

Natural factors - the sun, air and water. Natural physical factors are natural biostimulators. They soothe and tone the nervous system; positively affect the physiological systems of the body, improve the regulation of life processes - activate the metabolism, function, respiratory, blood circulation, digestive system; have the effect of hardening; increase the specific and non-specific immunity, the body's resistance, physical performance; speeds up the recovery of the patient, help to reduce the use of drugs. In the practice of therapeutic physical training the most commonly used form
a) sun exposure (heliotherapy) in the application of physical therapy, as well as sunbathing as a method of hardening;
b) Air (aerotherapy) - aeration in the application of physiotherapy facilities and air baths as a method of hardening;
c) water (hydro-balneotherapy) - paticular and general wiping, pouring heart and hygiene, bathing in fresh water and sea as a method of tempering

Types of phisical exercise, used in physical therapy
Exercise is the main remedy for physical rehabilitation patients and divided into gymnastics, sports applications, working and playing.

Gymnastic exercises are a combination of specially selected natural human movements. Selectively acting through gymnastic exercises on individual muscle groups or joints, you can improve overall coordination, restore and develop strength, quickness, agility and flexibility.

Sports applied exercises - these are natural physical actions and their elements that occur in life or in sports. Sports applied exercises renew or strengthen complex motor skills, restorative exercise influence, soothing effect on the body. These include walking, running, swimming, skiing, rowing, throwing, climbing, crawling, jumping.

Playing exercises – high emotional form of exercise . They contribute to mobility , mobile, reaction speed , attention. Gaming exercise aimed at improving motor skills and qualities in changeable conditions , to improve the function of a number of analyzers ; have a tonic effect on the patient's body , increase its functionality and emotional tone (especially in childhood) .
Employment exercise - the main method of social rehabilitation , active regeneration method of

lost functions after illness and injury. Depending on tasks household , restorative ,professional rehabilitation , professional.Of particular importance in rehabilitation of patients occupy household exercises that focused on teaching self-service elements needed in everyday life (washing, dressing , eating, mobility , work in the kitchen, bath , etc.).

Classification of gymnastic exercises

According to medical action all the exercises divided into respiratory , general developmental and special

.Breathing exercises . Neither occupation MPC can not pass without breathing exercises. By breathing exercises meant any change in the respiratory act (inhale-exhale - pause) . Breathing exercises are divided into static, dynamic and drainage . Static and dynamic breathing exercises used as general developing as relaxing and to increase ventilation

.By static breathing exercises are exercises that involved the main respiratory muscles (diaphragm , intercostal muscles, muscles of the abdominal wall) . Static breathing exercises performed in a different starting positions at rest, without moving the legs, arms , body. . Dynamic breathing exercises are exercises involving the act of breathing extremitas and trunk , with special coherence amplitude and rate movements performed with the rhythm and depth of breathing

.The special breathing exercises include: drainage exercises (in conjunction with postural drainage) , involving the removal of sputum ; saccadic exercise (intermittent , stepwise) breathing; audio pronunciation exercises with vowels and hissing sounds

.General developing exercises have a treated effect on all patients. These exercises include: respiratory , medical gymnastics , medical household , medical and sports exercises and therapeutic games

.Special exercises aimed at solving particular problems in various diseases . For example, to avoid the development of contractures trauma joints need special exercises to increase their mobility. Without the use of special exercises treated effect is significantly reduced. Special exercises in the pathology of the various systems are given in the literature on physical therapy

.By the nature of muscle contraction gymnastic exercises are divided into dynamic and static

.Dynamic (isotonic) - exercises in which alternate periods of contraction and relaxation of muscles ; while contraction of the muscles determines the movement in the relevant joints and spine (flexion, extension , abduction , adduction, tilts , turns, etc) . They contribute to the resumption of motor function , which is very important when they are disturbanse)

.According to the degree of activity exercise divided into active (performed by the involved) , passive (performed by physiotherapists with an effort of the patient) and active- passive (performed by using a practitioner involved) .

The children of the first year of life , as well as in patients who can not reduce the necessary muscle (paresis and paralysis of central origin) used reflex exercises , which are based on unconditioned reflexes and executed regardless of the wishes of the patient due to reflex changes in voltage and muscle tone . At the same time can be used both physiological and pathological reflexes

.Gymnastic exercise also divided : on anatomical principle ; on volume load ; implementation complexity (simple, complex); on the use of subjects , devices and ;on the mechanism of energy (anaerobic , aerobic); on the development of coordination , balance , corrective and other principles

.In physical culture are widely used ideomotor exercises (especially inpatient rehabilitation stage) . Ideomotor exercises performed mentally, they cause excitation of cortical and subcortical centers , encrease emotional tone..

Movement regimens

Proper regulation of motor mode in hospitals occupies an important place in the organization of the treatment process . Mode selection criterion is the comparison of pathological changes in the affected organ (body) with the corresponding clinical manifestations. This approach (

pathogenetic , pathologic) allows competently clear objectives , identify means and methods of MPC especially with patients at any stage of the disease, any pathology
.In appointing the patient movements total load must comply with clinical features of the disease, its general functional status and adaptability to physical loads . Roughly can offer the following regimens for hospital - clinical and clinics
:In the hospital :
Bed rest (strict and extended bed) administered after surgical interventions for severe general condition of the patient, for diseases that can be complicated when you stand up (the first days after myocardial infarction , cerebrovascular disorders , etc.).
Strictly - bed - given to patients in severe condition , with the increase of the objective symptoms and significant impairment of the function of the body
.Advanced bed - recommended for patients with moderate general condition , stabilization objective symptoms of the disease, the tendency to improve them . The patient needs constant medical supervision and assistance with self-service
.Half bed - recommended for patients in a satisfactory condition , the early period of recovery, with a decrease in the function of vital organs. The patient needs constant medical supervision, but can take care of themselves
.Free (tonic) - For patients with good general condition , incomplete functional recovery , , but the patient does not need constant medical supervision and can take care of themselves
.Outpatient and sanatorium conditions
Sparing - the patient's condition needs strict regulation intensity and duration of exercise
Sparing train - the patient's condition needs to be strictly regulated to unregulated duration intensity of physical activity (sports games elements and. Etc.)
Training.regimen - is recommended for patients with full clinical and functional recovery in case of insufficient adaptation to workload

Forms. of MPC

The main forms of MPC include:medical gymnastic , morning hygienic gymnastics and separate individual occupation the patient as directed by doctor .
Additional forms of physical therapy include: treatment by position; dosed out walking, climbing stairs, terrenkur; gymnastics in water (hydrokinezotherapy); employment by improving the forms of physical training: jogging (jogging trot) , swimming, exercise at the gym , cycling , skating , skiing and the like; games ; near tourism , etc

.Basic forms of MPC

Medical gymnastic
.Morning hygienic gymnastics
Treatment by position
Dosed out walking
Terrencur
Near tourism

Methods of MPC

methods MPC are classified by the following criteria :

1. The use of funds MPC :
   • gymnastic• Sport applied;• gaming
   .2 . Depending on the presence of an instructor
   :• Instructor-led exercise physiologist who organizes , conducts classes , studies and evaluates the reaction to load , makes recommendations to the patient ;
   • MPC without instructor , yourself, after appropriate training
   .3 . According to the number of patients in the group
   :• Individual - the instructor is engaged with private patients in the ward.
   • few-group - the instructor is engaged with 3-5 patients in the ward.

• Group - the instructor involved with a group of patients in the physical therapy room . Groups are formed on the basis of nosology ; functional homogeneity ; sometimes depending on gender and age (especially in childhood)

Periods of MPC

. Effective use of exercise for therapeutic purposes requires a comprehensive plan for their implementation , which depends on the dynamics of the disease . In accordance with the basic laws of stroke pathology full course MPC divided into three periods
First (I) - the body responsible phase of mobilization mechanisms for controlling the disease and the formation of temporary compensation
;The second (II) - responsible development phase reverse pathological changes and the formation of permanent compensation
;Third (III) - meets completion convalescence and restoration of disturbed functions .
Depending on the specific disease (medicine) , distinguish the following periods of MPC
:In therapy
:Introductory (preparatory) - when expressed morphological and functional abnormalities of organ or system
.Main (recovery) - morphological and functional changes are less expressed .
Final - residual manifestations of morphological and functional abnormalities in the body.
In surgery :
Preoperative (during planned operations)
.Early postoperative - until the sutures are removed .Late postoperative - after suture removal to hospital discharge .Remote postoperative - after discharge from the hospital to the full resumption of or compensation
.In Traumatology :Immobilization .Early postimmobilization (functional) - after removing the immobilization of the resumption of function by 90%.
Recovery- end of renewal functions of injured limbs and body as a whole
.In neurology :Early recovery .Late recovery .Residual (compensation residual effects)

.Dosage of physicalloads in MPC
.Form , duration and frequency of MPC , depending on the motor regimen
Stationary stage :
When strictly bedrest - allowedl movements in bed , toilet and eating using nurses showing static respiratory exercises , massage and passive exercises.
When extended bedrest - allowed the transition to a sitting position in bed , followed by lowering the legs on the floor and standing, toilet and eating alone, recommended morning hygienic gymnastics,medical gymnastic, with the number of repeat 5-6 times , the ratio of respiratory and general developing 3:2 or special exercise lasting 5-10 minutes , 3-5 times a day.
Ward regimen - appointed dosed walking , self-service, occupational therapy, morning hygienic and therapeutic exercises few-group method , with an average load , exercises for all muscle groups and joints, , average amplitude , dynamic breathing exercises . Value for respiratory and general developmental or special exercises 2:3 , duration of treatment 10-15 minutes 2-3 times a day
.In free regimen – recommended walking , climbing stairs up to 2-3 floors , morning hygienic and medical gymnastics in the starting standing position , the group method , exercises for all muscle groups and joints, at a rapid pace with the objects and gymnastic equipment , dynamic breathing exercises in conjunction with the general developmental or special in the ratio of 1:3-1:4 , lasting 15-20 minutes, 1-2 times a day
Sanatorium

.Sparing regimen (most restrictive) is assigned to all patients as a mode of adaptation during the first 3-5 days of a stay in a sanatorium. Showing all forms of MPC. Physical activity can reach 30 % of maximal aerobic capacity . Allowable heart rate depends on the age, sex, clinical manifestations of the disease , mode of motor activity and must not exceed an average of 104-106 beats per 1 min

.Sparing - training regimen provides tonic (moderate) influence. Prescribed to patients with circulatory disorders and respiratory insufficiency I degree , all patients older than 60 years in remission of the underlying disease and satisfactory adaptation to the conditions and means of rehabilitation. Showing all forms of MPC . Physical activity can reach 40 % . Allowable heart rate should not exceed 110-112 beats per 1 min.

Training regimen prescribed to patients without circulatory and respiratory disorders , with a reception compensation satisfactory adaptation to climatic and physical loads . Regimen is aimed at training, training the body , preparation for employment. Showing all forms of MPC . . Allowable heart rate should not exceed 130-148 beats per 1 min.

Training is carried out under close medical supervision , taking into account physical load tolerance .

Treatment for acute conditions depends on the duration of flow reduction processes in the body, as a predefined time resolution of the pathological process , and the rate of renewal of mental , physical , , manufacturing abilities of the patient. In chronic diseases patients are encouraged to engage in MPC during all life . .

Medical control in the application of medical physical culture

In the implementation of medical monitoring during medical gymnastic , training in walking and other elements when developing motor mode accounted for subjective feelings , changes of pulse, blood pressure and respiration at the height of the applied load , immediately after the exercise and after 3-5 minutes after class. This control allows you to properly dispense load , avoiding adverse reactions.

Types of control for the influence of physical load during MPC

The following types of monitoring gymnastics classes : express control, the current control and stages control .

Express control is used to assess the positive effects of one session (term effect) . For this study directly to the patient's response to exercise in the course of employment , or the effects of MPC neighbor aftereffect of exercise (immediately after physical exercise) . During the express control recommended use simple,instrumental and complex (radio telemetry) research methods (teleelektrokardiograf , elektrokardiosignalizator , etc.) that is particularly important in cardiovascular pathology.

Current control is used to evaluate remote aftereffects of exercise . Therefore, the current survey carried out in the course of rehabilitation treatment at least once every 7-10 days , and when the motor mode . It gives you the opportunity to make timely adjustments to the methodology of training in gymnastics and physical rehabilitation program . Using clinical data , the results of functional tests , performance instrumental methods , anthropometry .

Stage control was performed to assess the effect of MPC in the whole course (cumulative effect) , which before the training MPC, and then after the end of MPC deepened examined the patient. Using anthropometric measurements and, depending on the nature of the pathology , conduct functional tests and special methods of investigation , which indicate the state of one or the other system : cardiovascular, respiratory, nervous , musculoskeletal , etc.

Making appointments MPC

Movement regimen at the primary level of care appoints local doctor (general practitioner of family medicine) . It also conducts special investigations of patients , observate them, the procedure selects of MPC and their dosage , depending on the patient's condition , disease

characteristics and functional disorders. Algorithm of doctors when prescribing MPCshould be as follows :

• examine the health status , physical development and functionality of the patient ;
• exclusion of contraindications MPC;
;
• regimen selection motor activity, means, forms and methods of MPC depending on the stage of rehabilitation and MPC period ;
• charting classes of MPC ;
• selection of the dose of physical activity in accordance with the characteristics of the disease and the individual patient ;
• monitoring the effective of MPC

MPC – the independent scientific medical discipline using for treatment and preventive maintenance of various diseases of means of physical training (the physical exercises, natural factors of the nature) with the treatment-and-prophylactic purpose for faster and high-grade recovery of the person's health of and the prevention of diseases.

MPC as the medical method has acting factors on all organism of the patient – physical exercises. Movement is a basis of exercise therapy but only then it becomes the medical factor when it is organized as physical exercises and it apply in view of the general condition of the patient, features of the disease, disturbances of function of the affected system or all organism.

MPC is also educational process, it imparts hygienic skills, provides its participation of the general regimen in regulation by factors.

Peculiarities of MPC ***method:***

They are defined by medical means and a technique of their application at various diseases:

1. MPC **– a method of active therapy.** Application of physical exercises demands an active participation of the patient in medical process. Thus it is very important dosage of loadings in view of disease, degrees of functional disturbances, conditions, adaptation to physical loading (on the results of functional tests).

2. MPC **– a natural biological method of treatment** as in its basis is used biological functions-movements – a natural stimulator of processes of growth lays, developments, formation of all organism, increase of capacity. Can be used in children, in elderly, gerontal and mature age.

3. MPC **– a method of pathogenetic therapy** as physical exercises are capable to influence the general reaction of the patient, and his local displays.

4. MPC **– the method of educational, hygienic and psychological therapy** because it is not only sanity and strengthen all organism, but also carries out the educational, hygienic, psychological purposes.

5. MPC **– the method of nonspecific therapy,** the actions are carried out through all parts of nervous system from cells up to a cortex – hypothalamus, hypophysis, adrenal cortex, from peripheral receptors up to organs and muscles. At the same time there is specific action of exercise therapy on pathologically changed functions of all organism.

6. MPC **– the dosed out method** promoting only to therapeutic effect.

7. In MPC **the general and special training are distinguished.** The main purpose of the *general* – improvement and strengthening of the organism, *special* – the purpose of development of the function which is broken in connection with disease.

8. MPC **– a method of individual therapy** because individually picked up circuit of positions is applied, recurrences and change of complex medical gymnastics (MG) depending on the period of treatment.

9. MPC – **is a part of a complex of therapy** it can be combined with medicamentous therapy and supplements action of medicines, physiotherapy.

RESORCES AND FORMS OF MPC**:**

The MPC, natural factors, motor regimen, medical massage, ergotherapy.

Forms: MHG, MG, the independent individual occupations, dosed out walking, rises upstairs, terrain cure, mechanotherapy, hydrokinezotherapy.

MHG – it is a complex of the general developing exercises, intended for normalization of processes of stimulation and inhibition in a cerebral cortex.

MG – it is spend by a group or individual method in patients whose condition is very serious. Acquisition of groups are carried out basically on nosologic principle, duration of exercises makes from 10-15 minutes at the bed patient after acute disease, up to 45-60 minutes – at recovering. Occupation consists of the prologue (20-15 % of the general duration), the basic (65-75 %) and final (15-10 %). The prologue includes the most simple exercises, preparing an patient's organism to the basic loading. In the basic part of occupation are applied the various exercises rendering training and medical action, and the certain intensity of physical loading is supported. In a final part loading is gradually reduced. It is possible to strengthen action of exercise with the help of subjects (rubber tapes, dumb-bells etc.) and simulators (trainer) of the general action. It is possible to facilitate movement, using draught on blocked equipments and adaptations, changing a starting position, limiting exercises with effort and amount of muscular groups, using exercises in water, including respiratory exercises and etc. Musical support is used in exercise therapy in group occupations, MHG and MG.

Independent individual occupations – are carried out by patients individually, in second half of day – under the control of pulse.

Dosed out walking – its improving and training influence depends on the gone distance and rate of walking (slow – 60-80 in one minutes, medium – 90-110 in one minutes, fast – 120 and more). After acute disease walking with gradual increase in distance every 1-3 day fractional dozes up to 3-5 kms in a day is appointed.

Rises upstairs – gradual adaptation and training of patients at rise on steps.

Terrain cure – walking on a cross-country terrain.

Hydrokinezotherapy – physical exercises and swimming render training and hardening influence, thanks to combinative influence on an organism of mechanical, temperature and hydrostatic factors at temperature – 25-27º C is applied for treatment of diseases of organs of blood circulation, respiration, metabolism, nervous system, traumas in a phase of proof compensation and remission of chronic diseases. The temperature 34-36º C weakens muscles, reduces the spastic phenomena and a pain at movements, therefore is appointed to patients with the purpose of development and mobility in joints of extremities, a spine, reduction of muscular rigidity at spastic paralyses and paresises.

Mechanotherapy – in exercise therapy trainers of local and general action are applied.

Trainers of local action use for development of rigidity in joints of extremities and strengthening of the weakened muscles in patients with diseases and consequences of traumas of the locomotor system, in addition to active and passive physical exercises. Trainers of the general action are used for the general physical development, training of endurance of an organism and force of muscles, for reduction in body mass (velotrainer, «rowing device», running path, complex "Health"). Occupations with trainers are shown at cardiovascular diseases, diseases of respiration organs, locomotor's system with insufficient physical activity at the general satisfactory condition. Physical loading on trainers' dose out on duration of occupation and intensity depending on the patient's functional condition.

Regimens of motor activity – strict bed, half-bed (ward), free. In out-patient - polyclinic conditions and sanatorium operate – sparing, sparing-training, training regimens.

Periods of MPC

The 1-st introduction period – acute, sparing on strict bed and a bed regimen. A physiological curve of loading is one-topmost, a ratio of respiratory to general developing exercises – 3:1:1, rate is slow and middle, amplitude is small, duration of occupations is 3-5 minutes. Static respiratory exercises, easy stroking massage of extremities, passive general developing exercises are used.

The 2-nd Basic period – functional, on half-bed and free regimens, a ratio of respiratory, general developing and special exercises – 1:2:2, a physiological curve is two-topmost, rate, amplitude are middle. All forms of exercise therapy, individual or small group method can be appointed.

The 3-rd Final period – training, on a free, sparing, sparing-training regimen in out-patient-polyclinic conditions. It is the period of final training not only the broken functions, and all organism as a whole, a multitopmost physiological curve, a ratio – 1:3:4, rate and amplitude is maximal.

CLASSIFICATION OF PHYSICAL EXERCISES: gymnastics, on a sending of pulses, ideomotor, sports-applied, games.

The mechanism of action of physical exercises on an organism:

1. Stimulating action. Exercise therapy is a biological stimulator of morphofunctional structures and protective-adaptive reactions of an organism in development of adaptive reactions of the patient on physical loading the big role belongs to adaptational-trophic function of sympathetic nervous system as to regulatory homeostatic mechanism of a constancy of the internal environment. The neurohumoral way of influence of physical exercises is carried out through mediators of nervous system and hormones. And also depends on change of primary physical and chemical processes in working organs. Possessing the certain autonomy, processes of a tissue metabolism are subordinated to sympathetic regulation that influences intensity of a metabolism and functional properties of tissues and organs, and also on their reactivity. The improvement of a metabolism observed under action of physical exercises in patients with inflammatory, degenerative, destructive processes causes trophic action of physical exercises**.**

2. Trophic action which consequence is normalization of a metabolism, improvement of plastic processes and regenerations of tissue damage. Exercise therapy exceeds bio-energetic, activates oxidative phosphorylation, glycolysis, fermentative activity, lipolysis, oxidation-reduction processes.

3. Formation of compensations: At diseases disturbance of functions are compensated by adaptation of injured or other systems due to optimization of regulator mechanisms – it is a temporary or constant replacement of the broken functions (dyspnea, tachycardia at pneumonia). Exercise therapy develops compensations due to strengthening of respiratory muscles, increase in mobility of ribs, diaphragms, deep, rare breath, short – it is more economic. Physical exercises improve functions of other bodies and the systems participating in gas exchange: work of heart, vessels improves, the amount of erythrocytes, hemoglobin, delivery of oxygen to tissues is increased, that in turn conducts to reduction of dyspnea and a tachycardia. Regulation of

processes of compensation occurs on the reflex mechanism through the central nerves system and back to organ. Physical exercises increase a number of pulses in central nerves system and accelerate the mechanism of compensation (temporary and constant rehabilitation of invalids).

4. Normalization of functions: Exercise therapy liquidates motor disturbances, however recovery does not mean preservation of capacity for work. Therefore exercise therapy during recovery restores the lost functions with the help of special exercises (force of muscles, coordination of movements).

The organization of service exercise therapy:

The organization of all work on exercise therapy is assigned to doctor of exercise therapy and the instructor – methodologist with attraction of the medical personnel: nurses, doctors of medical establishment. The methodical management is carried out by all parts of treatment-and-prophylactic establishments where doctors of exercise therapy work carry out area VFD of city, region and republic.

Duties of doctor of exercise therapy: carrying out of patients' examination (before and after course of exercise therapy, MPO (medical-pedagogical observation)), definition of exercise therapy technique (forms, device, a dosage of physical exercises), a management of instructors' work, doctors' consultations of other specialties on exercise therapy, sanitary-educational work among patients, carrying out of MPO).

Duties of instructor of exercise therapy: the organization and carrying out of occupation of MG in wards, cabinets, halls of exercise therapy, carrying out of sports actions.

The documentation: the case record, the form № 42, anthropometrical examination, efficacy of treatment, drawing up of a complex, scheme of MG in view of an individualization of occupations, a starting position, number of repetitions of exercises.

It is necessary 1 rate of the doctor, 2 rates of the instructor and 2 rates of the masseur on 400-beds hospital.

DOSAGE OF PROCEDURES OF MEDICAL GYMNASTICS.

1. A choice of a starting position.
2. Selection of physical exercises in view of disease, age, person of the patient, current of disease. A ratio of respiratory, general developing, special exercises depending on period exercise therapy.
3. Duration of occupation (children – 20-45 minutes, adults – 20-40 minutes).
4. The number of exercise repetitions depends on features of disease, number, character of exercises.
5. Rate of performance: slow, middle and fast.

6. The degree of a pressure, amplitude depends on strong-willed qualities.
7. The degree of complexity of movements influences size of loading.
8. The rhythm of movements influences capacity for work. Rhythm promotes reduction of loading on nervous system due to automatism.
9. The number of general developing and respiratory exercises depends on period of exercise therapy-1, the period - 3:1, 2-1:2, 3-1:3.
10. Use of the emotional factor.

BASES OF THE MEDICAL MASSAGE

Massage is a method of treatment and prophylaxis of the diseases, representing set of methods of mechanical dosed out influence on various sites of the surface of the person's body by the masseur's hands or special devices.

Massage, as treatment-and-prophylactic means was known for a long time. It is applied in ancient times. It has arisen as a mean of national medicine and developed alongside with other kinds at all generations and people. For the first time massage has been applied as instinctive gesture (stroking, grinding and stretching) for simplification of pain of the struck or injured place.

It is known, that massage was applied even in a primitive society, in various tribes of Southern Africa. There are literary data about application of massage for many thousands B.C. in the countries of the Ancient East, Egypt, Babylon, Greece, Assyria, Rome. In Ancient China written certificates on application of massage concern to III thousand years B.C. In ancient India in the treatise "Ayur-veda" XVI-XVIII century up to A.D. the description of methods of massage, in particular grindings and stretching also are resulted. In Ancient Greece and Ancient Rome massage widely used in a daily life, in medicine, sports, military education. Klavdiy Galen described 9 kinds of massage, technique of stroking, grindings and stretching. Avitsenna (980-1032) promoted to distribution of massage to the countries of the East. Bases of classical massage have been formulated in XVIII century. Massage, grinding is especial, was widely applied in orthopedic practice, and also for prophylaxis of diseases. However in Europe massage had no special distribution till XIX century. Significant influence on introduction of massage in the European countries rendered the founder of the Swedish gymnastic system Peter Henry Ling (1776-1839). The outstanding role in development of massage belongs to Russian scientists: Mudriy M.J. (1776-1831) scientist – the founder of domestic therapy, doctors Zabelin S.G. and Ambolik N.M. (1744-1812) which propagandized massage and physical exercises as the means promoting to harmonious development of children.

The founder of modern so-called classical massage by right considers Zabludovsky I.Z. (1882-1913). In 1882 he has defended the dissertation devoted to action of massage on health. More than 100 works on receptions of massage belongs to him. These method prominent clinical physicians Botkin S.P., Ostroumov A.A., Zacharayn G.A. positively estimated. At the end of XIX century in Russia there were centers on preparation of experts in massage. In Petersburg school of massage has headed – Zalesova E.I., in Moscow – Solovyev K.G., in Kiev – Kramarenko V.K. technique of reflex massage has been developed in XX century by Scherbakov A.E. (1903-1908). Mechanical massage with use of vibration has in details developed Kreymer A.Ya. (1960-1981.) Massage in sports is widely used; about it speak researches of such experts as to Muravov I.V., Hruschev S.V., Goryachaya V.M., Epifanov V.A., Klapchuk V.V., etc.

The mechanism of influence of massage on an organism

Physiological action of massage is consisted that by means of various methods through afferent system of skin and muscles it is possible to improve, and frequently to normalize functions of various organs and systems. The mechanism of action of massage basically is connected with nervous system, it neurohumoral factor. Under influence of massing movements allocation of the tissues hormones participating in transfer of nervous pulses in CNS is increased, movement of lymph, blood, tissue liquid, trophic function, conductivity of nerves, processes of regeneration are amplified, function of the skin and metabolic processes in it is improved. In muscles processes of metabolism, elasticity of a muscular fiber, it contractive function that accelerates restoration of nervous activity are normalized. Massage renders direct and reflex influence on system of blood circulation. It improves gas exchange and the general metabolism in tissues.

Initial part in the mechanism of these reactions is the irritation of mechanoreceptors of skin, reforming energy of mechanical stimulants in the pulses acting in CNS. Formed responsible reactions promote to normalization of regulating and coordinating function of CNS, removal or reduction of parabiosis revealing, stimulations of regenerative processes. In action of massage is found reflection common physiological regularity established by Setchenov I.M., Pavlov I.P., Vedenskiy N.E., Uhtomskiy A.A., Mogendovich M.R. according to which responses depend on character and force of stimulant, conditions of reactivity of an organism, a phase of pathological process. Massage influences on the function of internal organs on the mechanism of motor-visceral reflexes. The theory of motor-visceral reflexes gives the preconditions for expansion of indications to prescription of massage as method of reflex therapy.

Owing to the irritation of nervous receptors arising at massage, pulses on afferent (centripetal) ways act in cerebral cortex and subcortex of the cerebrum, and from there the transformed energy is already distributed on afferent (centrifugal) ways to organs, tissues, muscles. The effect of massage depends on a condition (metabolism) of cortical and subcortical cells of the cerebrum.

Massage renders many-sided both local, and the general influence on an organism. Under influence of massage local blood flow of lymph is improved, the skin is cleared from atrophic epidermal cells. Function of sweat and sebaceous glands is stimulated, elasticity and a tone of muscles is increased. Reflexly massage influences on the function of internal organs and systems. Increase of electric activity of a cortex of the big hemispheres and lability of the nervous-muscular apparatus observing at massage is explained by influence of massage on various levels of nervous system in researches Belaya N.A.'s (1960), Shterengerts A.E. (1970), Katkov V.G. (1982) is shown.

Massage promotes to improvement, strengthening of an organism, renders beneficial influence on CNS, humoral mechanisms of regulation of functions, the nervous-muscular apparatus, the central and peripheral parts of blood circulation, skin and other functional systems.

As a result of involving of all these parts at influence of dosed out methods of massage there is a mobilization and training of protective-adaptive mechanisms that promotes to maintenance of therapeutic effect at a number of diseases, and at healthy people – to physical perfection.

Receptions, kinds and means of massage

The most convenient and widespread classification of massage is the classification suggested by Verbov A.F. on which 4 basic of methods of massage are distinguished: stroking, grinding and stretching, vibration and a number of auxiliary receptions (tab. 10).

The general rules of massage:

1) Movement make on a course of lymphatic ways, in the direction of the nearest lymph nodes (in figure massage lines are shown).

2) It is impossible to massage lymph nodes.

3) Massage should not cause painful sensations.

4) The massaged muscle should be as much as possible relaxed.

5) The patient should be in convenient position.

6) Influence of massage on an organism depends on a rhythm, rate of performance, pressure of a masseur's hand.

Technique of massage:

Stroking – one of the oldest and widespread methods used both with the medical purpose, and in sports, cosmetic massage, as sliding of hand's fingers or a hand on skin without its displacement. This reception is recommended to begin or finish any procedure of massage, and also at transition from one reception of massage to another. It is possible to massage by one or two hands. Stroke by both hands: 1) separately simultaneously: hands move in parallel; 2) it is separately consecutive, one hand finishes movement, another – starts; 3) in common: one hand is imposed on another (more intensive influence).

It is possible to carry out stroking: 1) longitudinally (on a trunk and extremities); 2) cross-section; 3) in zigzag fashion (on a stomach, a back, a buttock); 4) spiral (on the same areas); 5) circular (on a stomach, joints); 6) combined in a combination longitudinal with spiral stroking; 7) concentrically (in the aria of joints). Thus hands should not come off massaging skin, and the palm of the hand must densely adjoin to the surface of a joint.

All methods are carried out rhythmically, on the average rate 24-26 strokes in a minute. Stroking renders a soothing effect, improves blood- and flow lymph, exchange processes in massaged area, positively influences on a condition of the nervous-muscular apparatus, improves tissues trophycity.

Kinds of stroking

Plane stroking superficial – it is soft, sparing method, which apply on the big flat surfaces of skin (a stomach, a back, a thorax). This method causes receptors inhibition of skin and renders calming influence on nervous system, promotes to muscular relaxation, and also stimulates exchange processes in skin, increases its elasticity, anesthetizing effect has.

Plane deep stroking – it is more intensive method influencing on the receptors of deeply incorporated tissues of muscles, tendons, and vessels. At movement the masseur's hand is leaned on ulnar its edge. For reduction of its force of influence it is possible to lean on ulnar edge of the hand. This method uses at massage after removal plaster bandage, at contractures.

Clasping continuous stroking – it is a method of deep influence on a course of lymphatic and blood vessels. Apply for amplification of outflow of blood and lymph from massaged area. Method is shown at edema and lymphostasis.

Clasping broken stroking – it is energetic method of influence on all receptors of the apparatus for amplification of blood circulation, contractile functions of muscles. Method is used after fractures, at massage of extremities, lateral surfaces of a trunk, and also if necessary to bypass the certain sites of a body. It has stimulating effect on the CNS.

To auxiliary methods of stroking are concerned – *crest-liked stroking*, *stroking* carry out by back surfaces of the 2-nd, 3-rd, 4-th fingers on the person's muscles, a neck and a stomach; *rake-liked stroking* is applied at massage of the big surfaces, hairy part of a head, intercostal intervals, if necessary to bypass places of skin injury; *crosswise* stroking is applied at obesity, massive muscles, in sports practice; *tongs-liked stroking* is applied at massage of lateral fingers' surfaces, edges of a hand and foot, tendon, small muscles. Stroking is effective in a combination with gymnastics.

Methodical instructions to stroking:

1. Stroking is made at well-relaxed muscles.
2. Method is carried out independently in a combination with others.
3. Massage is began and finished by stroking. This method is used at transition from one method to another.
4. In the beginning is applied superficial, and then deep stroking.
5. Plane, superficial stroking is made in a direction of against flow of lymph.
6. If necessary to amplify lymph drainage stroking is made in a direction of flow of lymph.
7. At edema clasping deep stroking is necessary to begin with an overlying segment.
8. Stroking is carried out on a course of muscular fibers.
9. On various sites put various pressures. It should be big in the field of large vessels, at the expressed fatty layer, dense muscles. Thus at the beginning of method pressure is small, and then it is amplified and reduced at the end.
10. The hand, without stopping, slides up to the nearest lymph nodes (on a leg – up to inguinal, on a hand – up to axillaries), densely adjoining to a skin.
11. Stroking of the muscle should be begun with distal department or from a tendon in the direction to a proximal department.
12. To apply all kinds of stroking during one procedure unessential.
13. On the side of extremities flexion pressure should be big as large veins and lymphatic vessels here are located.
14. At an inflammatory edema stroking is made around of it, on the border of exudation, and then in the field of edema.

Grinding

It renders on an organism more energetic influence, than stroking. It consists in displacement or stretching of skin together with subject tissues in various directions.

Considerably amplifies blood circulation, exchange, trophic processes in tissues, grinding promotes to stretching of commissures, cicatrices, to resorption and removal of depositions in tissues of joints, tendon sheath, amplifies contractile function of muscles and increases their tone. Grinding is carried out rectilinearly – it is longitudinal or cross-section on a small surface round, spiral or in zigzag fashion on a back, hips, and an abdomen.

Auxiliary methods of grinding

Crest-liked, sawing, shading, tongs-liked grinding, planning at commisures, cicatrices, at the big fatty layer, crossing.

Methodical instructions to grinding

1. Grinding prepares to stretch.
2. Method is carried out more slowly, than stroking.
3. For amplification of action a corner between the masseur fingers and a massaged part is necessary to increase and put one hand on another.
4. Method of grinding alternates with stroking.
5. The direction of movement is not defined by a course of lymphatic ways and can be made in any directions.
6. Pressure upon tissues can be identical all time.
7. Method is considerably more intensive, than stroking and the masseur should be careful in injuring of skin.

Stretching

Method of massage, which recommend applying at hypotrophy of muscles, cicatricial adhesions, diseases with reduction of muscles tone.

It is distinguished continuous and broken stretching, which are made longitudinal, cross-section, semicircular or spiral. Broken stretching is carried out the same as also continuous stretching, but hands advance by pushes, taking the form of a leap, rhythmically.

Auxiliary methods of stretching – tongs-liked stretching (squeezing), milling, move by rolling (at massage of a forward wall of an abdomen), moving, twitching or tingling (at massage of the face, languid paralyses, cicatrices), a stretching and compression, suppression at treatment of traumas, dyskinesia of guts, the face, hairy parts of a head, points of an output of the nervous endings.

Methodical instructions to stretching

1. Muscles should be well relaxed.
2. Stretching – is the basic method of influence on muscles, therefore it is applied at hypotrophy of muscles, cicatricial adhesions.

3. To massage is necessary slowly, smoothly, without jerks.
4. Massage is made in ascending and descending directions.
5. Intensity of influence should be constantly increased from procedure to procedure, except for the most sensitive areas of a back surface of a neck, an internal surface of shoulders and hips.
6. Method should be begun with places of transition of muscles in tendons.

Vibration

Vibration can be carried out by hands or with the help of special devices. It can be continuous and broken.

Continuous vibration. The masseur's hands pressing on a tissue and not coming off from it make various oscillatory movements. If thus the hand is moved, such method is called as labile vibration, if it is not moved – stable vibration.

The stable vibration, which is carried out by one finger is called as acupressure.

Broken vibration or beating consists in that after each contact with a massaged surface the masseur's hand rises, i.e. renders short, fast strokes, is rhythmically following one after another.

Auxiliary methods of vibration

To auxiliary methods of continuous vibration is attributed concussion, shaking, pushing, to broken vibration – puncturing, chopping, patting, beating, whipping.

Methodical instructions to vibration

1. Method should not cause of painful sensations in the patient.
2. Intensity, force of influence at continuous vibration depends on a corner forming between fingers and the massaged surface. The more the corner of an inclination comes nearer to 90º the influence is stronger.
3. Method of continuous vibration is especially difficult and for its performance needs long training.
4. Duration of pressure upon a point 5-10 seconds. After each vibration it is necessary stroking. It is possible to influence one point from 5 up to 10 times.
5. Long fast short vibrations calmative act, short large vibrations excite nervous system.
6. Vibrations can become "pressure" if its are not accompanied by trembling movements.
7. Beating is made between other methods (it is supposed no more than 2-3 times during a procedure) no more than 1-1,5 minutes.

8. Patting is started with a back, then pass to a lateral surface of a trunk. On a lateral surface movement goes on an axillary line from top to down, on extremities – also from top to down. On an internal surface of hips patting is not applied or make very weak. The movement is faster, the more intensive is influence.
9. At a hacking it is necessary to move hands, to carry out rhythmically, beats should be sometimes soft, sometimes strong, but painless, it is necessary to render them perpendicularly to a surface along of muscular fibers.
10. At performance of continuous vibrations can be dosed out force, elasticity, and softness of beat.
11. The direction of beat can be plumb or vertical, slanting or inclined.

Massage can be **the general,** when all parts of a body are massaged, or **the local** at which the certain part of a body is massaged. In a combination with exercise therapy, balneopelotherapy and other kinds of treatment massage is very effective means of restoration of the broken functions and irreplaceable means of disease prophylaxis.

Kinds of massage (tab. 20)

Classical massage is a massage at which performance are used 4 classical methods with the purpose of diseases treatment. Therefore it is still called medical.

Hygienic (health-improvement) massage – is applied to prophylaxis of diseases, with preservations of working capacity. It can be the general and the local.

Sports massage – it is a totality of methods of the massage used in sports practice with the purpose of faster restoration of sports work capacity. It is distinguished the following varieties of sports massage: 1) *Hygienic* in the form of self-massage which is applied daily in the morning together with gymnastics. 2) *Training* – as means of strengthening of muscles and physical perfection of the sportsman. It is carried out long (30-50 minutes) and is detailed for a day and earlier before training. Before competitions at hours when performance is appointed. It used all methods, basically stretching. 3). *Preliminary* massage – is applied before sports performance, with short-term during of 3-5 minutes 4). *Restoration* – is appointed for fast restoration of work capacity of muscles after performance or in breaks between competitions. 5). *Medical* – is used at traumas and depends on a kind of sports and character of a trauma.

Cosmetic massage can be applied with the prophylactic and medical purpose. It improves a condition of skin of the face, a head, a neck, promotes to elimination of cosmetic defects.

Segmental massage is based on use of peculiarities of a segmental structure of a body: the irritation of skin receptors of the certain zones affects on the internal bodies and systems of

an organism, innervated by the same segments of a spinal cord. So, the collar zone corresponding to segmental zone C4, is especially rich by receptors (cervical sympathetic ganglia and the vegetative centers of a chest part of spinal cord). Massage of this zone is appointed at migraine, hypertension. The technique of segmental massage is based on strict sequence of various methods. The methods of classical massage are used in it.

In clinical practice are applied specially developed techniques of segmental-reflex massage differentiated for separate diseases, which is in detail stated in monograph of Glayzer and Danycho. Authors consider, that segmental massage should be applied, acting on Zacharyin-Ged's zones on special massage lines (fig. 3, 4).

Segmental-reflex massage renders more full regulating and normalizing influence on exchange processes, secretor activity and other functions of an organism. A version of segmental-reflex massage is acupressure.

Acupressure – is a massage at which massage narrowly limited sites of a body. The choice of points is determined by their functional activity and topographical conformity of a projection of nervous trunks taking place in tissues and neurovascular fascicles to separate organs and systems. In a basis of acupressure, as well as acupuncture lays the motor-visceral mechanism of influence on an organism – it is one of the methods of east reflexotherapy. Depending on force, character and duration of influence acupressure can be calming (inhibitory) or stimulating (tonic). For reception of inhibitory action is carried out smooth slow pressing with gradual increase of force 3-4 times without take-off a finger from skin within 2-3 minutes. Acupressure is appointed for a relaxation of muscles, with removals of a nervous pressure, a pain in muscles, joints. Short, strong pressing with sharp take-off a finger from a point renders stimulating influence, duration of influence on a point 30-60 seconds. During one procedure masseuring of 8-10 points is supposed.

The version of acupressure is the Japanese therapy – SHIATSU which is carried out by pressing by a small pillow of the big finger on a working muscle thus removing is amplified of the superfluous collected lactic acid, blood circulation is stimulated. It is recommended to apply shiatsu at self-massage.

Linear massage – it is a version of east massage, carried out on a direction of current of energy in a sieve of the meridians connecting points of acupuncture. There are 14 basic (12 paired and 2 unpaired), 15 secondary and 8 wonderful meridians. Linear massage can be tonic and inhibitory. Tonic action is carried out in a direction of current of energy, inhibitory – against current of energy in a meridian in which the pathology is found out. On an internal surface of the lower extremity energy flows from foot up to inguinal fold (meridians of a liver, a spleen, kidneys), and on an external surface of legs – on the contrary – from inguinal fold to foot

(meridians of a stomach, an urinary bladder). On the hands energy is directed from a hand up to a shoulder joint on an external surface (meridians of guts) and from a shoulder joint to a hand on an internal surface (meridians of heart and lungs). At inhibitory influence duration of massage 5-6 minutes. A direction of the masseur's hands movement is against a course of a meridian. At tonic – easier pressing with smaller amount of fluctuations in one minute are carried out along a meridian within 3-10 minutes.

Auriculotherapy – a version of acupressure on an auricle is located more than 100 points which leave 18 zones – projections of various organs. The technique of massage of an auricle is in detail described in D.N. Tabeeva's monograph.

Gynecologic massage – is applied at diseases of female sexual sphere, can be external and internal.

Sexual massage – is applied to amplification of a sexual inclination. It is used methods of classical massage and acupressure. It is basically stroked and grinded forward and internal surface of hips, a back along a spine and a thorax.

The Swedish massage was suggested by P.K. Ling, it has the peculiarities: 1). More intensive, strong movements with deep penetration up to the bone in tissues. 2). Stretching of indurations, extension of neurovascular fascicles. Muscles on a course of lymph. 3). Revealing of pathological changes in tissues and application of methods depending on detection of deviations.

The Finnish massage consists basically in stretching of muscles on a bone by one big finger, alternating stretching with stroke by one or two hands.

Periosleal massage – so-called pressing acupressure, intensity of pressure is selected for the best contact with a bone. It is effective as soothing, improving means.

Connective massage – it is massage of the reflex zones, which are taking place in a connective tissue. This massage influences on the certain receptors, causing various reflexes.

Cryomassage – it is massage by ice – it is recommended at contusion and a stretching of ligaments. Stimulation and a reduction are consisted in carrying out of massage in a combination with medical gymnastics.

Vibrating massage – can be manual and mechanical.

Mechanical massage is carried out with the help of: masseur "Bodrost", a gymnastic stick, massage rollers, electromasseurs (ЧЭНС-2), etc.

Hydromassage, underwater shower-massage, vacuum massage, pneumomassage, baromassage, sinocardial massage, cup's massage, self-massage.

Indications to application of massage:

- Diseases and traumas of the locomotor system; diseases and consequences of CNS traumas;
- Diseases and traumas of peripheral nervous system; diseases of cardiovascular system; diseases of respiratory organs, chronic diseases of digestive organs outside of a phase of aggravation.

Contra-indications to application of massage:

Acute feverish conditions, acute inflammatory processes, bleedings and inclination for them, blood diseases, purulent processes, diseases of skin, nails of the infectious, fungous and obscure etiology, skin damage, thrombosis, thrombophlebitis, atherosclerosis of peripheral vessels of extremities, obliterating endarteritis with trophic disturbances, gangrene, aneurysm of vessels, inflammation of lymphatic vessels, the active form of tuberculosis, venereal diseases, chronic osteomyelitis, benign and malignant tumours, the mental diseases accompanying with superexcitation or significant changes of psychics.

PHYSICAL REHABILITATION AT DISEASES OF CARDIOVASCULAR SYSTEM

Clinico-physiological substantiation:

To diseases of cardiovascular system is concerned – ischemic disease of heart (myocardial infarction, stenocardia), atherosclerosis, hypertonic disease, arterial hypotonia, myocardial dystrophy, миокардит, endocarditis, heart diseases, cardiosclerosis, etc.

Diseases of cardiovascular system are a principal cause of mortality and invalidism of the population of economically development countries. To distribution of disease is promoted by a number of factors of the external and internal environment: consumption of high-caloric food, excess weight, smoking, an inactive way of life, and stressful conditions of a modern life.

At various diseases of system of blood circulation and development of cardiovascular insufficiency the various mechanisms regulating blood circulation are involved in pathological process. Therefore the specified diseases are characterized by development of functional deviations not only from the side of the central apparatus of blood circulation, but also the various systems functioning with it in close interaction. In this connection almost all therapy of diseases of blood circulation system represents functional therapy.

In a basis of development of the functional adaptation to physical loading in patients with various diseases of cardiovascular system dosed out training lays. As it is known, the cardiovascular system carries out function of blood distribution which is characterized by four basic hemodynamic factors:

1) Reductions of myocardium (cardial factor);
2) Participation of vascular system in blood promotion (extracardial factor);
3) Influence of processes of an exchange on function of blood circulation (the factor of tissue exchange);
4) Group of auxiliary factors of blood circulation (extracardial – work of muscles, movements in joints, excursions of thorax and diaphragm, etc.)

In the mechanism of the cardial factor of hemodynamics it is necessary to take into account excitation of function of the central blood circulation apparatus. During performance of physical exercises are stimulated trophotrophic and energotrophic influences. So inflow of blood to coronary system is considerably increased, vessels of a myocardium are extended, the amount of functioning capillaries are increased, oxidation-reduction processes are amplified that conducts to stimulation of trophic processes in a cardiac muscle. Stimulation of the central influences (corticovisceral), action of the humoral substances formed at muscular activity promotes amplification to contractile function of a cardiac muscle, increase of systolic volume.

Influence of physical exercises on vessels is caused by action of blood wave on elasticity of an arterial wall. As a result of increase in volume of quickly circulating blood congestional symptoms in parenchymatous organs and in a patient's organism are decreased. Under influence of physical loading the tone of veins is improved also. The venous blood flow is accelerated also at realization of function of external breath in connection with negative pressure in chest during a breath and potentiation of blood inflow to heart. Rushes of blood to muscles at the moment of their relaxation are alternated with outflow during reduction of muscles strengthening venous blood circulation. Reduction of skeletal muscles due to squeezing of lymphatic vessels accelerates lymph current. On acceleration of a venous blood flow render also movements in joints, as each joint is braided with venous network. During a relaxation the veins are filled with blood and at a tension their blood moves ahead in a central direction.

The important role belongs to cardiovascular function of a diaphragm. So during a breath in connection with increase of intra-abdominal pressure large venous vessels in an abdomen cavity throw out blood in the direction of a thorax, on expiration peripheral blood flows in vessels of an abdomen cavity and the following respiratory exercise intensifies promotion of blood in the direction of heart.

Under influence of dosed out training in muscles energetic substances (adenosine thiphosphoric acid (ATA), glycogen, phosphagen) are collected and their expense in comparison with unexercised muscles is decreased. In an oxidation-reduction phase of a metabolism it is increased the process of resynthesis energetic substances (lactic acid) and the phenomena acidosis are decreased.

Among many-sided influences of physical exercises on circulation system it is necessary to take into account and development of collateral circulation in a myocardium, decrease in coagulation of blood and increase of anticoagulative system of blood, reduction of sensitivity of coronal arteries of heart to humoral spasmogenic factors, reorganization of vegetative nervous system aside of prevalence parasympathic department promoting more economic work of heart, occurrence of positive emotions as a result of stimulating action of physical exercises on nervous system.

The exercise therapy causes at patient feeling of good spirits, increase his mood, that in its turn positively affects on current of regenerative process.

Indications to application of physical rehabilitation at cardiovascular diseases

The physical rehabilitation exercise therapy **is shown** at the following cardiovascular diseases.

1. Deseases of neurohumoral apparatus regulating a circulation:
   a) Cardiovascular neurosises;
   b) The diseases connected with insufficiency of coronary circulation – stenocardia and myocardial infarction;
   c) Hypertonic disease;
   d) Arterial hypotonia;
2. Diseases of a myocardium:
   a) A dystrophy of myocardium;
   б) myocarditis in subacute and the chronic periods;
   в) cardioslerosis;
3. Diseases of endocardium and heart diseases:
   а) Rheumatic endocarditis (endomyocarditis);
   б) Heart diseases.

Contra-indications:

The exercise therapy is contra-indicated:

а) at increase of cardiovascular insufficiency, especially of progressing left ventricle, acute myocarditis, an aggravation of rheumatic carditis and a malignant hypertension;

б) at tachycardia in rest, ventricle extrasistole, ciliary arrhythmia, it is especial in a phase of decompensation;

в) presence of dyspnea in rest, and also cyanosis of edema it is necessary to consider as the relative contra-indication which is not excluding strictly dosed out application of medical gymnastics.

PHYSICAL REHABILITATION AT MYOCARDIAL INFARCTION

The clinical characteristics:

Severe pains in the region of heart as a result of coronal arteries obstruction or a long spasm. The necrosis focus in a cardiac muscle is developed, arterial pressure blood is reduced, blood supply of all myocardium become worse, cardiac insufficiency is developed, erythrocyte sedimentation rate (ESR), leukocytosis is increased, there come changes on the electrocardiogram (displacement of segments S-T, occurrence of pathological wave Q and negative T.

Tasks:

Proceeding from the clinico-physiological characteristic, actions of exercise therapy on the patient's organism, the exercise therapy decides the following tasks:

1. Strengthening of a myocardium, improvement of peripheral blood circulation, amplification of exocardiac hemodynemic factors;
2. Improvement of coronary blood circulation and normalization of a metabolism;
3. Increase of the general condition of the patient's tone;
4. Training of cardiac-vascular system with the purpose of increase of a level of an organism functionalities;
5. Positive influence on the patient's psychics:

Now the third-stages system of rehabilitation of infarcted patients is organized. Physical rehabilitation at a stationary stage is directed on achievement of such level of the patient's physical activity at which he could serve himself, up stairs on one floor and make walks up to 1 km 2-3 times in a day without essential negative reactions.

The medical gymnastics and all volume of physical rehabilitation at a hospital stage, including the medical control over its adequacy, safety and efficacy, are carried out by the physician, the doctor and the instructor of physiotherapy exercises.

Physiotherapy exercises is appointed to 2-3 day of disease after liquidation of a painful syndrome and such complications as a cardiogenic shock, a pulmonary edema, severe arrhythmia. All period of a stationary stage of rehabilitation is divided into 4 degrees with subdivided of a daily level of loadings and maintenance of gradual intensifies of them.

The 1-st stage – stationary (duration about 3 weeks at small foci infarction, 6 weeks – macrofocus), the physiotherapy exercises is directed on prophylaxis of the complications connected with a bed regimen (thromboembolia, a congestion pneumonia, intestine atony, and etc.), on improvement of a functional condition of cardiovascular system (first of all on training of peripheral blood circulation at sparing loading on a myocardium), on creation of positive emotions at the patient, on training of orthostatic stability and restoration of simple motor skills.

Activization of the patient begin with the first days of the patient's stay in a hospital at absence of the painful syndrome, increasing negative dynamics of an electrocardiogram and pulmonary-cardiac insufficiency, severe arrhythmia and other complications.

The 2-nd stage – local sanatorium, duration of 4 weeks is important and frequently a determining part in restoration of patients' work capacity with myocardial infarction. At this time on a background of their adaptation to the new conditions of a life connected with various restrictions because of disease, the primary tasks of physical training and restoration of physical work capacity, mobilization of reserve opportunities of an organism are solved. Three regimens of patients' motor activity after a myocardial infarction are scientifically proved and approved in conditions of local sanatorium or a polyclinic: sparing, sparing-training, training. Regimens include the most accessible forms of physiotherapy exercises: medical gymnastics, the morning hygienic gymnastics, dosed out walking, up stairs, independent individual occupations, massage, terrain cure, psychotherapy.

At a choice of the individual program of training it is necessary to take into account severity of infarction current in an acute period, a condition of peripheral blood circulation and a level of tolerance to physical loading before prescribing of occupations of physiotherapy exercises.

Depending on weight of clinical current of a myocardial infarction in local sanatorium the physiotherapy exercises is appointed in 4-10 weeks after an infarction to patients of the I, II, III clinico-functional classes with initial tolerance to loading which are not lower than 200-300 kgm/min. Thus it is necessary to be guided the following criteria: the general satisfactory condition of the patient, a rarity of attacks of a stenocardia, absence of negative dynamics of an electrocardiogram on dosed out loading.

Contra-indications to patients' occupations are – often attacks of a stenocardia, severe disorders of a rhythm (often extrasystole, paroxysmal tachycardia, ciliary arrhythmia)

insufficiency of blood circulation above the IIA stage, a proof arterial hypertensia over 170/100 mm of mercury column, an accompanying diabetes mellitus.

The 3-rd stage – it is out-patient polyclinic

At all stages one of the basic means of rehabilitation is the physiotherapy exercises.

It is shown by numerous researches, that the best results are reached, if the physiotherapy exercises are started in early terms: after the termination of a painful attack and absence of complications with an individual dosage of loading under the control of pulse. On a strict bed regimen – is admitted increase of pulse – on 10-12 beats/min., on the others – up to 100 beats/min.

At a dispensary-polyclinic stage the patients who have transferred a myocardial infarction as a matter of fact represent the persons, suffering by chronic ischemic disease of heart with postinfarcted cardiosclerosis. Physical loadings are gradually and consistently increased with the purpose of the patient's preparation for daily motor loading. The basic difference of physiotherapy exercises at this stage is prophylactic character in relation to an atherosclerosis underlying **ischemic disease of heart.**

PHYSICAL REHABILITATION AT ISCHEMIC DISEASE OF HEART

The clinical characteristics:

Severe pains behind a breast bone, the blood supply of a cardiac muscle caused by acute coming insufficiency.

Tasks:

1. Restoration of function of cardiovascular system by inclusion of compensation mechanisms of cardial and extracardial character.
2. Increase of tolerance to physical loadings.
3. To affect reflexly coronary vessels.
4. Secondary prophylaxis of ischemic disease of heart.
5. Restoration of work capacity and return to professional work.
6. Preservation of restored work capacity.
7. An opportunity of partial or full refusal of medicines.
8. Improvement of life quality.

The same forms of physiotherapy exercises are used (the medical gymnastics, the morning hygienic gymnastics, dosed out walking, up stairs, independent individual occupations,

massage), it is in addition recommended hydrokinezotherapy, trainings on a velosimulator, elements of sports games.

PHYSICAL REHABILITATION AT ATHEROSCLEROSIS

Among diseases of cardiovascular system the most important meaning has an atherosclerosis as the most widespread disease in the second half of human life.

In a basis of this disease is a disturbance of lipoid metabolism, connected with disorder of trophic influences from the side of the central nervous system. Owing to accumulation of cholesterol in blood and reduction of the contents in lecithin focal infiltration by lipoid of an internal membrane of arteries is developed, atherosclerotic plaques are formed in which salts of calcium are gradually put aside. Disturbance of a structure of an artery wall, an aorta, results in narrowing of a lumen of vessels with deterioration of organs blood supply, sites of a body and to development of ischemic disease of heart, an atherosclerosis of brain vessels, kidneys vessels, obliterating endarteritis.

Peculiarities of physiotherapy exercises at an atherosclerosis: the complex of medical gymnastics is carried out daily, duration of 40-60 minutes; patients carry out respiratory exercises, dynamic exercises, with dosed out static effort, exercises on a relaxation, with subjects (dumb-bells, gymnastic sticks, stuffed balls), on gymnastic apparatus (a gymnastic bench, a wall, a simulator "Health", a velosimulator). The level of training loading in a complex of physical exercises is created by combinations of exercises, application of burdening, increase in repetitions of special exercises. Simple exercises are included in view of character of current of disease, functionalities of an organism, with small loading without burdening (a dumb-bell of 0,5-1 kg, stuffed balls – up to 2 kg, respiratory exercises, exercises on a relaxation). For independent patient’s occupations of elderly age the morning hygienic gymnastics, medical gymnastics, walks on foot, self-massage, in the middle age – terrain cure, driving on a bicycle up to 5-10 kms, rowing, skiing, skating, near tourism are shown.

Contra-indication to prescribing of physiotherapy exercises to the patients with initial forms of a cerebral atherosclerosis can be acute disorder of brain blood circulation.

PHYSICAL REHABILITATION AT HYPERTONIC DISEASE

The clinical characteristics of patients:

The increased arterial pressure, headache, vertigo, noise in ears, insomnia, erethism, impossibility to concentrate on work, general weakness.

Tasks:

1. To strengthen and improve all organism.

2. To counterbalance processes of excitation and braking in brain cortex.

3. To settle coordination activity of all parts of blood circulation, to improve their function and to reduce a vascular tone in precapillaries and arterioles.

4. To develop reserve functions of the apparatus of blood circulation and all organism of the patient.

5. To increase oxidation-reduction phases of a metabolism and to improve prophylactic processes in organism tissues.

6. To reduce various subjective displays of disease (the headache, vertigo, nervousness, dyspnea) and to increase in this connection the general work capacity.

The physiotherapy exercises at hypertonic disease have normalizing an effect on vascular reactivity, promoting to reduction in a tone of vessels. It is in its turn accompanied by reduction of arterial pressure. Physical exercises increase contractile ability of a myocardium. At patients parameters of venous pressure are normalized, speed of a blood flow both in coronary, and in peripheral vessels are increased that is accompanied by increase in minute volume of heart and reduction of peripheral resistance in vessels.

Under influence of dosed out physical exercises parameters of lipoid metabolism, coagulating activity of blood are normalized and becomes more active anticoagulative system. Compensator-adaptive reactions are developed, adaptation of the patient's organism to an environment and various external stimulus are increased. Beneficial effect on patients is especial render special physical exercises. Under influence of physiotherapy exercises at patients the mood is improved, the headache, the vertigo, unpleasant sensations in the region of heart are reduced.

The physiotherapy exercises are shown at the first and second stage of hypertonic disease. Intensity and volume of occupations depend on the general physical preparation and the functional condition of cardiovascular system determined at carrying out of dosed out tests with loading. The patients with a hypertension shows morning hygienic gymnastics, the medical gymnastics, dosed out walking, terrain cure, near tourism, sports games, hydrokinezotherapy, mechanotherapy, massage of collar region. To special exercises at hypertonic disease carry on exercises on relaxation of muscular groups, on development of balance, coordination, respiratory dynamic exercises.

Contra-indications to physiotherapy exercises at hypertonic disease are: increase of the arterial pressure (AP) more than 210/120 mm of mercury column, a condition after a hypertonic

crisis, significant reduction of AP with acute deterioration of state of health, disorder of cardiac rhythm, development of an attack of a stenocardia, acute weakness, dyspnea.

PHYSICAL REHABILITATION AT ARTERIAL HYPOTONIA

The physical rehabilitation renders normalizing influence on vascular reactivity, promoting to normalization of a vascular tone. It is distinguished two types of vascular reaction. The first type is characterized by decrease in the general reactivity of an organism and inclination to atonic reactions. For these patients at medical gymnastics general physical loading on an organism should be average and increased. As special exercises use the exercises promoting increase of the general tone and a tone of vessels, appoint exercises with static and dynamic effort, with small burdening (dumb-bells). During course of treatment apply game exercises and games, jumping up. In second half of a course exercises on a relaxation of muscular groups carry out, number of exercises with static effort reduce.

For patients with a hypotonia with inclination of cardiovascular system to spastic reactions general physical loading should be average. To special carry the exercises rendering certain sedative influence and promoting reduction of a vascular tone (on a relaxation of muscular groups, respiratory dynamic exercises). Game exercises are expedient for applying in second half of course of medical gymnastics and without elements of competition.

Besides medical gymnastics apply the morning hygienic gymnastics, dosed out walking, terrain cure, near tourism, sports games, mechanotherapy, hydrokinezotherapy, massage of collar zones.

Occupations carry out in starting positions laying and sitting.

Contra-indications to medical physical culture: acute deterioration of state of health (weakness, vertigo, a pain in the region of heart) a condition after a hypotonic crisis, disorder of a cardiac rhythm (extrasystole, paroxysmal tachycardia).

PHYSICAL REHABILITATION AT INSUFFICIENCY OF BLOOD CIRCULATION

The physiotherapy exercises at cardiovascular insufficiency are applied after the termination of increase of clinical displays of insufficiency. Use of physiotherapy exercises pursues the purpose to facilitate work of heart by development and trainings auxiliary (extracardial) factors of blood circulation, to warn a hypodynamic syndrome, to approach and fix clinical recovery and functional restoration.

Physical rehabilitation at insufficiency of blood circulation of the II degree B

The clinical characteristics:

Insufficiency of the right and left heart; cognational phenomena, disturbance of substances and functions of other organs are expressed sharply. Very much limited activity of the patient, habitual movements cause fast weariness, dyspnea, palpitation.

Tasks:

1. To restore physiological function of cardiovascular system, influencing on hemodynamics, metabolism, oxidation-reduction processes.

2. Gradual strengthening a cardiac muscle and the adaptation of its function to dosed out loading.

3. To increase the general tone of an organism, to prepare the patient for performance of elementary daily loadings.

The physiotherapy exercises are carried out by a technique of the limited regimen. Peculiarity of a technique is gradual development of functions of a diaphragm, the exercises increasing and reducing of intra-abdominal pressure are appointed, in the beginning of treatment active exercises are alternated with passive.

Physical rehabilitation at insufficiency of blood circulation of the II degree A

The clinical characteristics:

Insufficiency of the right and left heart; the phenomena of cognation; disturbance of function of other organs and a metabolism are expressed poorly. The limited activity of the patient, habitual movements do not cause tiredness, dyspnea, palpitation.

Tasks:

1. In the first half of course of treatment – to improve functions of auxiliary factors of blood circulation.

2. In the second half of course of treatment – will gradually increase requirements to the central apparatus of blood circulation.

The technique of physiotherapy exercises is carried out on a sparing regimen. Respiratory exercises with accent on an exhalation are used, at bending and inclinations of the corpus actively to involve a wall of a stomach during a breath. Exercises for the corpus, dosed out walking, up stairs are recommended.

Physical rehabilitation at insufficiency of blood circulation of the 1-st degree

The clinical characteristics:

Presence of subjective symptoms of the insufficiency revealed at habitual physical strains (fast weariness, dyspnea, palpitation, etc.). In rest these attributes of hemodynamics disturbance are absent.

Tasks:

1. To restore function of cardiovascular system with primary influence on extracardial factors of blood circulation in first half of medical course.

2. To carry out increasing training of a cardiac muscle in the second half of medical course.

The technique of physiotherapy exercises is carried out by a technique of a tonic regimen. Walking in the simple and complicated kind, dosed out and rhythmical run in quiet rate is used. Movements with gradually increasing effort, alternate with exercises on a relaxation of separate muscular groups and respiratory exercises, and also exercises in a starting position laying and sitting for an abdominal press, exercise in balance, coordination and a throwing on gymnastic rug.

PHYSICAL REHABILITATION AT DYSTROPHY OF THE MYOCARDIUM

In a basis of a myocardium dystrophy biochemical and physical-chemical changes in a cardiac muscle of various severity and etiology lay. These changes, usually arise as the secondary phenomenon on a background of a chronic intoxication, disturbance of a meal, a metabolism, nervous-endocrine influences, results to weakness of contractile force of a cardiac muscle and, hence to development of cardiac insufficiency. The last at dystrophies of a myocardium does not fall outside more often the limits of the 1-st degree, but gradually with a deepening of biochemical disturbances in a myocardium can develop and insufficiency of the II-nd degree

Tasks:

1. Development of the patient's functional adaptation to physical loadings.

2. Normalization of his reactivity, processes of excitation and inhibition in a cerebral cortex.

3. To improve tissue metabolism and to facilitate work of heart due to inclusion extracardial factors of blood circulation.

4. Restoration of function of cardiovascular system.

The technique of physiotherapy exercises depends on a functional condition of blood circulation system, character of injury of a cardiac muscle, of the patient's age and a degree of the adaptation to physical loads.

At the dystrophy of a myocardium developed on ground of obesity the physical rehabilitation as means of the general improvement and strengthening of the patient, as training of a cardiac muscle with the purpose of development of functional reserves is recommended. Regular and long application of morning hygienic gymnastics, the medical gymnastics, dosed out walking, terrain cure, mechanotherapy, hydrokinezotherapy, near tourism, sports games in a combination with a diet is the effective mean promoting to improvement of work capacity of a cardiac muscle.

At the dystrophy of a myocardium developed on a background of vegetative-endocrine influences, it is necessary to take into account presence of disturbances of neuro-humoral regulation of blood circulation system. From means of physiotherapy exercises the medical gymnastics has primary value, which apply carefully, in a strict dosage and sequence in starting positions laying and sitting, then standing. It is prescribed also dosed out walking, hydrokinezotherapy, passive rest on fresh air.

At a dystrophy of a myocardium owing to a chronic physical overstrain on the foreground the insufficient and increased sensitivity of the central apparatus of blood circulation to physical loadings acts. The patients' condition is characterized by the general asthenization, fast increase of fatigue and dyspnea, pains in the region of heart, sweating, vertigo, erethism, a sleeplessness, presence of a tachycardia (bradycardia), a hypotonia, arrhythmia, decrease of wave T on an electrocardiogram. The clinical picture of a chronic overstrain corresponds to chronic insufficiency of blood circulation of the I or П degree. The organization of medical process should provide the limited regimen within 1-2 weeks with the subsequent application of general-restorative treatments at which the physiotherapy exercises is a basic element of complex therapy. At this disease mainly apply the medical gymnastics, dosed out walking, up stairs.

PHYSICAL REHABILITATION AT MYOCARDITIS

The most often reasons of acute and chronic myocarditis are the transferred infections (scarlet fever, sepsis, diphtheria, rheumatism, flu, etc.). Application of physical rehabilitation pursues the purposes of consecutive strengthening of the patient's organism and training

extracardial factors of blood circulation system at observance of a principle of sparing the weakened cardiac muscle. The physiotherapy exercises is recommended at subacute and chronic current of this disease at absence of pains, reduction of weakness, absence of a tachycardia, tendency of ESR, pictures of blood to normalization, absence of temperature.

In the beginning the medical gymnastics in the limited regimen is prescribed, then at positive dynamics of heart function, transfer on sparing and free regimen. Simultaneously with medical gymnastics dosed out walking, the morning hygienic gymnastics, dosed out training on stairs, walks on fresh air, in sanatorium conditions – terrain cure is recommended. A general dosage of loading and a technique of medical gymnastics same, as well as at insufficiency of blood circulation.

PHYSICAL REHABILITATION AT HEART DISEASES

Principal cause of the majority of heart diseases is the transferred rheumatism. At defects of valves that develops either insufficiency of the valve, or narrowing of an aperture, or simultaneously and another, that conducts to disorder of blood circulation. Insufficiency of blood circulation is compensated by lengthening of diastole and stronger reduction of muscles of a corresponding department of heart that results to a hypertrophy of a myocardium, thus, the heart disease is not limited by disturbance only valvular apparatus, the myocardium is involved in disease process, sometimes and a pericardium also.

The physical rehabilitation is recommended first of all at insufficiency of mitral valve and has for an object functional strengthening of a myocardium and development of all reserve factors of blood circulation, their adaptation to new conditions of blood circulation. At decompensated heart diseases the procedures of medical gymnastics are applied by a technique at insufficiency of blood circulation of the II degree, respiratory exercises in deep breath as they actively influence on venous pressure are not recommended, raising it on an inhalation. Most carefully it is necessary to appoint physiotherapy exercises at the combined defects and at a stenosis of mitral apertures. At these defects the big loading falls on a weak wall of the left auricle that promotes to congestion in a small circle of blood circulation and a hypertrophy of the right auricle. In a kind of insufficient receipt of blood contractile function of the left auricle also is weakened.

The technique of physiotherapy exercises at heart diseases depends on the form of defect, the patient’s adaptation to physical loadings. The volume of application of means of physiotherapy exercises is various (morning hygienic gymnastics, the medical gymnastics, dosed

out walking, stay on fresh air, massage, etc.) as adaptation of blood circulation system is various at different patients.

PHYSICAL REHABILITATION AT CARDIOSLEROSIS

Cardiosclerosis is characterized by development in thickness of a myocardium limited cicatrices or diffuse foci of a sclerosis with primary their concentration in a muscle of the left auricle. Slerosed coronal arteries of heart, in the greater degree are subject to spasms, promote to development of an ischemia of a myocardium. Such distubance of a meal of a myocardium causes development of an atrophy of muscular tissues and replacement by their connecting tissue that result in reduction of contractile functions of a cardiac muscle of work capacity of a myocardium and to development of insufficiency of coronary blood circulation. In this connection general work capacity of the patient goes down, the fast weariness and a dyspnea are developed at physical loading, the phenomena of coronary insufficiency.

In complex treatment of patients with cardiosclerosis, essential value is got with moderate training by physical exercises and settlement of the patients' general regimen, especially a diet and movements. The severe dosage and sequence of physical loadings increase in alternation with elements of passive rest are obligatory conditions of dosed out application of physiotherapy exercises in patients with this pathology.

Tasks:

1. Struggle against displays of coronary insufficiency.
2. Strengthening a myocardium and training of extracardial factors of blood circulation.
3. Adaptation of a cardiac muscle to dosed out household and labour loadings.
4. Improvement of the patient's general tone.
5. Prophylaxis of an atherosclerosis.

At absence of attributes of signs of blood circulation, from forms of physiotherapy exercises use: morning hygienic gymnastics, procedures of the medical gymnastics, dosed out walking, terrain cure, hydrokinezotherapy, near tourism at weak-rugged country, moderate walks on ski, skates. The choice of exercises, their dosage depend on the patient's age, presence or absence of attributes of coronary insufficiency and adaptation to physical loadings. At presence in the patient of attacks of a stenocardia and disorders of a rhythm, chronic cardiovascular insufficiency a technique of physiotherapy exercises is changed according to a degree of cardiac insufficiency and the patient's reaction to physical loading.

PHYSICAL REHABILITATION AT DISEASES OF RESPIRATORY ORGANS

The pathological processes developing in bodies of breath can injure separate parts of the respiratory tract or cause the combined defeats of its various departments. For diseases of respiratory organs following symptoms are characteristic: dyspnea, cough, asthma, expectoration, hemoptysis, pains in the field of a thorax. At pathological process in any department of the respiratory tract function of all system therefore ventilation of lungs worsens is broken, gas exchange is broken, pulmonary insufficiency and as consequence hypoxemia and hypoxia is developed, that leads to disturbance of breath.

One of forms of disturbance of breath is superficial breath (the short breath, the speeded up breath, bad ventilation of lungs and hypoxemia). Another form of disturbance of breath is expiratory dyspnea connected with difficulty of an exhalation. It arises owing to a reflector spasm of bronchial tubes at BA or inflammatory process in a bronchial tube at a chronic bronchitis.

At all diseases of respiratory organs their function owing to the various reasons is broken: restrictions of mobility of a thorax and lungs; deterioration of passableness of a respiratory surface of lungs; decrease in elasticity pulmonary parenchyma; disturbance of diffusion of gases in lungs, the central regulation of breath and blood circulation.

Mechanisms of medical action of physical exercises.

FE at their medical application reflector and humoral raising the respiratory center, promote to improvement of ventilation and gas exchange in lungs. Normalization of gas exchange occurs not only by influence on external breath, but also on tissue (improvement of oxidizing processes and recycling of oxygen). Muscular contraction is one of stimulus of the respiratory center. At performance of physical exercises the metabolism in muscles owing to what in blood a plenty CO and the lactic acid, having an irritating effect on the respiratory center acts becomes more active.

During the dosed out training the special respiratory exercises conterminous with phases of breath (movement of hands and legs, trunks) become conditional stimuluses of the respiratory center and reflex cause increase and a deepening of breath. A greater role plays here and a nose-pulmonary reflex arising at breathe through a nose. The irritation of receptors in the top respiratory tracts reflex leads to expansion of bronchioles and to a deepening of breath.

Under influence of physical and special respiratory exercises improves blood-and lympho-cerculation in lungs, pleura which promotes activization in them of regenerative processes and to the prevention of complications: solderings, emphysema, abscesses, etc. Specially picked up starting positions enable to improve drainage function of lungs that promotes removal from bronchial tubes and alveoluses of pathological contents.

Employment by medical physical culture tone up CNS, promote improvement of nervous processes in a cortex. The dosed out training conducts to improvement of a functional condition of the patient and mobilization of compensator mechanisms. FE salutarily influence on the nervously-regulator mechanisms of blood circulation system.

Physical rehabilitation at a bronchial asthma.

The bronchial asthma is characterized by attacks of expiratory dyspnea caused by narrowing of a gleam of small bronchuses, edema of their mucous and occurrence exudates in them.

Primary tasks of medical physical culture (MPC) are:

1. Recovery of steadiness of processes excitation and inhibition in a cortex of big cerebral hemispheres, repayment of pathological cortico-visceral reflexes.
2. Reduction of a bronchospasm and improvement of ventilation of lungs.
3. Activization of trophic processes in tissues.
4. Prophylaxis of lung emphysema.
5. Training to the extended exhalation.

Course of MPC in a hospital shares for three periods: I-sparing serves for acquaintance with functionalities of the patient, its duration depends on severity of a condition and includes respiratory exercises, massage of peripheral muscular groups. II - employment are spent in a starting position sitting and use MG, MGG, the dosed out walking, massage in the beginning dot and vibrating, then classical massage of a thorax. In III period – in conditions of local sanatorium or a polyclinic same forms of MPC are used.

It is necessary to note, that in employment special respiratory exercises with lengthening an exhalation are used; the sound exercises promoting reflex reduction of a bronchospasm, exercise on a relaxation of muscles of the top humeral zone; diaphragmal breath, strengthening of muscles of a prelum abdominal.

MPC is contraindicated at respiratory and cardiac insufficiency with decompensation of these system functions.

Physical rehabilitation at acute pneumonia.

Acute pneumonia – inflammatory disease of lungs.

Tasks:

1. Strengthening of blood- and lympho-cerculation of lungs with the purpose of exudate resorption and prevention of complications.
2. Prevention of commissures.
3. Activization of a tissue metabolism with the purpose of improvement of trophic processes in tissues.

4. Normalization of depth of breath, improvement of ventilation in lungs, increase in mobility of a diaphragm, strengthening of sputum removing.
5. Prophylaxis of bronchitis.
6. Rehabilitation of physical working capacity.

In the I period of employments in a starting position laying are general-development, static respiratory exercises, massage of peripheral muscular groups. In the II period MG, MHG, the dosed out walking, massage, postural drainage. In the III period all the same forms in conditions of local sanatorium or a polyclinic.

MPC is contraindicated to patients with the expressed intoxication, a high temperature, respiratory insufficiency, tachycardia (pulse is higher than 100 in 1 minutes).

PHYSICAL REHABILITATION AT DISEASES OF DIGESTIVE ORGANS AND ENDOCRINE SYSTEM.

By I.P. Pavlov's works and his followers it is established, that processes of digestion of food in an organism of the person are regulated by the central nervous system. Disturbances in activity of the highest nervous centers negatively influence on a motility and secretor function of a gastrointestinal tract. Diseases of digestion organs, in their turn, can be reflected in a functional condition to the central nervous system and cause disturbances of a metabolism.

At diseases of digestive system can be observed functional disturbances in the form of easing or a distortion of secretor functions of digestive glands, in disorder of motility, in deterioration of absorption of food, dyspeptic phenomena – it such diseases as of organs of an abdominal cavity, spasm of pylorus, dyskinesia of biliferous tracts. Except of functional allocate organic diseases – gastritis, stomach ulcer, colitis, diseases of a liver and biliferous tracts – cirrhosis, hepatitis, cholecystitis.

Etiological factors of the majority of diseases of a gastrointestinal tract are various – they are disturbances of nervous regulation of digestion, the use of strong or substandard food, influence of alcohol, acids, alkalis, and other chemical substances, pathogenic microorganisms, etc.

To diseases of endocrine system carry such illnesses, which are developed as a result of disturbance of function of glands of internal secretion, disturbance of a carbohydrate, fatty and albuminous metabolism, a wrong meal, an intoxication, and other reasons, including ecological influences. Most often there is adiposity, diabetes mellitus, gout among them.

Mechanisms of medical action of physical exercises.

The exercise therapy at diseases digestive and endocrine systems plays the important role in a complex of rehabilitation actions.

At diseases of digestive system it is observed changes of motor, secretor and absorbing its function. Pathological processes are in various departments of the digestive tract in closed interrelations among themselves and are caused by disturbances of nervous regulation. Disturbances of secretor properties of a gastrointestinal tract are usually reflected in its motor function and on the contrary.

Basis of the organization of medical process at diseases of digestive system is the regimen. Its components is the diet and a regimen of movement. It is connected by that the functional condition of digestive system is influenced actively not only food, but also with conditions of an environment, in particular movements, physical exercises.

Physical exercises influence on digestive system as motor-visceral reflexes. Short muscular loads of small and average intensity increase excitability of a cortex of big cerebral hemispheres including the digestive center that makes active vegetative functions, improves digestion, stimulates function of a liver, tones up muscles of a urinary bladder, muscles of a prelum abdominal and a diaphragm (original massage of organs of an abdominal cavity) – it makes active functions of a digestive tract.

Intensive physical loads (running within 30 minutes) render oppressing influence on digestion (reduction of quantity of allocated gastric juice, downturn of its acidity), which is more expressed right after reception of food, in 1-2 hours after meal. Physical load of average intensity (quiet walking) gives toning up effect (stimulates elimination of juce, makes active a motility of a stomach and peristalsis of intestine).

Carried out researches and clinical observations (G.N. Prolastin, 1969) have shown, that under influence of the physical exercises applied before and after meal (in norm and pathology), there is a change of a functional condition of sympathetic nervous system to natural reflection on the subsequent activity of a vagus nerve. So walking during 30-40 min. right after meal oppresses function of a stomach, and through 30-40 min. after meal – stimulates.

Hence, knowing character of disturbances of secretor or motor function and considering a phase of digestion, it is possible to reach normal functioning of digestive organs by means of the differentiated purpose of physical loads of various intensity.

Under influence of physical exercises trophic processes of digestive organs - improve becomes more active blood- and lympho-cerculation, reduction of inflammatory processes, acceleration of regeneration processes is observed.

Physical exercises have medical effect and on formation of indemnifications, which are carried out by a principle of motor-visceral reflexes. Having received signals about disturbance

of function of digestive organs, the central nervous system reconstructs their work by perfection of compensator mechanisms. Physical exercises normalize also position of the displaced organs of an abdominal cavity.

At diseases of endocrine system medical action of physical exercises is caused first of all by improvement of trophic processes, in which basis changes of oxidation-reduction processes in tissues under influence of muscular activity lay. Physical exercises increase power inputs of an organism, can change albuminous, fatty and carbohydrate metabolism and by that to restore tissue structures.

Bases of a technique of physical rehabilitation at diseases of digestive system.

Tasks:

1. Rendering of a positive effect on psychological and emotional sphere.

2. Development and improvement of external and diaphragmal breath.

3. Normalization of secretor, motor, absorption and excretory functions of the digestive tract.

4. Improvement of lympho-and blood circulation in an abdominal cavity and organs of a small palvis.

5. Strengthening of muscles of a prelum abdominal and palvic fundus.

6. Regulation of the intra-abdominal pressure providing prophylaxis of constipation, developments of stagnation and adhesive processes.

The medical physical culture is used in a phase of attenuation of an exacerbation and in a phase of remission. Technique MPC provides a combination general developing and special exercises. General developing exercises render toning up influence on CNS, improve function of digestive organs and a metabolism. Exercises special – it for muscles of a prelum abdominal (strengthening peristalsis, secretor function, outflow of bile), exercises in a relaxation (reduce a tone of muscles of a stomach, reduce a spasm of the pilorus and sphinkters) and respiratory (have massing effect on a liver, a stomach and intestine). Starting positions are: laying, kneeling, palmar-knee. Rate - is slow and average.

Wide use the exercise therapy finds increases of working capacity in sanatorium conditions, when complex influence of medical factors of environment is directed on "reorganization" of all organisms with the subsequent change of its function**.**

Indications to use of physical rehabilitation at diseases of digestive system.

Physical rehabilitation **is shown** at chronic diseases of a stomach: chronic gastritis, gastroduodenitis (normocytic, hypocytic, hypercytic, anacytic), in the compensated form without expressed changes of a mucous membrane of a stomach and a duodenum.

At illnesses of intestine exercise therapy apply at chronic colitis, enteritis. At dyskinesia of digestive system - habitual constipations.

The exercise therapy is shown also to patients with omission of internal organs (gastroptosis, visroptosis).

Contra-indications to use of physical rehabilitation at diseases of digestive system.

To destination of physical rehabilitation **are contra-indicated**: bleedings, penetrating ulcer, acute perivisceritis (perigastritis, peridodenitis, at occurrence of an acute pain during caring out of exercises.

Physical rehabilitation at diseases of a stomach and an intestine.

Chronic gastritis – the most wide-spread disease of digestive organs, which is characterized by an inflammation and dystrophic changes of a stomach mucous with disturbance of its function. Disease proceeds with secretor insufficiency, with normal or increased secretion.

In treatment of a chronic gastritis alongside with a diet, medicamentous treatment the important role is allocated to exercise therapy. Tasks of exercise therapy are: liquidation of inflammatory process and improvement of blood- and lympho-circulation in organs of abdominal cavity that adaptation to increasing physical loads promotes processes of regeneration in a mucous membrane of a stomach, its normalization of secretor and motor function.

In the 1st period corresponding to acute and subacute phases of disease medical gymnastics is spent by laying on a back or sitting for 2 hours up to meal or in 1,5-2 hours after meal. During remission carring out of exercises for increase of intra-abdominal pressure in a starting position is supposed - laying on a stomach. In a combination to medical gymnastics massage of a forward abdominal wall, acupressure of segments of a spine are spent.

In the II period except for general-roborant exercises special exercises with accent on diaphragmal breath and a relaxation, segmentary massage are included.

In the III period and sanatorium-resort conditions – alongside with MG, segmentary massage is used the dosed out walking, terrencur, mobile and sports games, sweaming.

Peptic ulcer of a stomach and duodenum – a chronic inflammatory disease with formation in a wall of a ulcer (niche). More often this defect is localized on small curvature of a stomach or in an initial part of a duodenal gut.

In occurrence of disease the important role of diseases play neuro-endocrine influences on a background of overstrain and breakdown of CNS, a diet; a gastrointestinal tract, alcohol, the smoking, hereditary predisposition, the infectious factor, an allergic component.

At peptic ulcer there are degenerate changes of a mucous membrane of a stomach and a duodenum and its disturbance of its secretor functions. Illness proceeds with periodically repeating exacerbations and is characterized by pains in epigastrium, connected with reception of food or on an empty stomach, with expressed dyspeptic phenomena: heartburn, eructation, vomiting, and constipations. For patients are appointed a sparing diet, sedatives, mud cure, coniferous baths, medicines, mineral waters, exercise therapy, which is directed on settlement of processes of excitation and inhibition in a cortex. As contra-indication to assignment of exercise therapy serve – strong pains, bleeding, perforation, stenosis and a stage of decompansation. The exercise therapy is appointed to 2^{nd}-4^{th} day from the moment of hospitalization.

In the 1^{st} period (to two weeks) respiratory exercises of static character in a starting position laying, exercises on a relaxation for average and small muscular groups duration of 10-15 minutes are shown.

In the II period at significant improvement of a condition of the patient the morning hygienic gymnastics, medical gymnastics, massage of a forward abdominal wall, independent employment with use of diaphragmal breath, the dosed out walking is recommended. Duration of employment till 15-20 minutes, in small rate, small amplitude.

In the III period in a phase of incomplete and full remission, exercises for all muscular groups with restriction of load on muscles of an abdominal wall, exercises with shells up to 2 kg on coordination, morning hygienic gymnastics, medical gymnastics, independent individual employment are used, the dosed out walking, sports games. At a stage in sanatorium is widely used terrencur, walks, sports games, sweaming.

Chronic colitis – is an inflammation of a mucous membrane of large intestine or a enterocolitis – inflammation of all intestine mucous. The reasons of its inflammation are various, first of all the infectious nature, secretor insufficiency of a stomach and a pancreas, the nervously-reflex mechanism, disturbances of a diet and an inactive way of life. Characteristic attributes of colitis are: colicy pains in a stomach, constipations or diarrheas. The diet, anti-inflammatory and symptomatic preparations, mineral waters, means of exercise therapy enter into complex therapy of the patients with this disease.

In the first period of exercise therapy the important role is played with a choice of a starting position. It is applied starting positions lying on a back with the legs bent in knee joints, and also kneeling and on all fours, that promotes a relaxation of muscles of an abdominal wall and salutarily influence on intra-intestinal pressure. Exercises for muscles of a prelum abdominal are contra-indicated.

At spastic constipations special exercises with diaphragmal breath, exercises in a relaxation are entered. At atonic constipations – the exercises promoting strengthening of peristalsis (for muscles of a prelum abdominal and a pelvic fundus).

In the second period general-developing and special exercises are carried out in slow rate in all starting positions. The accent is done on exercises in a relaxation. Effectively alongside with the morning hygienic and medical gymnastics, this has been dosed out by walking use of segmentary massage.

In the third period of MPC the circle of general-developing considerably extends and special exercises, exercises with the shells, special exercises for a prelum abdominal, the dosed out walking is included.

Physical rehabilitation at diseases of a liver and biliary tracts.

At various pathological conditions of a liver biliary tracts are involved in a process. Both in physiological conditions and at pathological conditions this system is closely connected with a metabolism in all organism, blood circulation, breath and digestion. At diseases of a liver and biliary tracts clinical displays are characterized by a number of functional disorders from a side of metabolism, digestion, breath and blood circulation.

Dyskinesia of biliferous tracts.

Depending on functional disturbances of a gallbladder contractility, dyskinesia are subdivided on hyperkinetic (hypertonic, spastic) and hypokinetic (hypotonic, atonic). Clinical forms of dyskinesia predetermine the differentiated approach to construction of a technique of medical gymnastics.

The exercise therapy is shown at both forms of dyskinesia both during remission and at the minimal subjective displays of disease, at moderately expressed painful syndrome the medical gymnastics can be applied only on a background of complex treatment.

At hypokinetic form of dyskinesia the general physical load is average. Starting positions lying on a back, to a side, standing, sitting, on all fore, in a knee are used. The medical gymnastics with a complex of respiratory exercises with delay on a breath and an exhalation is appointed (promotes removal of a painful syndrome and dyspeptic phenomena), special exercises for muscles of a stomach, inclinations of a trunk in a combination to rotation for increase in intra-abdominal pressure carry out with care, various kinds of walking, exercise on a relaxation of muscles, morning hygienic gymnastics, independent individual employment, inactive games, segmentary massage are included. Duration of medical gymnastics is 20-30 minutes.

At the hyperkinetic form of dyskinesia on the first employments of medical gymnastics give small physical load, the starting position laying on a back prevails, avoid static efforts, static and dynamic respiratory exercises, respiratory exercises on right side in a combination with waving movements for improvement of blood supply of a liver are shown. Various general-roborant exercises promote to improvement of work of a cardiac musle and outflow of blood from a liver, exercises for muscles of a prelum abdominal should be alternated with relaxation. Except for that the morning hygienic gymnastics, inactive games, independent individual employment, self-massage of a stomach, segmentary massage are recommended. Duration of employments is 20-30-minutes with passive rest of 3-7 minutes.

Cholelithiasis and cholecistitis.

Cholelithiasis is characterized by development in a system of biliary tracts of gallstones. In a basis of this disease disturbance of the cholesterol metabolism, hereditary predisposition lies, change of structure of bile has meaning, and also nervous regulation influencing on evacuation of gallbladder and function of sphincters. To factors promoting to disturbance of a liver activity and metabolism, excessive completeness, pregnancy, a superfluous and irrational meal, hypokinesia etc. are concerned.

Congastion of bile, complicating its outflow from a gallbladder, promotes drift of an ascending infection and occurrence of inflammation in a gallbladder. Development of a cholecystitis is promoted by gallstones.

The cholecystitis can acute and chronically flow. It is necessary to consider, that the chronic cholecystitis represents a series of exacerbations and it is accompanied by sclerous changes of gallbladder walls, and also by atrophic or hypertrophic changes of its muscles, can be formed and fibrous adhesions with an omentum, transverse colon and duodenum.

At specified diseases exercise therapy to improvement of blood circulation in an abdominal cavity, normalization of intra-abdominal pressure, activity of digestive processes, peristalsis of intestine is applied. Respiratory movements of a diaphragm actively influence on a liver and stimulate a hepatic blood-flow and biliferous function.

The exercise therapy provides purpose of medical gymnastics, morning hygienic gymnastics. Mainly exercises for muscles of the trunk in position standing and sitting on a bench, lying with gradual increase in load at a prelum abdominal, avoiding static efforts, in a combination with a relaxation are used. Diaphragmal breath lying on a back and the right side is recommended. Exercises with medical balls and on a gymnastics wall are used. It is expedient to appoint the dosed out walking, sweaming, rowing, inactive games, self-massage of a stomach, segmentary massage.

Physical rehabilitation at diseases of a metabolism.

Adiposity – is a disease described by superfluous adjournment of fat in an organism. Two forms of adiposity ***exogenic (alimentary***) - as distinguish result of an excessive meal at the limited physical mobility and ***endogenic,*** caused by disturbance of functions of internal secretion glands or regulation of a fatty metabolism in the first turn of hypothalamus.

It is distinguished four degrees of adiposity: 1 degree – weight of a body exceeds norm on 10-30 %, II – 30-45 %, III – 50-100 %, IV – more than on 100 %. Patients are complained on bad state of health, fast fatigue, sleepiness, dyspnea, hypostases, pains in the field of heart, increase the BP. Complex treatment of adiposity includes diet, water procedures, hormonal preparations, exercise therapy, massage.

Tasks: improvement of a metabolism, activization of oxidizing processes, strengthening of processes of splitting of fat, reduction of superfluous weight of a body, to eliminate various disturbances in an organism, accompanying adiposity (constipations, dyspnea, sleepiness, the reduced working capacity).

In the 1 period there is an adaptation to increasing physical loads, recovery its motor skills and physical working capacity using morning hygienic gymnastics, the medical gymnastics, the dosed out walking, independent employments, walking on stairs, mechanotherapy, hydrokinezotherapy, massage.

In the II period except for these means are actively included exercises of cyclic character in the moderate rate: walking, near tourism, medical sweaming, exercises on breath, muscles of a prelum abdominal, corrigated exercises, exercises on simulators. Thus all the ways of increase of load are applied: involving of large and average muscles, increase in amplitude of movement and duration of employments, use of exercises with burdening, mechanotherapy and duration of employments from 25 till 40 minutes.

Contra-indications to employments on simulators: adiposity of the IV degree, insufficiency of blood circulation of the II and III stages, hypertensive, diencephalic crisis, an exacerbation of calculous cholecystitis, increase BP higher than 200/120 mm of mercury column, reduction of pulse up to 60 in minutes.

Diabetes mellitus – the disturbance of a carbohydrate metabolism caused by insufficient development of insulin by a pancreas. The reasons are disorder of nervous regulation, heredity, infectious diseases, excessive use of carbohydrates. The main thing in treatment of diabetes – observance of a diet with the small contents of carbohydrates and fats, preparations reducing the contents of sugar of blood and exercise therapy, massage.

Tasks: stimulation of recycling of sugar in an organism, compensation of insulin insufficiency, increase of stability of an organism to carbohydrates to improve function of cardiovascular and respiratory systems, to increase physical working capacity, to interfere for development of micro- and macro-angiopathies.

Indications: all forms of diabetes mellitus. At complication of diabetes by ischemic disease of heart, myocardial infarction the medical gymnastics is under construction in view of these diseases.

Contra-indications: hyperglycemia within the limits of 16,6 ммol/l and higher, presence of acetone, attributes of a coma.

All forms of exercise therapy are used: morning hygienic gymnastics, the medical gymnastics, the dosed out walking, independent employments, hydrokinesotherapy, massage, inactive games, in view of a functional condition of cardiovascular system and at absence of complications (furunculosis, atherosclerosis, hypertonic diseases, obliterating endarteritis).

It is important that a patient at exercise therapy knew, that at occurrence of feeling of hunger, weakness, trembling of hands, it is necessary to eat 1-2 slices of sugar and to stop employments. After disappearance of hypoglycemia it is necessary to reduce a dosage of load.

Gout – disease resulting of disturbance of an protein metabolism (purine). The reasons are: heredity, overeat of meat, alcohol. At a gout uric acid - the end-product of purine bases is postponed in joints and other tissues, causing inflammatory process that leads to deforming arthrosis.

To treatment a dairy-vegetative diet, plentiful drink, radon and hydrosulphuric baths, hormonal preparations, exercise therapy, massage.

Physical exercises promote to improvement of a metabolism, removing of uric acid, recovery of the disturbed mobility in joints. Among forms of exercise therapy the morning hygienic gymnastics, medical gymnastics, active and passive movements in joints with increase in the amplitude, the dosed out walking, rises on stairs, independent individual employments, mechanotherapy, hydrokinezotherapy, terrencur, outdoor games, massage of muscles and injured joints are used.

PHYSICAL REHABILITATION IN SURGERY, TRAUMATOLOGY AND ORTHOPEDICS.

In surgery – at operations on internal organs for access to them it is necessary to open a chest and an abdominal cavity. By preparation and carrying out of cavitary operations to an

occasion of chronic diseases treatment is subdivided into the preoperative and postoperative periods.

Operations on thoracic cavity – in the preoperative period operations on lungs with the purpose of a reserve of functionalities MPC is included.

The primary tasks:

- Reduction of intoxication.
- Improvement of function of cardiovascular system and external breath.
- Strengthening of physical strengths of a patient and psychological status.
- Mastering by the exercises necessary for the patient in the early postoperative period.

Contra-indications:

Pulmonary bleeding, cardiovascular insufficiency (III stage), myocardial or lung infarction in an acute period, high temperature(38-39° C).

The technique of physical rehabilitation is made in view of localization and prevalence of pathological process, a condition of external breath, age of the patient, character of disease and a kind of intervention, a degree of physical readiness of the patient.

The early postoperative period:

Tasks:

- Prophylaxis of pulmonary complications by improvement of ventilation of lungs, drenage of bronchuses, straightening of the remained part of a lung.
- Prophylaxis of phlebothrambosies.
- Prophylaxis of disturbances from the side of gastro-intestinal tract (paresises of a stomach and an intestine, a delay of a stool, meteorism.
- Improvement of function of breath and cardiac activity.
- Prophylaxis of restriction of mobility in a humeral joint on the operated party.
- Preparation of patients for expansion of a motor regimen.
- Increase of a tone of nervous system.

Contra-indications have temporary character:

The general severe condition of patients caused by complications during operation is (a shock, cardiac arrest, loss of blood, etc.), a secondary bleeding, frequent small pulse.

The medical gymnastics is appointed in 1-2 hours on 3-5 times a day and includes: diaphragmal breath, exercises on an exhalation, turns on the healthy side, dynamic respiratory exercises for 2nd day. Massage, a postural drainage, since the 2nd-3rd weeks getting up, walking on stairs, on a corridor. In 2 months after it is possible to appoint medical swimming.

Operations on an abdominal cavity. Operations on organs of abdominal cavity are made to an occasion of peptic ulcer of a stomach and duodenum, cholecystitis, hernia, appendicitis, wounds of an abdominal cavity, etc.

Tasks of the preoperative period are:

- To increase the general tone of an organism (emotional and nervous-muscular).
- To improve a functional-condition of cardiovascular and respiratory systems.
- Improvement of motor function of a stomach and intestine.
- Strengthening of muscles of a prelum abdominal.

Technique of MPC includes: training of chest type of breath, with the formed, extended exhalation, general-developing and special exercises in various starting positions (lying on a back, on a right and a left side, standing on all four / with highly lifted pelvis).

Independent employments up to 5-6 times in a day should include the exercises promoting removing of sputum, activization of blood circulation in distal departments, increase in mobility of a diaphragm, extremities, reductions and expansions of muscles of a prelum abdominal.

Contra-indications:

The general severe condition, increase of a temperature, danger of a bleeding, perforation of vermiform process, suspicion on an ulcer, appendicular infiltrate, peritonitis and so forth.

In the postoperative period:

In the early postoperative period a technique of the medical gymnastics is made in view of features of operative intervention, current of the postoperative period, a condition of the patient before operation and after it, age of the patient.

Respiratory exercises with the subsequent expectoration are used. The medical gymnastics after appendectomy can be begun at the first 3-5 o'clock, for the 2^{nd}-3^{rd} day is getting up both walking on a corridor and stairs. For the 4^{th}-5^{th} day in a group, for the 6^{th}-7^{th} day the patient is discharged from hospital.

Medical gymnastics after operation of peptic ulcer of a duodenum and a stomach: in the 1^{st} day – chest type of breath (respiratory exercises) and exercises on distal departments of extremities, N 5-6 on 5-10 minutes.

For the 2^{nd}-3^{rd} day – supporting a postoperative wound the patient carries out the medical gymnastics including respiratory exercises and exercises on small and average muscular groups, small and average joints, turns of a trunk sideways, massage of muscles of a spine, preventive maintenance of developments of stagnation in lungs (postural drainage), transition in position sitting in beds (for the 4^{th}-5^{th} day), then to getting up for the 6^{th}-9^{th} day.

From the 9th-10th day of employment by morning hygienic gymnastics, the medical gymnastics including respiratory general-developing exercises, exercises on strengthening of muscles of a prelum abdominal), massage of a spine.

At cholecistectomy – the same principle, as in the previous material, only to sit with the lowered legs on the 6^{th} day, to get up on the 10^{th}-12^{th} day, thus on postoperative cicatrix the bandage is imposed. Within 6-12 months heavy work with a pressure of muscles of a prelum abdominal is not recommended. MPC in conditions of a polyclinic the medical gymnastics, morning hygienic gymnastics, massage of a backbone, terrencur) is appointed.

Physical rehabilitation after herniotomy has peculiarities:

In the first 7-10 days after operation as much as possible reduce load on the abdominoanterior wall, pressure of muscles of a stomach is excluded, to sit on the 5^{th} -6^{th} day, to go on the 8-10^{th} with a supporting bandage. At the strangulated hernias - exercises on strengthening of muscles of a stomach only in 2-3 weeks, to sit on the 6^{th} -8^{th} day, to get up on the 12-14^{th} day. For 14th day MPC includes morning hygienic gymnastics, medical gymnastics, walking, stay on fresh air, adaptation to household load. Only in 3-4 months after herniotomy it is shown the complex of medical gymnastics promoting strengthening of muscles of a prelum abdominal, from starting positions lying, sitting and standing.

Physical rehabilitation in traumatology and orthopedics.

Use of physical exercises at diseases and traumas of locomotor system promote to healing of wounds, improvement of blood supply and to elimination of developments of congestion in the injured parts of a body, to the prevention of complications – contractures, muscular dystrophies, commeasures, etc. Physical exercises render normalizing influence on a level of the basic ' nervous processes, increase a tone of a cortex of cerebral big hemispheres, work psycho-therapeutic, and restore forces of the patient more quickly. Physical exercises are appointed in the first days after patient's reception in a hospital in view of a patient's condition and his specific features.

All course of physical rehabilitation is conditionally divided into 3 periods: immobilization; post-immobilization; recovery.

I. The period of immobilization corresponds to bone adhesion of breaks, which comes in 30-90 days after a trauma.

Tasks:

- Increase of a vitality of the patient;

- Improvement of function of cardiovascular, respiratory systems, gastro-intestinal tract, metabolic processes, immobilized extremities.
- Improvement of blood- and lympho-circulation in a zone of damage.
- Stimulation of regenerative processes.
- The prevention of muscles hypotrophy and rigidity of joints.

Contra-indications:

- The general severe condition caused by loss of blood, a shock, an infection, accompanying diseases, increase of a temperature higher than 37,5° C, a proof painful syndrome, danger of a bleeding, presence of the foreign bodies located near from large joints, nerves, vitally-important organs.

- From forms of MPC are used: MGG, medical gymnastics (1-3 times a day), including static and dynamic respiratory exercises, general developing exercises covering all muscular groups, exercises on coordination, balance. Exercises for symmetric of extremities, ideomotor and isometric exercises on immobilized muscular groups, for prophylaxis of contractures and hypotrophy of muscles in the form of independent individual employment. Massage is appointed from the 2nd week once a day. Mastering by the elementary skills of self-service.

II. Postimmobilization period: is begun after removal of a plaster bandage or skeletal extension. Clinically and roentgenologically in these terms consolidation of area of fracture and reduction of force and endurance of muscles, amplitudes of movements in joints is marked.

Tasks:

- Preparation of the patient to getting up, training of the vestibular apparatus, training to skills of movement on crutches.
- Restoration of function of the injured extremities.
- Normalization of a correct posture.
- Recovery of motor skills.

In this period are used: MG, medical gymnastics, load increases due to increase of a number of exercises and their dosage, massage of 10-15 procedures, independent individual employment, mechanotherapy, hydrokinezotherapy, work therapy.

III. Recovery period.

During this period the residual phenomena in the form of restriction of amplitude of movements in joints, decrease of force and endurance of muscles of the injured extremities leading to reduction of working capacity are possible.

In this period MGG, medical gymnastics, the independent individual employment, the dosed out walking, mechanotherapy, hydrokinezotherapy are appointed.

Estimation, efficacy of treatment:

Under recovery is understood as performance by patients of full volume of movements in joints, recovery of muscular force, speed and coordination of movements.

Measurements are spent:

1. Angular measurements of amplitude of movement in a joint by means of goniometers (a limit the act. and pass, movements).
2. Goniometry – measurement of curvature and movement in a spine, corners of an inclination of a pelvis, (Gamburtsev's goniometer).
3. Linear measurements by a centimeter tape (length, a circle of the injured and healthy extremity in comparison).
4. A circle of extremity.
5. Muscular force (dynamometer).
6. Endurance of muscles in static (dynamograph) and dynamic (ergograph) work.
7. A tone of muscles.
8. Applied purposeful movements.

Traumas of a spine: These are the severest injuries; the sequence of medical actions is determined by prescription, a degree, character of injury and neurologic disorders.

Tasks in the period of immobilization:

- Elimination of displacement of vertebrae.
- Elimination of a compression of a spinal cord and it roots.
- The prevention of relapses and secondary injuries of nervous elements.
- Increase of force and endurance of muscles of a trunk and neck.
- Increase in mobility of a spine. At injury of a cervical department (C5-C6) it is appointed:

- Treatment by position, (the patient stack on a rigid bed, extension by means of Glisson's loop) the head end is raised on 50 sm (at flexion fracture). At extantion fracture under a head the small pillow keeps within and extension is imposed, the medical gymnastics is appointed on 2-3 day (general-developing exercises for distal departments of extremities and respiratory exercises in the ratio I:2, in the certain rate with pauses, with recurrences 4-6 times, 2-3 times a day.
- In 15-30 days after extension pass during – 8-10 days in position sitting with expansion of motor regimen (to sit, move). The medical gymnastics, the dosed out walking, independent individual employment (a pressure of muscles of a neck).

Contra-indications: movements of a trunk forward;

In postimmobilized period in 8-10 weeks remove fixing plaster bandage. The medical gymnastics is directed to this period on strengthening of muscles of a neck, a shoulder girdle and the upper extremities, recovery of movements in a cervical department of a spine. Medical

gymnastics spend in a starting position laying, then sitting and standing. Widely use exercises on coordination of movements, balance, normalization of a posture and gait. Alongside with gymnastics is appointed massage of portal zones of muscles of a spine and the upper extremities, hydrokinezotherapy in pool, work therapy.

Injury of bodies chest and lumbar vertebra.

More often compression fracture is met. At small compression (no more than 1/3 of heights of a body vertebra), accepts the functional method of treatment developed by V.V. Gorinevskaya and E.F. Dreving), which essence consists in longitudinal extension for axillary spaces on rigid bed with an inclination 40-60 sm, and bolsters under area of injury.

The medical gymnastics is divided for 4 periods:

1. The period (7-10 days): the medical gymnastics is directed on increase of vitality, maintenance of cardiovascular, respiratory and digestive systems, the prevention of decrease in force and endurance of muscles.

   Respiratory exercises (static and dynamic), general-developing for the small and average muscles, the facilitated sliding movements in micro-extremities, raising a little of a pelvis, during 10-15 minutes, lying on a spine, individually are used.

2. The period (up to 30 days): Alongside with the previous tasks strengthening of trunks muscles, a shoulder girdle and pelvis fundus, development of "a muscular corset", employment by medical gymnastics during 20 minutes are appointed, turns on a stomach, extensive exercises, caving in a chest department, the bolsters under a breast in a starting position lying, in a combination with isometric (a pressure \ a relaxation of muscles of a spine, active movements of the lower extremities) are already resolved.
3. The period (till 45-60 days) – strengthening of trunk muscles and pelvis fundus, extremities, coordination of movements and mobility of a spine.

   Basis – is an axial gradual load on a spine (being on all fours, in a knee) lying on a spine. Deduction of a trunk in a pose "swallow" (lying on a stomach) – during 2-3 minutes and direct legs under a corner 45°– 23 minutes.
4. The period in 60 days after a trauma – goes adaptation to vertical position and in employment exercises in a starting position "standing" (inclinations, removal and reduction of legs, half squattings) are included, skill of a correct posture, with gymnastic subjects, at a gymnastic wall is got.

At treatment of fractures with a significant forward compression for 4-6 months is imposed an extensive plaster corset and medical gymnastics from the first days after a trauma is appointed. In 4-6 months the medical gymnastics is directed on strengthening of a trunk muscles, extremities, massage, hydrokineziotherapy is recommended.

At fractures of pelvis bones methodical principles of MPC are the same as at a fracture of spinal column. The patient without complicated fracture stack on a mattress with the wooden board enclosed under it, for relaxation of muscles of a pelvis and legs under half-bent both slightly dissolved hips and knees ("position a frog") bring the bolster. Employment by medical gymnastics in 3-5 days after crisis is begun.

In the I the period various exercises of hands and partially to a trunk, very cautious movements on the bolster by legs without tearing off heels from a bed are applied at support of the methodologist.

In the 2 period exercises for legs, pelvis girdle, muscles of a spine, in a starting position lying on a stomach are entered.

In the 3 period to the patient allow to rise, observe of functions of pelvis muscles, walking and a poster.

Physical rehabilitation in orthopedics at an osteochondrosis of a cervical department of a spine.

The osteochondrosis of a spine represents a disease in which basis the degeneration of an intervertebral disk with the subsequent involving in process of a body of adjacent vertebrae, and also changes in intervertebral joints and the ligamentous apparatus. Increase of degenerative changes in an intervertebral disk has corresponding morphological, a substratum and characteristic clinical displays. But the variety of clinical forms of osteochondrosis entails also variety of ways of physical rehabilitation, which develops from various orthopedic, medicamentous and physiotherapeutic, and also MPC.

MPC is effective not only at an exacerbation of disease, but also is a basis of prophylaxis of exacerbations and progressing of degenerative process. The medical gymnastics at osteochondrosis in the methodological plan should be uniform, but with the obligatory account of specific peculiarities of an organism, localization of process and a stage of disease.

At carrying out of medical gymnastics it is necessary to observe following principles:

- The medical gymnastics is spent in a cotton-gauze collar of Shvants's type. Constant carrying it during of a course. Thus rest for a cervical department is created, microtraumas are prevented, pathological impulsation is decreased.
- In the initial and basic period of course of treatment active movements are completely excluded, they are supposed for 15-20 day.
- All gymnastic exercises alternate with exercises on a relaxation.

- From the first procedures of medical gymnastics exercises for strengthening of a neck muscles, isometric, respiratory exercises are entered.
- Occurrence of pains testifies about necessity to reduce a load.

Tasks:

- Strengthening of an organism.
- Decrease of pathological proprioceptive impulsation from a cervical department. Improvement of blood circulation in the injured segment, reduction of a hypostasis in tissues.
- At humeroscapular periarthritis – reduction of pain in a humeral joint, and the upper extremity, prophylaxis of neurogenic contracture of a humeral joint, recovery of movements amplitude.
- At a back local sympathetic syndrome – prophylaxis of vestibular desturbances.
- At discogenic ischemic myelopathy – strengthening of the weakened muscles and struggle against spastic displays of diseases.
- Means and forms of MPC: medical gymnastics up to 30 procedures, massage of collar zone, muscles of hands (15 proc.), treatment by position (a dream on a rigid bed with a small pillow), hydrokineziotherapy.

Technique of medical gymnastics: in the acute period of disease (a relaxation of muscles of a shoulder girdle, exercise on small both average muscular groups and joints. In subacute period the medical gymnastics is directed on strengthening of muscles of a neck and a shoulder girdle, general-developing, respiratory, isometric exercises are used. Active movements in a cervical department – in the final period of MPC are used.

Osteochondrosis of a lumbosacral department of a spine.

Treatment is consisted of medicamentous therapy, traction of a spine for reduction of volume of prolabial parts of a disk and decompression of a nervous vertebra; MPC and physiotherapy is appointed.

At selection of exercises it is necessary to consider following anatomo-biochemical peculiarities of a lumbosacral department of a spine.

Intradisk pressure in the injured disk is decreased in horizontal position (on 0,5-1 kg/sm2) and in vertical is increased. Therefore the dream on a board is appointed, and physical exercises are executed in a starting position, lying on a spine, a stomach, a side, on all fours.

As hernias of an intervertebral disk enters more often "conflict" to the nervous endings that is shown in a pressure, and it is possible and contracture of long muscles of a spine it is necessary to include exercises in employment of medical gymnastics on a relaxation.

Already in subacute stage in employment are included:

a) Physical exercises on bending of a spine;

b) A starting position laying on a stomach with leading under a stomach of the small sizes of cotton-gauze blotters;

It is unnecessary to include in medical gymnastics physical exercises on unbending of a lumbar department of a spine (especially in acute and subacute stages).

It is necessary to use physical exercises on "extension" of a lumbar department already in acute and subacute stages, i.e. they promote to decompression.

Active movements in a lumbar department it is shown only outside of a stage of exacerbation and for stimulation of the injured department of a spine and strengthening of trunk muscles, pelvis fundus static exercises (on 2-3-5 sec.) are used.

At employment by medical gymnastics it is necessary to fix a lumbar department by a belt of weight-lifter or an orthopedic corset.

Except for medical gymnastics massage of muscles of a spine, a waist, receptions of manipulation, skeletal extension, in a chronic stage of hydrokineziotherapy, swimming, terrain cure, the dosed out walking is used.

Surgical treatment is shown at absence of effect from conservative therapy within 6-9 months.

Physical rehabilitation for children with an orthopedic pathology. Platypodia.

Tasks: strengthening of all organism and the muscular apparatus of feet, improvement of local blood circulation of feet, increase of the general and force endurance of muscles of the lower extremities.

The basic place in MPC is occupied with the special tasks directed on correction of feet deformation, education and fastening of a habit of correct position. A basis of rehabilitation is the general training of an organism.

In the beginning of a course special physical exercises for muscles of a crus and the feet directed on restoration of deformation of feet, reduction of the pronation and supernited contracture of a forward department of feet are appointed, which are alternated with general-developing and exercises on relaxation. For strengthening of muscles walking on sand, a pebbles is used. To fix correction it is necessary by means of special kinds of walking: on tiptoe, heels, an external surface of feet, and for corregated effect ridge boards, slanting surfaces are used. Except for medical gymnastics massage after warm feet baths is necessary used. On a course is 12-15 procedures necessary. Orthopedic methods – carrying of special footwear on a

thick sole with a low heel. Addition to treatment swimming by style "crawl", walking on skis, driving on a bicycle, game in volleyball is.

Scoliosis

General tasks: improvement of a functional condition of cardiovascular system, organs of breath, the nervous-muscular apparatus. Increase of physical working capacity by the general training of an organism.

Special tasks: unload of a spine, correction of scoliotic deformation, formation of well developed muscular corset for stabilization of a spine and the prevention of progressing of scoliosis, training and fastening of a habit of a correct posture.

Patients with the 1st and the 2nd degree of scoliosis MGG, MG with inclusion of general-developing, respiratory and special exercises for muscles of a spine, breast, a stomach and extremities is appointed. For correction of scoliosis symmetric and dissymmetric corregated and detorsion exercises in position of the least static pressure (laying on a stomach and a spine) are used.

Congenital muscular torticollis.

Tasks: improvement of blood- lympho-circulation in the injured muscle, the prevention of rough scarring. Reduction of muscular contracture, increase in mobility and reduction of an inclination of a head, compensator increase in a muscular tone at the healthy side. The prevention of a face asymmetry.

Treatment should begin in early terms from 2 weeks till 3 months, stroking massage of extremities, massage of muscles of a neck is appointed. On the injured side – light grinding, stroking from time to time and vibration. Except for these methods treatment by position, a corregated cap is used. In the age of 7-8 months – Shants's cotton-paste collar, ionophoresis with potassium iodide, solux.

PHYSICAL REHABILITATION IN CLINIC OF TRAUMAS OF CENTRAL AND PERIPHERIC NERVOUS SYSTEM.

Treatment and rehabilitation of patients with various diseases and traumas of the central and peripheral nervous system are one of actual problems of the modern medicine, demanding the complex approach with use of the broad spectrum of medical means, including exercise therapy.

In neurological and neurosurgical practice the ancient principle «treatment to itself similar» is shown, i.e. treatment by movement at disturbance of function of movement. Exercise

therapy at neurological and neurosurgical clinic has a number of peculiarities which obligatory observance makes this method by the most effective:

1. It is possible the early application of exercise therapy, which provides combined use of kept (after brain accident of functions) and again recreated, adapted to changed conditions of the somatic status.

2. Aim use of means and receptions of exercise therapy at restoration of temporarily broken functions with the purpose of their maximal compensation.

3. The directed action on the supreme cortical functions with the purpose of training and retraining in a combination with simple "mechanical" exercises.

4. Adequacy and dynamic changeability of physical exercises.

5. Gradualness of expansion of motor regimen.

6. Complex use of exercise therapy components (massage, MG, treatment by position) and dependence on specific tasks of the given stage of rehabilitation.

7. Necessity of special exercises use:

a) in the increasing of volume of muscular force;

b) directed on muscular tension;

c) reception of the differentiated tensions;

d) directed on expansion of all scale of nervous-muscular activity – adequate speed of movement, smoothness;

e) antispastic and antirigid exercises;

f) anticonvulsive exercises which are understood as struggle against pathological synergies and synkinesises;

g) reflective and ideomotor (impulsive-phantom) exercises;

h) group of the exercises directed on restoration or new formation of applied motor skills (standing, walking, household skills, writing);

i) passive movements, including manual therapy;

j) group «forcing down, revolting exercises» (i.e. exercise forces down insufficiently steady skill are pressings, pushes, deduction, cargoes, elastic drafts, passive resistance);

k) exercises restoring and strengthening afferentation (deep sensitivity).

All these exercises are individually selected by the instructor depending on a kind of pathology, opportunities of engaged.

The peculiarity of exercise therapy is necessity of estimation of motor functions of neurological patients – for creation of a complex of the medical actions strictly to adequate motor opportunities of the patient.

There are three systems of estimation:

1. Five-mark system at slugish paresises and paralyses.
2. System of definition of movements amplitude (volume of movement and per cent of muscular force loss).
3. An estimation of household daily motor activity (for motor disturbances).

Estimation of motor and the patient's social adaptation:

1. The easiest degree of disturbance of motor function – defect is felt by the patient at significant loading.

2. At a slight degree of disturbances – defect is shown at any purposeful physical activity and not accompanied by essential functional restrictions.

3. The average degree of disturbances limits social activity of the patient (travel, cooking, the basic forms of work activity are possible only at assistance).

4. At a severe degree of disturbances of motor functions patients' social activity is considerably limited.

5. At very severe disturbances of motor function the motor effect is expressed in the most rough form. The patient is without movement, completely depends on assistance.

All complex of medical actions, including exercise therapy is under construction depending on the listed categories of the patient's state.

The criteria enumerated above are applied for estimation of movements coordination and subcortical disturbances though do not determine a degree and character of a tremor, hyperkinesis, athetosis. They are divided on 4-5 degrees (the slightest, slight, average, severe and very severe).

VASCULAR DISORDERS OF BRAIN

Various on character vascular disorders of brain determine tactics and a way of carrying out of exercise therapy.

Insult, as a rule, is accompanied by motor defect as spastic hemiparesis. At the ischemic nature of insult MG is begins on the 3-rd – 4-th day, at hemorrhagic – at full stabilization of the patient's condition on the 5-6-th day and prescribe only respiratory exercises and passive movements in joints of the injured extremities. If the insult is combined with hypertension disease all occupations by MG are strictly supervised by measurement of arterial pressure. Occupations are not carried out at figures higher than 180/105 mm of mercury column. Massage

is carried out irrespective of arterial pressure and last no more than 20-25 minutes. It is began treatment by position from the 3-rd – 5-th days. During later period of restoration of restriction reduce and exercise therapy carry out with sufficient intensity.

At thromboembolia loading is dosed out depending on the patient's somatic condition. Thromboembolic disorders of brain are characterized more proof spastic hemiparesis with smaller dynamics of their return development. During MG reduce number of isometric exercises, it is especial for the lower extremities, apply inclinations and turns of the corpus with the big amplitude less often, avoid sharp movements in distal departments of extremities.

At vessels aneurysm of brain in postoperative period MG is carried out with a sufficient degree of activity. If aneurysm is not completely liquidated, exclude strain and isometric pressure, sharp wave movements in proximal departments of hands and legs, transition in position sitting is cautious, and then standing, basically form skills of self-service. At subarachnoid haemorrhages exclude any force and isometric exercises, limit volume of movements in large joints, avoid sharp inclinations and turns of a head.

Course of patients' treatment with insults lasts 25-30 days, then the patient independently is engaged 2-3 months. And the course repeats. From means and forms of exercise therapy in a complex of medical actions enter:

1. Treatment by position (with the help of bandage spastic reduced extremities result in corregating position, duration of treatment by position 1-2,5 hours depending on the patient's subjective sensations and the control for spasticity of muscles.

2. Massage is weakening (stroking from time to time, large shaking, slow stretching) influencing on segmentary and reflex points. Between receptions of massage include deep stroking, duration of procedure of 35-45 minutes. The basic attention pay on that the tone did not raise above initial. Desirable medical effect – reduction of spasticity.

3. MG – tasks: a) reduction in a pathological tone; b) reduction of a degree of paresis – increase in muscular force; c) elimination of collateral cooperative movements; d) a reconstruction and formation of the major motor skills;

With this purpose are used:

1. Passive movements in joints both separate, and adjacent – flection, extention, external rotation, supination of forearms, extention of brushe, feet, fingers, flection and rotation of a hip, a crus. At performance of passive movements in two and more joints of paretic extremity warn undesirable synkinesis which can prevent from restoration of normal movements. It is reached by use of anticonvulsant exercises. So, flection of a hip with simultaneous extension of a crus and back flection of feet. Carrying out of passive movements finish treatment by position, and in the further pass to half active movements.

2. The directed tension of muscles-antagonists.

3. Reception of the minimal, strictly dosed out tensions in spastic reduced muscles, it allows the patient to learn to operate by a condition of the spastic contraction of muscles.

Reduction of a degree of paresis and increase of muscular force

Paretic muscles can be simultaneously spastic, and their strengthening with the help of exercises not only does not strengthen this spasticity, and on the contrary promotes its decrease. Peculiarities of MG for amplification of muscles at spastic hemiparesis:

1. The discontinuance of occupation at the beginning increase of tone is higher of initial.

2. Use of combined movements in two and more joints should not be accompanied by cooperative movements.

3. In the beginning amplification of muscles is carried out in a diapason of small amplitudes.

4. An obligatory combination of amplification methods of paretic muscles with their subsequent stretching, increase in their physiological length.

5. Necessity of early transition from «abstract force exercises» to the elementary household skills.

6. Application of force exercises is concerned and to general development.

7. At carrying out of the occupations directed on amplification of muscles, strict observance of uniform breath even is necessary at the moment of the greatest tension.

The prevention and elimination of faulty synergies and synkinesises (falty cooperative reactions)

1. Correct precautionary treatment by position.
2. Training of the patient to principles and skills of dosed out and differentiated tension of separate muscles.
3. Training of the patient in occurrence of cooperative tensions.

Treatment of synkinesises

1. Conscious suppression of pulses in muscular synkinetic groups.
2. Orthopedic fixing of one or two joints (by elastic bandage).
3. An active relaxation of synergetic muscles.
4. Anticonvulsant exercises and movements.

The reconstruction and formation of the major motor skills first of all rising and walking, promotes to social, and then and social-labour rehabilitation and readaptation.

At the first stages all enumerated actions carry out with the help of the instructor.

Ataxia

At ataxia treatment by position and massage have a supporting role. Complex of MG consists of the big group of antiataxic exercises: a) for increase of accuracy and neatness of movements; b) for coordination of actions between two joints; c) for reduction of tremor; d) on training of function of balance in position standing and at walking.

Flabby paresises and paralyses

Tasks of exercise therapy: 1) adequate increase of muscle force; 2) creation of acceptable balance between paretic muscles and their synergists on the one hand and antagonists with another with the purpose of performance of motor acts; 3) an indirect reflex tention of muscles (ideomotor exercises); 4) the prevention and elimination of joint-muscular contractures and rigidity; 5) the prevention and elimination of faulty compensator movements spontaneously arising in the patient.

Methodical receptions of easier or difficulty of movements and actions concern to ways of adequate influence with training effect of muscles force.

Receptions of movements easier: 1) reduction of counteraction of muscles- antagonists; 2) movements in a horizontal plane; 3) one-stage amplification of paretic muscles.

Receptions of movements difficulty: 1) repeated repetitions of movements in one plane before occurrence of weariness; 2) repetitions of movements in changing planes from horizontal up to vertical; 3) rendering of an active and passive obstacle to movement by increase in resistance by a hand of the instructor; 4) receptions of easier and on the contrary; 5) inclusion in the motor act of separate training movement. The important means of rehabilitation is massage and treatment by position for the prevention of rigidity in joints.

Physical rehabilitation at craniocereberal trauma

In an initial stage (the first day) craniocereberal trauma MG is not used. In the early period (2^{nd}-5^{th} day) apply special respiratory exercises, the general and local treatment by position. At favorable flow of traumatic disease already at the end of the early period begin occupations by special medical gymnastics. Use basically passive and half passive exercises.

The intermediate period (5-30 day) proof disorders of brain function get specific feature to the given localization of a trauma. In motor sphere are hemiparesises and hemiplegia, disturbances of coordination of movements, paresises of cranial nerves, in mental – an asthenic syndrome, disorders of memory, other disturbances of cortical functions.

In this period it is expanded the program of respiratory exercises, continued treatment by position, carrying out general strengthening and special gymnastics.

In the late regenerative period (4-5 weeks) after a severe trauma continue to carry out respiratory exercises, treatment by position (training of orthostatic functions) and some passive movements.

Peculiarities of the regenerative period – cannot suppose hyperventilation, which can provoke epileptoid seizures.

In the late regenerative period the leading part belongs to active special exercises, which should be strictly dosed out, purposeful and adequate to the local neurologic status. Character, number and sequence of exercises are selected for the patient individually. At languid paresises and paralyses the similar choice of exercises is facilitated by a preliminary estimation of the patient's muscular system. At spastic paralyses and paresises exercises treatment is directed on reduction of a muscular hypertonus, restoration of muscles force and elimination of pathological synkinesises. In residual period the medical-regenerative actions started in the previous period are carried out. Besides directed compensation of the lost locomotor functions is carried out with the purpose of training to necessary household and labour skills, self-service and movement, labour processes and by that of the patient's social rehabilitation.

Physical rehabilitation at disturbances of peripheral nerves

Neuritises (the traumatic, infectious, vascular, toxic nature) demand, probably, early and active regenerative treatment, which is carried out depending on severe of motor defect and a stage of disease.

In the early postoperative period – passive, half passive and active movements are carried out only in those joints which stay from a place of a trauma or operation, and in some cases are not even contiguous. So at operations on nerves (or traumatic injuries) in the aria of a forearm the first movements are allowable in a humeral joint and in metacarpophalangeal. The big role is allocated to ideomotor exercises, and also isometric tension.

Massage in this period has mediated character – it is directed on the muscular groups located distal and proximal from a place of injury.

Treatment by position is carried out with the help of plaster and vinyl-plastic langet, duration of their application is defined by the attending physician.

In the early regenerative period ideomotor exercises are combined and supplemented with the reflex exercises based on use of natural synergies and synkinesises, these exercises are rather effective after operations on peripheral nerves because allow to receive the differentiated tension of paretic muscles without movement of joints.

Isometric exercises, massage, treatment by position

In the late regenerative period carry out the basic active medical exercises on paretic muscles, their massage.

Treatment by position depends on depth of paresis, the more deeply paresis, the treatment by position is longer.

In residual period continue occupations by medical gymnastics, increasing exercises for training household and professional skills, enter game and sports- applied elements for formation of compensator adaptations.

Massage up to 20 procedures with an interval of 2-3 months. Treatment by position carry out with the help of orthopedic and orthopedic products (devices, tutors, special footwear).

Special difficulty at rehabilitation represent tendinous muscular contractures and restrictions of movements in joints. It is necessary to avoid a painful component at development in joints.

In cases of unsuccessfulness conservative therapy surgical treatment of contractures and deformations is carried out.

Physical rehabilitation at neuritises of facial nerve

Neuritis of facial nerve is shown by peripheral paresis or paralysis of mimic muscles of a corresponding half of a face. From the first days of disease treatment by position, massage, MG, then in the period of the residual phenomena and complications (contractures, cooperative movements) are used.

Tasks of exercise treatment: to treat blood circulation in the aria of the face, especially on the side of injury, and also a neck and all collar zones; to restore function of mimic muscles, to prevent development of contractures and cooperative movements, to restore a correct pronunciation. At severe disorders of a nerve it is necessary to change displays of facial expression (mimicry) to hide face defects.

In the early period (the 1-st – 10-th day) treatment by position is used (to sleep on one side on the injured side, to sit bending a head on a side of injury for 10-15 minutes 3-4 times in a day), to tie up a scarf for pulling up of muscles from the healthy side on a side of injury, adhesive plaster tension from the healthy side on the sick), massage begin from collar area and neck, then massage of the face, since a relaxation of muscles of a healthy half, and then the sick one within 5-7 minutes, increasing up to 15-17 minutes; medical gymnastics on a muscle of a healthy half, then – on the sick.

In the basic period from the 10-12-th day from the beginning of disease till 2-3 months treatment by position till 4-5 o'clock in a day is used. Massage superficial and from within a mouth, mimic gymnastics before a mirror 2-3 times in a day.

In a residual period after 3 months. All kinds of exercise therapy with accent on medical gymnastics are used which task is the increase in muscular activity for a reconstruction of the maximal symmetry between the healthy and sick sides of the face.

Treatment of contractures includes MG, massage, treatment by position (adhesive plaster bandage is imposed from the sick side on the healthy one. Revealing and treatment of synkinesises and anticooperative injuries.

PHYSICAL REHABILITATION IN OBSTETRICS AND GYNECOLOGY.

Physical rehabilitation in obstetrics and gynecology plays extremely big medical and preventive role.

Physical exercises have some effect on a condition of psychics, cause positive emotions in pregnant and sick women, improve a metabolism, make active work of organs of blood circulation and respiration, train muscular system including the muscles participating in labor activity, promote elimination of developments of stagnation in organs of an abdominal cavity and in a small pelvis, strengthen action of the medical actions used at gynecologic diseases, and also corrigate various pathological displacement of an uterus.

Physical rehabilitation during pregnancy, in labor and the postnatal period is applied as general preventive roborant.

Contraindication for carrying out of physical rehabilitation are: acute feverish conditions, purulent processes, systemic-organic decompensations, progressing active tuberculosis, chronic appendicitis, gestoses (incoercible vomitting, edema, nephropathy, preeclampsia), uterine bleedings, placental presentation, hydramnion, habitual abortions, painful pain after occupations.

Methodical installations on carrying out of MPC are concretized according to the periods (trimesters) of pregnancy (I-I – 16 week; II – 17-32 week; III – 33-40 week).

The first trimester is characterized by difficult reorganization of an organism in connection with conception, care in a dosage of loading and by application of the exercises raising intra-abdominal pressure therefore is required.

Tasks:

1. Inculcation of skills of regular occupations by physical culture;

2. To learn the woman to skills both of full breath and any pressure, and relaxation of muscles.

3. Perfection of the maximum regulator mechanisms and mental processes.

4. The prevention of possible complications of pregnancy and adaptation to pregnancy.

5. Increase of functionalities of an organism, first of all cardiovascular, respiratory, osteo-muscular and other systems.

The following means and forms of MHG, medical gymnastics, the independent occupations, dosed out walking, terrain cure, massage of collar zones, training actions, self-massage of mammary glands are prescribed.

At construction of occupations by MG and independent occupations use exercises for distal and proximal departments of hands and legs, for training of abdominal and thoracic type of respiration, muscles of the prelum abdominal, pelvic fundus (point of departure on the back, on the side, standing, knee-handed).

The second trimester (17-32 week).

All prescriptions of the first trimester are continued, however the level and character of loading should be changed, since 24-25 week, that is since time of the maximal loading for cardiovascular system.

Tasks:

1. To improve the conditions promoting to valuable development of a fetus.
2. Preparation for labor (strengthening of the prelum abdominal, increase elasticity of perineum, increase of force and endurance).
3. Prophylaxis of venous congestion in the extremities.
4. Increase in oxygen capacity of blood.
5. Improvement of a posture.
6. Prophylaxis of venous congastion.
7. Increase of oxygen capacity of blood.

Technique of MG: Point of departure – except for laying on an abdomen, accent on thoracic type of breathing, special exercises for muscles of a prelum abdominal, oblique muscles of an abdomen, diaphragm of the pelvis, exercise developing flexibility of a spine, mobility of hip joints (various attacks), semisquattings, general tonic statistical and dynamic, respiratory exercises, exercises in a relaxation.

The third trimester (33-40) week.

Duration of occupation is 20-35 minutes. The primary task of the functionalities preservation providing growth and development of a fetus, and also labor activity.

Tasks:

1. Stimulation of respiration, blood circulation.
2. Prophylaxis of congestion.
3. Stimulation of intestine activity.
4. Increase in elasticity of pelvic fundus.
5. Preservation of a tone of muscles of an abdomen wall.
6. Increase in mobility of sacrococygeal joints of a spine, hip joints.
7. Psychoprophylactic training of the pregnant for labor.

Technique: Point of departure (laying, sitting) – exercises on a relaxation and extension of muscles of pelvic fundus and the exercises increasing mobility of sacroiliac articulations of hip joints and a lumbar department of a spine. Last 2 weeks before labor training to skill of deep rhythmical breathing and relaxation which is necessary for muscular groups in any point of departure. Massage of the bottom part of an abdomen.

Labor. Physical exercises can be used in labor with the purpose of stimulation of labor activity and as means of prophylaxis of early fatigue at labor.

Contra-indications: To carrying out of medical gymnastics in the first period of labor: preeclampsia, eclampsia, severe diseases (diabetes mellitus, **ТБЦ, НК of the 2nd– 3rd degree**), placental presentation, wrong position of a fetus, early bursting of amniotic waters.

The prenatal gymnastics is began in the beginning of labor activity at disclosing of the neck uterus on 1-1,5 cross fingers (the development, the certain complex consisting of respiratory statistical and dynamic exercises).

In the postnatal period: At absence of contra-indications gymnastics is appointed on the 2-nd day after labor.

Contra-indications: the feverish condition, weakness in connection with the big loss of blood and severe labor, nephropathy, eclampsia during the labor, breaks of a perineum of the 3-rd degree.

In a complex of exercises are included the exercises strengthening peripheral blood circulation, diaphragmatic respiration for muscles of an abdominal press (oblique). In the subsequent exercises for muscles of an abdominal press and pelvic fundus are entered. After a discharge from a maternity hospital the woman should continue occupations by gymnastics during 6-8 weeks.

Physical rehabilitation at chronic inflammatory diseases of female genitals.

Indications: the residual phenomena of inflammatory process, the general weakness caused hypodynamia, reduction in a functional condition of cardio-respirator system, weakness of muscles of pelvic fundus, reduction of work capacity.

Contra-indications: the exacerbation of inflammation, with the increase of body temperature, increase ESR, the phenomena of pelvic peritoneum irritation, bleeding. Physical exercises are contra-indicated at encupsulated purulent processes before opening and application of drainage.

Tasks: 1. Liquidation of the residual phenomena of inflammatory process.

2. Prophylaxis of hypodynamia.

3. The general strengthening an organism.

The following forms are prescribed:

MHG, the medical gymnastics, the dosed out walking, natural factors. In complex of MG necessarily are included: the exercises quickening blood circulation in pelvic area (flexion, inclinations, turns, rotations), training hip joints, walking with rising to socks, with high rising of a knee, with a wave of a direct leg forward, aside, in half-squatting, with overcoming of obstacles, exercises for direct and oblique muscles of an abdomen (for strengthening an abdominal press and prophylaxis of atonic constipation).

Physical rehabilitation at anomalies of position of female genitals.

Indications: the got forms of retrodeviation.

Contra-indications: in a case of concomitant inflammatory process, tumors (or after operation), MG is appointed in point of departure (knee-hands, knee-elbow, knee-chest, foot-chest) – these positions promote to relaxation of an abdomen wall and change of intra-abdomen pressure. At fixed retroflexia MG is applied in a combination with physio-, balneo-, mud treatment and gynecologic massage.

MG is carried out at 1,5-2 hour after physiotherapeutic procedures and massage.

Physical rehabilitation at internal genitals falling

MG is directed on strengthening of muscles pelvic fundus. Complex MG should not be included the exercises raising intrabdomenal pressure, running, jumping up.

Point of departure – a knee-hand, a knee-elbow, sitting, laying. At the same time with general development respiratory exercises, are included isometric. The special attention should be turned on carrying out of MG at falling of the womb, a vagina and a forward wall of a rectum.

PHYSICAL REHABILITATION IN PEDIATRICS

In pediatrics before physical rehabilitation unlimited opportunities are opened. Perhaps, there is no another area of clinical medicine in which it would be possible to apply so widely and effectively the different means of exercise therapy: the physical exercises, natural factors of the nature (the sun, air, water), massage, etc.

Coryphaeuses of domestic pediatrics:

Filatov N.F., Kisel A.A., Molchanov V.I., Speransky G.N., Tur A.F., Dombrovskaya Yu.F. attached a great importance to exercise therapy in practical work, as to a method of prophylaxis and treatment.

«Inculcation of skills of physical training at children's age – during amplified growth of an organism when all organs and tissues are most capable to development and if it is necessary to regeneration – it is especially valuable and effective» (Speransky G.N., 1959).

Though physical rehabilitation in children is constructed on basic bases, characteristic for all exercise therapy, in pediatrics it has the specific peculiarities.

These peculiarities are determined first of all by anatomy-physiological parameters of development of children' organism of the different age periods. To each period of the childhood there correspond also the peculiarities in formation of motor skills, character of responses to application of means of physical training. That is why at selection of physical exercises and at carrying out of occupations of exercise therapy with children the data of age physiology should be always considered.

Peculiarities of physical rehabilitation in children:

1. The gymnastics of infants is constructed on principles of use unconditioned reflexes kept some time after a birth (reflex gymnastics).

2. Use of the simplest passive, active movements in a combination with massage.

3. Peculiarity of massage carrying out is use of receptions "stroking" and massage.

4. A special technique of swimming of children of 1 year of a life.

5. Feature is principles of construction of techniques of medical gymnastics at diseases of children of preschool age. The game method and wide use of imitating movements is put in basis ЛГ at this age.

6. Active muscular activity is an obligatory condition for normal development and formation of a growing children's organism.

Restriction of motor activity owing to any reasons and at any children's age extremely affects on a condition of physical development and health weakened. At the same time it is impossible to forget and about physical peculiarity of a children's organism – the increased reactivity in reply to external and internal irritations. During occupations by exercise therapy, it is easy to allow children' neuro-psychological and general physical overload.

7. Exercise therapy – the method of specific pathogenetic therapy it is especially important in children as correction of the broken functions of an organism promotes, influences on mechanisms of development of disease process.

8. Exercise therapy – a method of anthropometrics, calculated on the general influence on a growing organism.

9. Exercise therapy – the important component of system of rehabilitation (regenerative treatment) first of all physical restoration of the patient, the functions of separate systems broken owing to illness, organs, and also mentality of the patient.

10. Exercise therapy in children – is the medical-pedagogical process having educational meaning. During occupations the will, consciousness, hope for full restoration are formed.

11. Exercise therapy – a part of system of complex treatment, which is necessarily used at all stages of treatment.

Forms of MPC – in children: medical gymnastics, MHG, tasks for independent occupations, mass kinds of exercise therapy.

From methods: game, gymnastics, sports is more often used.

Physical rehabilitation for sick children of early age.

Contra-indications: general severe condition of the child, toxicosis, a high temperature of a body, disease of blood, acute gastrointestinal diseases, heart diseases with the phenomena decompensation, inflammatory processes on a skin, absence of reaction to an environment in the child.

Acute pneumonia

Tasks of MPC: reflex strengthening of activity of respiratory muscles, reduction of meteorism, improvement of function of intestines, acceleration of resorption of inflammatory infiltrates, straightening of atelectasis, reduction of developments of stagnation in parenchyma of lungs; the prevention of complications; maintenance of proof compensation of respiratory insufficiency and gradual recovery of function of external breath, improvement of function of other internal organs and systems, the prevention to relapse of disease, influence on CNS.

Stimulation of protective forces of an organism, maintenance of the further growth and psychomotor development of an organism of the child.

In the 1st period stroking massage of a body, extremities, a stomach, passive physical exercises for hands and feet, reflex exercises with change of the child's position are appointed . Individual employments in chamber within 3-4 days till 5-10 minutes, 2-3 times to day are spent.

In the 2nd period, which 10-12 days proceed, children receive stroking massage of extremities and body, a thorax, passive and reflex exercises. Active exercises according to psychomotor development of the child on the average rate, duration of 10-15 minutes.

In the 3rd period MPC spend more intensively in a hospital till 10 days, then in a polyclinic. Rate of exercises variable with number of repeats of 4-5 times, duration of 15-20 minutes.

Rachitis

Tasks of MPC in the beginning period: normalization of the basic nervous processes, improvement of a metabolism, recovery of disturbances of function of breath organs and system of blood circulation, prophylaxis of possible deformations of the locomotor system.

Assignments: medical gymnastics (passive and reflex physical exercises), stroking massage of a spine, a stomach and extremities by warm hands, freely, within the limits of physiological amplitude of movements in joints. Employments spend individually, duration of 10-12 min., in a starting position – laying. For preventive maintenance of deformations – a flat mattress and change of the child's position.

Tasks during reconvalescence: to the previous tasks add: liquidation of muscular hypotonia and disorders of psychomotor development or a delay of motor skills, correction of deformations of locomotor system.

Assignments: individual employment by medical gymnastics during 10-15 min. 2-3 times a day, massage by all receptions of a spine, a stomach and buttocks. Gymnastic exercises appoint in conformity with motor opportunities of the child, exercises for correction of deformation of a skeleton are entered. Special exercises: laying-out on a stomach, exercises laying on a stomach.

Tasks during the residual phenomena: normalization of functions of organs and systems, which have been injured by rachitis, normalization of psychomotor development, correction of deformations of the locomotor system, increase of nonspecific reactivity of immune system.

Assignments: in dependence on age MHG to the child is appointed. Medical gymnastics in duration of 18-20 minutes, massage, physical exercises corresponding to psychomotor development of the child, special exercises for the weakened muscular groups, for reduction or

liquidation of deformations – corregated exercises together with massage, the general UVI, from 6 month age – brine-coniferous baths.

Hypotrophy

Tasks of MPC: improvement and normalization of the basic nervous processes, a metabolism, protective forces of an organism, function of digestive organs, cardiovascular, respiratory and other systems; obstacle to deficiency in psychomotor development and its liquidation, recovery and normalization of motor skills in case of their disorder.

At hypotrophy of the 1st and 2nd degree employment by MPC up to 15 minutes, include active with a small amount of repeating physical exercises according to a level of development of a motility, passive, active by means of exercise for development of the motor skills, stroking massage of a body, extremities and hypotonic muscles with use of all receptions. At hypotrophy of the 3rd degree duration of employment of 5-8 minutes. Use mainly stroking massage of a body and extremities, reflex exercises, laying-up on a stomach.

METHODS OF THE MEDICAL CONTROL AT APPLICATION OF PHYSICAL REHABILITATION.

At realization of the medical control during employments by medical gymnastics, trainings in walking and at development of other elements of motor regimen are considered: subjective sensations, changes of pulse, arterial pressure, and breath at height of applied load, is direct upon termination of performance of exercises and in 3-5 minutes after employments. Such control allows correctly to dose out a load, avoiding unfavorable reactions.

The list of questions to the final control

№	Questions
1.	Definition of sports medicine as clinical discipline. The basic directions of SM.
2.	Actual questions of optimization of the person's motor activity at the modern stage.
3.	Concept about medical control. The purpose and tasks of medical control.
4.	The organization of SM service. Forms of the doctor's work in SM.

5.	Features of medical examination of the persons, engaged by physical training and sports.
6.	Kinds of medical observations. Features of the medical control over persons of a different sex and age.
7.	Estimation of conditions, the organization and technique of carrying out of employments by physical culture.
8.	Technique of complex medical examination of athletes and sportsmen, kinds of medical examinations.
9.	Peculiarities of gathering of general and sport anamnesis. Peculiarities of general medical examination of organs and systems.
10.	The analysis and estimation of hearts percussion and auscultation data of the sportsman. Physiological criteriae of training.
11.	Definition of the term "physical development». Factors, that define physical development of the person.
12.	Methods of definition of physical development and a condition of the locomotor system (somatoscopy, anthropometry).
13.	Methods of an estimation of physical development (standards, an anthopometrical structure, indexes).
14.	Recommendations on harmonization or corrections of physical development depending on its features.
15.	Concept about functional tests and their value in functional diagnostics. The basic tasks of functional examination.
16.	Kinds of functional tests.
17.	Functional tests with a delay of breath (Shtange, Genche-Soobraze), loading-respiratory tests. A technique of carrying out and an estimation.
18.	Functional tests with change of a body position in space (orthostatic, clinostatic). A technique of carrying out and an estimation.
19.	Functional loads with standard load.
20.	Methods of carrying out of Martine-Kushelevsky’s functional test.
21.	Types of reaction of cardiovascular system on standard physical load.
22.	The analysis of results of complex medical examination. The medical conclusion.
23.	Division of persons on medical groups that are engaged by physical training
24.	Age parameters of the children's admission before playing sports.
25.	Rough terms of renewal of employments by physical training and sports after diseases.
26.	Concept about the general physical working capacity and tolerance to physical loads.

27.	Direct and indirect method of definition of physical working capacity. Functional tests on effort (loading tests).
28.	Indications and contra-indications for purpose assignment of loading tests. Conditions of carrying out of testing.
29.	Clinical and functional signs of tolerance to physical loads.
30.	Technique of carrying out and principles of calculations of physical working capacity at performance of submaximal test PWC170 (at cycle-ergometry and step-ergometry).
31.	Methods of definition MOC. Calculation of parameter MOC on Astrand's nomogramm and size of PWC170.
32.	Tests of Rufye, Navaky, Harward step-test, Cooper's tests, a technique of carrying out and an estimation of results of testing.
33.	Classes of physical condition.
34.	Connection of physical working capacity with parameters of health.
35.	Concept about "quantity" of the person's physical (somatic) health.
36.	"Adaptable" (V.P. Kaznacheev and R.M. Baevsky) and "power" (G.L. Apanasenko) the concepts of definition of health quantity.
37.	Concept about «person's biological age».
38.	The express train-estimation of a level of the population physical health at prophylactic examinations (on G.L. Apanasenko). Concept about «a safe level of health».
39.	The differentiated recreational-improving motor regimens in practice of preventive medicine. Boundary and training frequency of systoles depending on a physical condition.
40.	The generalhmj conformity of changes of a functional condition of an organism under influence of physical loads of different intensity (insufficient, optimum, increased).
41.	Changes of blood circulation function, breath, system of blood, excretion, digestion, immune and endocrine systems under influence of optimum physical loads.
42.	Concept about acute and chronic physical overstrain.
43.	The reasons of occurrence of prepathological conditions, diseases and injuries during employments by physical culture and sports.
44.	Risk of sudden death during employments by physical training and sports.
45.	Acute pathological conditions (a liver-painful syndrome, a gravitational shock, a hypoglycemic condition, etc.), the reasons of occurrence, the emergency care.
46.	Overtraining, the reasons of occurrence, stages of overtraining.
47.	Disturbances of a heart rhythm. Hyper- and hypotonic conditions.
48.	Dystrophy of a myocardium due to chronic overstrain, a clinical picture, stages of flow,

	treatment and prophylaxis.
49.	Concept about "physiological" and « pathological sports heart».
50.	Chronic injures and overstrains of the locomotor system.
51.	Diseases and disorders of nervous system.
52.	Diseases an ear, a throat, a nose.
53.	Diseases of digestive organs.
54.	Diseases of urinary system.
55.	Diseases and disturbances of endocrine system.
56.	Physiological mechanisms of recovery processes.
57.	Meal as a factor of restoration of working capacity.
58.	Medical and biologic ways of restoration and stimulation of physical working capacity.
59.	The characteristic of biologically-active substances.
60.	Pharmacological ways of overfatigue prophylaxis and restoration of sports working capacity.
61.	Use of hardening for diseases prophylaxis.
62.	Classification of dopes. An anabolic syndrome. Antidoped control.
63.	Concept «physical rehabilitation». Ways, forms and methods of FR. The periods and stages of FR.
64.	Physical exercises - is a basic way of FR. The mechanism of medical action of physical exercises. Classification of physical exercises.
65.	Indications and contra-indications to assignment of medical gymnastics.
66.	Regimens of motor activity. Indications to assignment of motor regimens at stationary, out-patient-polyclinic and sanatorium stages of rehabilitation, their tasks and the contents.
67.	Bases of medical massage. The equipment and sanitary-and-hygienic requirements to a massage cabinet.
68.	Kinds of massage. Indications and contra-indications to assignment of massage. The mechanism of medical action of massage on an organism.
69.	The basic methods of massage.
70.	Indications and contra-indications to assignment of FR at diseases of cardiovascular system.
71.	Tasks and features of FR technique at myocardium infarction with the list of special exercises.
72.	Tasks and features of FR technique at ischemia disease of heart with the list of special exercises.

73.	Tasks and features of FR technique at hypertonic disease and hypotension with the list of special exercises.
74.	Indications and contra-indications to assignment of FR methods at broncho-pulmonary pathology.
75.	Tasks and features of FR technique at acute bronchitis, pneumonia with the list of special exercises.
76.	Tasks and features of FR technique at a chronic bronchitis, bronchial asthma and a pleurisy with the list of special exercises.
77.	Indications and contra-indications to assignment of FR methods at diseases of digestive organs.
78.	Tasks and features of FR technique at chronic gastritis and peptic ulcer of a duodenum with the list of special exercises.
79.	Indications and contra-indications to assignment of FR methods at diseases of kidneys and disturbances of a metabolism. Features of FR technique at adiposity and diabetes mellitus.
80.	Indications and contra-indications to assignment of physical rehabilitation in surgery.
81.	Tasks of feature of FR technique in the preoperative and postoperative periods at operative interventions on organs of an abdominal cavity depending on an motor regimen and current of the postoperative period with the list of special exercises.
82.	Tasks of feature of FR technique in the preoperative and postoperative periods at operative interventions on organs of a chest cavity depending on a motor regimen and current of the postoperative period with the list of special exercises.
83.	Indications and contra-indications to assignment of physical rehabilitation at traumas of the locomotor system.
84.	Tasks and a technique of physical rehabilitation depending on the period (immobilization, postimmobilization, regenerative) and a method of treatment. A substantiation of a choice of ways and FR forms.
85.	Indications and contra-indications to application of FR method at orthopedic disturbances in children.
86.	Features of a technique and special exercises at platipodia, disturbances of a posture and scoliosis depending on its degree.
87.	Features of a technique and special exercises at congenital muscular stiff-neck, a congenital dislocation of a hip.
88.	Indications and contra-indications to assignment of physical rehabilitation at neurological diseases.

89.	Tasks and features of FR technique at acute disorder of brain blood circulation, treatment by the position, special exercises.
90.	Features of FR application at the closed and open traumas of a brain.
91.	Modern FR technologies in patients with infantile cerebral paralysis.
92.	Indications and contra-indications to assignment of physical rehabilitation at diseases and traumas of peripheral nervous system.
93.	Features of recovery-compensator therapy at neuritis of the facial nerve, special physical exercises.
94.	Separate techniques of medical gymnastics at neuritis of the ulnar and radial nerves, radiculitis.
95.	Physical rehabilitation at traumatic injuries of a spinal cord.
96.	Features of physical training of early age children.
97.	Tasks and features of a technique of medical gymnastics in children of early age at acute pneumonia.
98.	Tasks and features of a technique of medical gymnastics in children of early age at a rachitis and hypotrophy.
99.	Features of a technique of use of physical exercises for women with normal current of pregnancy depending on a trimester.
100.	Features of a technique of use of physical exercises in labor and the postnatal period.
101.	Indications and contra-indications to assignment of FR in a gynecologic practice.
102.	Tasks and features of FR at chronic inflammatory diseases of female genitals, anomalies of position of an uterus, at disturbances of menstrual functions and functional incontinence of urine.

TESTS FOR THE CONTROL OF A CURRENT LEVEL OF KNOWLEDLEGE

80. At what disease employments in the preparatory group are resolved?

1. Bronchial asthma
2. Chronic decompensate rhinitis
3. Scoliotic disease of the 3rd degree

*4. Healthy, but he is not enough physically prepared

5. Chronic calculous cholecystitis.

79 Whom are employments by physical culture contra-indicated?

1. Scoliosis of the 1 degree

2. Shortening of extremity on 1 sm
*3. Chronic glomerulonephritis
4. Chronic bronchitis.

78. Through what period of time is spent medical examination of the athlete in special medical group?
1. In a year
2. In 1 month
3. Weekly
*4. In 6 months
5. In 3 months.

77 What estimations of physical development are at use of a method of standards?
*1. Harmonious
2. Good
3. Sufficient
*4. Middle
5. Bad.

76. How to estimate Martine-Kushlevsky's test at sharply expressed tachycardia (more than 100 %), increase of systolic arterial pressure on 60 mm of mercury column, diastolic – on 20 mm of mercury column?
1. Normotonic
2. Hypotonic
*3. Hypertonic
4. Diastolic.

75 What density of physical load is physiological at employments by physical culture in the basic medical group?
1. 10 %
2. 30 %
3. 50 %
*4. 70 %
5. 100 %.

74 What medical group it is necessary to direct for employments by physical culture of the person who has transferred viral hepatitis B 6 months ago?

1. In basic
2. On MPC
*3. In special
4. In preparatory.

73. In what medical group is authorized to be engaged in physical culture to the man of 20 years with myopia – 8 OD?

1. In basic
2. In special
*3. In group of MPC
4. By sport
5. He can not be engaged in physical culture.

72 At an estimation of orthostatic tests about what prevalence of a department of vegetative nervous system will be spoken the increase of rate of systoles on 30 beats and increase of systolic arterial pressure on 30, and diastolic – on 20 mm of mercury column?

*1. Sympathetic
2. Parasympathetic
3. Both
4. Any of them.

.

71 At presence of the sportsman on an electrocardiogram (decrease of segment T on 2 mm, impression and two-humpback wave), what is necessary to undertake?

1. To continue trainings
*2. To stop trainings
*3. To appoint out-patient treatment (metabolites, vitamins, tranquilizers, preparations of calcium, B-blockers of adrenoreseptors)
4. To appoint treatment in a hospital, a bed regimen.

70. What kind of sports is recommended to engaged to the patient with an osteochondrosis of a spine without neurological displays?

1. Weight-lifting
*2. Swimming

3. Shooting from a bow
4. Gymnastics
5. Boxing.

69 At inharmonious physical development when parameters of muscular force on parameters of hand and stature dynamometry are sharply decreased, what is recommended?

1. Swimming
*2. Employments on gyms
3. Aerobics
4. Running by «trot»
5. Jumps.

68 At presence of frequent flu diseases (more than 6 in a year) in what volume physical loads are resolved?

1. In the basic group
2. In special group
*3. In preparatory group
4. In sports section
5. In group of MPC.

67 What improving effect of sports is provided?

*1. A regularity of employments
*2. Versatility of trainings
*3. Duration of trainings
4. Balance of a meal
5. A condition of the respiratory system.

66. What sections of work of the sports doctor are the basic?

*1. An estimation of physical development of the sportsman
*2. The decision of a question on the admission to competitions
*3. The control over sanitary-and-hygienic conditions of places of training
4. Definition of competitions terms
* 5. Sanitary-educational work with sportsmen.

65. What does serve by statement to finish of load at carrying out of the test?

*1. Pallor

*2. Cyanosis

3. Tachycardia

*4. Dyspnea

*5. Dizziness.

64 Name most often meeting mistakes in a regimen and a technique of training?

*1. Wrong combination of load and rest

2. Construction of training

*3. The frequent intense competitions

4. Absence of the organized rest between trainings

*5. Wrong staffing of training groups.

63. What from listed means of MPC are given in to an exact dosage on a level of physical load?

1. Massage

2. Outdoor games

3. Motor regimen

*4. Physical exercises.

62What is defined selection of MPC exercises for each patient?

*1. Tasks of MPC in complex therapy

*2. A functional condition of the injured systems

3. patient’s sex

4. A complex of medicamentous therapy.

61. What from below listed is necessary to include in methodical instructions for instructors of MPC?

1. The plan of complex therapy

2. A dosage of medicamentous means

*3. A dosage of physical load

4. Remoteness of disease.

60. The condition of the patient is severer, the more often or less often between gymnastic exercises includes respiratory exercises?

*1. More often

2. Less often.

59 What kinds of trainings are distinguished at carrying out of MPC?

1. Preliminary

*2. General

3. Basic.

*4. Special.

58. Through what mechanisms stimulating influence of MPC on an organism is carried out?

1. Adaptable

*2. Humoral

3. Conscious.

*4. Nervous.

57 How muscular contractions on character are subdivided?

1. Fixed

*2. Dynamic

3. Involuntary

*4. Static.

56. How many periods is available in MPC exercises?

1. One

2. Two

*3. Three

4. Four.

55 What principles underlie in a basis of individual techniques of MPC?

*1. Nosology

*2. Pathogenesis and clinic

3. Etiology

4. Anatomy.

54 Name means of exercise therapy?

*1. Physical exercises.

2. Solar and air baths.

*3. Medical massage.

4. Occupational therapy.

53. Name forms of MPC.

*1. Medical gymnastics.

*2. Hygienic gymnastics.

*3. Individual tasks for individual employments

4. Underwater extension of a spine.

52. Name kinds of occupational therapy?

1. General strengthening

*2. Regenerative

3. Complex

*4. Professional.

51. A method of what therapy is MPC?

*1. Functional

*2. Pathogenetic

3. Medicamentous

4. Regenerative.

50. What forms of MPC are not recommended by small foci myocardial infarction at a stationary stage of rehabilitation?

1. Medical gymnastics

2. Walking on stairs three stair-walls

*3. Terrain cure 3 km.

4. MHG

*5. Sports games (badminton).

49 What period of MPC is appointed at a stenocardia of rest?

*1. Introduction
2. Basic
3. Final.

48. What forms and means are applied at an arterial hypertensia 2 A with cerebral crisises?
*1. Medical gymnastics
*2. Massage of collar zone
3. The dosed out walking of 5 km.
4. Mechamotherapy
5. Swimming in a pool.

47 Name terms of MPC beginning at uncomplicated myocardial infarction?
*1. 1-2 days
2. 5-6 days
3. 2-3 days

46 Is it necessary MPC for the child of 6 years, who was operated considerably in occasion of Fallot's tetrade?
*1. Yes.
2. No.

45 What forms of MPC are comprehensible to rehabilitation of the patient with aortal stenosis?
1. Go trotting along 2 km.
2. Sports games
*3. Medical gymnastics
4. Tirrain cure 5 km.
5. Near tourism.

44. What starting positions are applied to carrying out of MPC at acute myocardial infarction in the first 3 days of disease?
*1. Laying on a spine
2. Standing

3. Sitting

*4. Laying with rise on a head-rest

5. Laying on a stomach.

43. What period of MPC is appointed at a stenocardia of rest?

*1. Introduction

2. Basic

3. Final.

42 Indications to assignment of MPC at a stenocardia of rest.

*1. Satisfactory condition

2. Reduction of attacks

*3. The full termination of attacks

4. Tachycardia over 100 beats in a minute.

41 Indications to assignment of MPC at stenocardia of a pressure?

*1. Satisfactory condition

2. Extrasystoly above 1:10

3. Reduction of attacks

*4. Full termination of attacks.

40. On what week at acute myocardial infarction (small foci) MPC is appointed?

*1. The first.

2. The second.

3. The third.

39 In what cases at acute pneumonia is contra-indicated MPC?

*1. Expressed intoxication, high temperature

*2. Respiratory insufficiency of the 3rd degree

*3. Tachycardia – more than 100 beats in a 1 minute.

38 What means and forms of MPC are used at rehabilitation of patients with acute pneumonia at half-bed regimen at a stationary stage of rehabilitation?

*1. Morning hygienic gymnastics

*2. Medical gymnastics

3. Dosed walking

*4. Postural drainage

5. Massage.

37. Name contra-indications for assignment of MPC at bronchoectatic disease.

*1. Pulmonary bleeding

*2. Expressed cardiovascular insufficiency

*3. Single proveins of blood in sputum

4. Subfebrile temperature.

36. What special exercises are used at treatment of a bronchial asthma in the attack period?

1. Sound gymnastics

2. Exercises on a delay of breath on an exhalation

3. Dynamic respiratory exercises

*4. All answers are true.

35. Specify special starting positions at carrying out of medical gymnastics at bronchoectatic disease with lower lobual bronchoetasies.

1. Standing

2. Sitting on a chair

*3. Laying on a couch with the raised foot end.

34. What exercises are recommended to the patient with acute pneumonia, being on half-bed regimen?

*1. Static respiratory exercises

*2. Dynamic respiratory exercises

3. Exercises with burdening

4. Exercises on gymnastic apparatuses

5. Exercises with gymnastic apparatuses.

33. If physical activity corresponds to functional condition of an organism in the patient with diagnosis: Acute pneumonia; what is frequency of breath?

1. Is decreased on 1-2 breathes

*2. Is increased on 2-3 breathes

3. Is increased on 6-8 breathes.

32 In the preoperative period, to the patients allocating big quantity of sputum, how many is necessary to carry out the exercises directed on drainage of bronchial tubes during a day:

1. 2-3.
2. 4-6.

*3. 8-10.

31. Is appointed a massage at diseases of lungs during the preoperative period?

1. Yes.

*2. No.

30. Through what time after removal of a part of a pulmonary lobe medical gymnastics is appointed?

* 1. In 1-2 hours after the termination of narcosis action.
2. In 24 hours.
3. In 2 days.

29. Massage of a thorax for 2 day after segmenectomy.

*1. It is shown.

2. It is not shown.

28. What kind of respiratory exercises is preferred in the first days after operation on a lung to?

1. Chest type of breath
2. Respiratory type

*3. Diaphragmal type of breath.

4. Full breath.

27. When patients are gone on a free regimen after operations on a lung?

*1. 4 - 7 day.

2. 7 - 10 day
3. 14 - 16 day.

26 Through what time after appendectomy can be begun MPC?

1. In the first 3-5 hours after operation

*2. In 1 day after operation

3. In 2 days after operation.

25 Through what time after appendectomy the patient is learned to turns on the sideways?

1. In 1 day.
*2. After 1 day.
3. In 2 days.

24. Through what time after appendectomy massage of a thorax to the patient is recommended?

1. In 1 day after operation.
*2. On 2 day.
3. On 3-4 day.

23. Is it recommended MPC at complication of a trauma of an abdominal cavity by fecal fistulas:

1. It is recommended.
*2. It is not recommended.

22. When it is possible MPC to appoint at a thrombophlebitis of deep veins?

*1. From the 1-2 days at presence of a pressing bandage
2. From the 3-4 days at presence of a pressing bandage
3. From the 5-7 days.
4. From the 10-14 days.

21 Criteria to assignment of MPC at a thrombophlebitis.

*1. Reduction of a pain in a foot
2. Full discontinuance of a pain in a foot
*3. Normalization of a body temperature
*4. Reduction of ESR and leukocytosis.

20 Contra-indications to assignment of MPC in the early postoperative period at diseases of lungs:

*1. An internal bleeding.
2. A bronchial fistula.
*3. Spontaneous pneumothorax.
4. Respiratory insufficiency of the 2nd degree
5. Subfebrile temperature.

19. What exercises are recommended to patients in the early postoperative period at lobotomy / 3 days/?

*1. Static respiratory.

2. Dynamic respiratory.

3. Respiratory exercises with resistance.

4. Exercises with gymnastic subjects.

18. Contra-indications to assignment of MPC at operations on organs of an abdominal cavity:

*1. Perforation of a vermiform process.

*2. Peritonitis.

3. Meteorism.

4. Cardiovascular insufficiency of the 1st degree.

17. Criteria of efficacy of MPC rate after herniotomy:

*1. Improvement of intestine motor function.

*2. Reduction of meteorism.

3. Increase of a diaphragm mobility.

16 Tasks of MPC at varicose expansion of veins in a stage of decompensation:

*1. To improve peripheral blood circulation.

*2. To activizate up cardiovascular activity.

3. To increase working capacity of the patient.

4. Strengthening of muscles of the lower extremities.

15. In what starting position exercises are carried out at varicose expansion of veins of the lower extremities?

1. Standing.

2. Sitting.

*3. Laying.

14. When is possible to carry out isometric pressure of muscles for patients with fractures?

*1. The 1-2nd day after a trauma.

2. The 2-3rd day.

3. The 10^{th} day.

4. In 1 month.

13. How frequently independent employments at fractures during immobilization are spent ?

1. 1-2 times

2. 2-3 times

*3. 5-6 times.

12. When is possible to recommend active movements in joints of the operated extremity at treatment of diaphysal fracture by a method of osteosynthesis ?

*1. Since the first days.

2. In 1 week.

3. In 4 weeks.

11. The technique of carrying out of medical gymnastics at a trauma of a spine provides:

1. 2 periods.

*2. 3 periods.

3. 4 periods.

10 A starting position for carrying out of medical gymnastics at compression fracture of bodies chest vertebrae in the 1st period.

1. Laying on a spine.

2. Laying on a stomach.

*3. Laying on a stomach with the bolster under a breast.

9 Tasks of MPC at fractures during immobilization:

*1. Improvement of functions of cardio-vascular, respiratory systems and a digestive tract.

2. Recovery of function of the injured extremety.

*3. Strengthening of blood- and lymphocirculation in a zone of injury.

4. Training of the vestibular apparatus.

8. Contra-indications to assignment of MPC at fractures:

*1. Danger of bleeding.

*2. Presence of the foreign bodies located near to large vessels and nerves.

3. Meteorism.

*4. The expressed painful syndrome.

5. A body temperature $37,2^0$ C.

7 What forms of MPC are shown to patients with fractures in the postimmobilization period?

*1. Medical gymnastics.

*2. The individual task for independent performance.

3. Medical swimming.

*4. Mechanotherapy.

6. The basic criterion of restoration of work capacity of patients at fractures:

*1. Full volume of movement in joints.

2. Restoration of muscular force.

3. Restoration of coordination of movements.

5. In what period of medical gymnastics at fractures of bodies chest vertebrae are shown extensive exercises?

1. 1 period.

*2. 2 period

3. 3 period.

4. What means and forms of MPC are shown to patients with fractures of bones of a pelvis in the 1st period?

*1. Medical gymnastics.

*2. An individual complex for independent carrying out.

3. Mechanotherapy.

*4. Massage of the lower extremities.

3 What exercises render optimum biomechanical influence on curvature of a spine in patients with scoliosis?

*1. Asymmetric exercises.

2. Symmetric exercises.

3. Exercises on extension.

2. What kinds of physical training are contra-indicated to patients at a scoliosis of the 2nd degree?

1. Swimming

* 2. Shooting from a bow

*3. Basketball

* 4. Weight-lifting.

1- In what period of diseases for patients with an osteochondrosis of a cervical department of a spine are shown isometric pressure of a neck muscles and a shoulder girdle?

*1. Acute

2. Subacute

3. Final.

89. What procedures should precede medical gymnastics at platypodia?

*1. Massage of feet.

2. Correction by bandaging.

90. What special exercises are shown for patients with scoliosis?

*1. Corrigated symmetric.

*2. Corrigated asymmetric.

3. Ideomotor.

*4. Respiratory.

91. What muscles massage is spent at scoliosis:

*1. Spine

2. Collar zones.

3. Stomach

4. Pelvis fundus.

5. Lower extremities.

92. List means of passive correction at scoliosis:

*1. Massage.

2. Performance of detorsion exercises.

*3. Treatment by position.

93. Whether it can be used PR with the purpose of disinhibition of a cortex and the nerves, which are being in a condition of oppression?

*1. Yes.

2. No.

94. What exercises should not be applied at hysteria?

1. Disciplining.

2. Coordinating.

* 3. Emotional with display.

95. At carrying out of active exercises in the beginning of MPC course – what is necessary for avoiding in patients with insult?

1. Synkinesises

*2. Exhaustions of paralyzed muscles

3. Respiratory exercises.

96. When massage is appointed at muscular contractures?

*1. Up to medical gymnastics.

2. After medical gymnastics.

97. Terms of assignment of MPC at neuritis of a facial nerve?

* 1. Since the first days of disease.

2. From the end of the first week of disease.

3. From the 2nd-3rd week of disease.

4. From the 4-5th week of disease.

98. Is adhesive plaster bandage imposed at neuritis of a facial nerve?

*1. Against draft of muscles of the healthy side.

2. In a direction of muscles draft of the healthy side.

99. If function of mimic muscles completely isn't restored?

*1. Is limited a mimicry of a healthy half of a face.

2. Function of mimic muscles of the sick side is used as much as possible.

100. In the acute period of osteochondrosis of a spine is not applied?

1. Self-extension.

2. Physical exercises on a relaxation.
3. Respiratory exercises.
* 4. Dynamic exercises on a spine.

101. At absence of effect of conservative treatment of osteochondrosis of a spine, when it is applied surgical intervention?
1. After 3-4 months of treatment.
2. After 5-8 months of treatment.
*3. After 9-12 months of treatment.

102. To receptions of manipulation are concerned:
*1. Mobilization.
2. Redressement.
*3. Manipulation.
4. Immobilization.

103. At contracture of mimic muscles adhesive plaster bandage is imposed with draft:
* 1. From the sick side on healthy.
2. From the healthy side on the sick.

104. What form of MPC is more preferable at osteochondrosis of a spine in a chronic stage?
1. Jogging.
2. Foot walks.
*3. Swimming.

105. Name indications for employments by MPC during pregnancy.
*1. Rheumatismes, inactive phase.
2. Subacute thrombophlebitis.
3. Nephropathy.
4. Hydramnion.

106. To what exercises is preferred at all periods of pregnancy?
1. Corregated.
*2. Respiratory.
3. Static.

107. In what starting position are carried out significant number of exercises?

1. Standing.
*2. Laying.
3. Sitting.

108. Primary task of MPC at an inflammation of female genitals.

1. The general strengthening of an organism.
*2. Prophylasis of adhesive disease.
*3. Liquidation of the phenomena of inflammation process.
4. Restoration of work capacity of the woman.

109. Name contra-indications for carrying out of MPC at pregnancy, labors, the postnatal period.

1. Multiple pregnancy.
2. Wrong position of a fetus.
*3. The expressed toxicoses (preeclampsia, eclampsia).
*4. Prelying of a placenta.
*5. Habitual abortions.
*6. Hadramion.

110. What exercises are contra-indicated at carrying out of MPC in the first trimester of pregnancy (1-16 weeks)?

1. General-developing.
2. Respiratory.
3. On a relaxation.
*4. Increasing intra-abdominal pressure.

111. What exercises are indicate to the woman in labor during labor?

1. Corregated.
2. Strengthening of a prelum abdominale.
*3. Respiratory.

112. When is possible to use MPC in the postnatal period at absence of contra-indications?

1. Right after labor.
2. In the 1st day after labor.
*3. On the 2nd day after labor.

4. On the 4-6th day after labor.

113. Name indications to MPC at chronic adnexitis.

1. The expressed exacerbation of process.
*2. The residual phenomena of inflammatory process.
3. Decrease in a functional condition of cardiorespirator system.

114. What means and forms of MPC are indicate at chronic adnexitis at an out-patient stage?

*1. Morning hygienic gymnastics.
*2. Medical gymnastics.
*3. The dosed out walking.
4. Hardening mesures.
5. All answers are true.

115. What special exercises are applied at wrong position of a fetus?

1. Diaphragmal breath.
2. Standing, inclinations with a simultaneous half-turn of a trunk in a side position of a fetus.
3. Being on all fours, a spine to bend in a lumbar department, to lift a head and a pelvis.
*4. Laying on one side with the raised foot end, the foot bent in a knee, to lead by means of hands to a breast.

116. In what terms special exercises are spent at wrong position of a fetus?

1. Since 16 weeks.
2. Since 28 weeks.
*3. Since 32 weeks.

117. What day after normally proceeded labors is appointed medical gymnastics?

1. For the 1st day after labor.
*2. For the second day after labor.
3. For the 5th day after labor.
4. For the 7th day after labor.

118. Name indications for employments by medical gymnastic in the postnatal period.

1. A feverish condition.
*2. Break of perineum of the 1st-2nd degree.

3. Weakness in connection with severe labor.

119. Specify contra-indications for assignment of medical gymnastic at anomaly of position of female genitals.

1. Fixed retroflexy of an uterus.
2. Hyperanteflexy of an uterus.
3. Falling of a vagina.
4. Falling of an uterus.

*5. Exacerbation of chronic salpingo-adnexitis.

120. In what sequence is necessary to spend procedures at fixed retroflexy?

1. medical gymnastic before physiotherapy procedures and massage.

*2. medical gymnastic in 1 hour after physiotherapy procedures and massage.

121. What method of MPC is used in children in the age from 1 year till 4 years.

1. Group.
2. Small-group.
3. Individual.

*4. Game.

122. List primary tasks of MPC at rachitis in children?

*1. Correction of changes of the locomotor system.
2. Normalization of a metabolism.
*3. Restoration of psychomotor development of the child.
4. Normalization of function of cardio-respirator system.
*5. The prevention of deformation.
6. Recovery of immunity.

123. Name a leading task of MPC at pneumonia in the beginning period in children of early age.

*1. Reduction of developments of stagnation in lungs.
2. Immuno-modulating.
3. Strengthening of respiratory muscles.
4. Compensation of respiratory insufficiency.
5. Improvement of an emotional tone.

124. What kinds of respiratory exercises are applied at bronchial asthma in children?

*1. Saccadic breath.

2. The extended exhalation.

*3. Sound gymnastics.

*4. Drainage exercises.

5. Nasal breath.