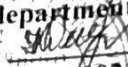
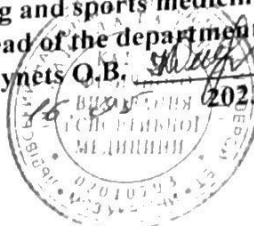


**LVIV NATIONAL MEDICAL UNIVERSITY N.A. DANYLO HALYTSKY**

**Department of Physical Training and Sports Medicine**

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

Head of the department  
k.b.s., associate prof. Kunynets O.B.   
Protocol № 18 from  2023

## **GUIDELINES**

in the discipline

## **PHYSICAL REHABILITATION AND SPORTS MEDICINE**

for 4th year students

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

**Topic 3** *"Determination and estimation of general physical capacity and aerobic  
productivity. Tolerance to physical activities."*

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

According to the curriculum, the study of physical rehabilitation and sports medicine at the medical faculty is carried out in the 4th year of study. The program is designed for 75 hours, of which 30 classroom hours (practical classes), 8 hours - lectures and 37 hours of independent work of students (IWS).

Methodical recommendations prepared by assistant of the department of physical education and sports medicine Marusiak S.V., Candidate of Medical Sciences, associate professor of the department of physical education and sports medicine Leontieva Z.R.

According to the general wording of the head of the Department of Physical Education and Sports Medicine, Candidate of Biological Sciences, Associate Professor O.B. Kunynets.

Reviewers:

Dutka R.Y., Doctor of Medical Sciences, Professor, Head of the Department of Propaedeutics of Internal Medicine, Danylo Halytskyi Lviv National Medical University  
Maglyovany A.V., Doctor of Biological Sciences, Professor of the Department of Physical Education and Sports Medicine, Danylo Halytskyi Lviv National Medical University

Methodical recommendations were discussed and approved  
at the methodical meeting of  
the Department of Physical Education and Sports Medicine  
Protocol № 18 from 16 of May 2023

**1. Relevance of the topic:** The most important section of sports medicine is functional diagnostics and functional readiness testing, physical fitness and other characteristics of the functional state of the organism. General and specific adaptive capabilities of the athlete's body are tested both in the laboratory and during training in gyms and stadiums. Based on the test results, you can determine the functional state of the organism, its adaptive capacity at the moment. Knowledge of the classification of functional tests helps the coach and the doctor to solve specific problems related to the objective assessment of the state of functional readiness and efficiency of the athlete.

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

**3. Learning goal (specific objectives):**

*To know:* to master the theoretical basis, principles of conducting and evaluating the results of functional tests used in sports medicine.

*To be able:*

- to carry out functional tests which are applied in sports medicine;
- to determine physical performance when performing the test PWC170 on velergometry and stepergometry;
- to fill in the medical control card of the sportsman (form №061-o) with results of the carried-out functional tests.

**4. Learn practical skills:**

- conducting and evaluating the Cooper test;
- determination of physical capacity (PWC170) using a step test and bicycle ergometer;
- determination and estimation of maximum oxygen consumption.

**5. Basic knowledge, skills, abilities necessary for studying the topic (interdisciplinary integration).**

**Anatomy:** Know the anatomical structure of the human body, features of the musculoskeletal system and musculoskeletal system.

**Physiology:** Know the features of the physiological state of the organism after exposure to physical activity normal and pathology. Determine the change in heart rate, blood pressure.

**Propaedeutics of internal diseases:** To collect the general anamnesis, medical examination of bodies and systems. Perform somatoscopy and anthropometry. Evaluate the results obtained.

**Propaedeutics children's diseases:** Know the features of physique and physical development in children of different ages.

**5.1. Student advice.**

*Theoretical questions for the lesson:*

- the concept of general physical capacity, aerobic performance and tolerance to physical activity;
- direct and indirect methods of determining physical activity;
- functional tests for effort (stress tests);

- indications and contraindications to the appointment of stress tests and conditions that require special attention when testing;
- testing conditions;
- types and initial value of loads;
- clinical and functional signs of the threshold of tolerance to physical activity;
- submaximal test PWC170. Methods and principles of calculating physical performance during the test PWC170;
- determination of maximum oxygen consumption;
- calculation of the indicator of maximum oxygen consumption according to the Astrand nomogram and according to the index PWC170;
- Navakki test, Harvard step test, Cooper test: methods of conducting and evaluating tests results;
- Functional classes depending on the power of the load performed in the testing of physical capacity and aerobic performance;

## 5.2 Practical works (tasks) used in class:

1. Describe the method of determining physical capacity (PWC170) when using a step test and a bicycle ergometer.
2. Describe the method of conducting and evaluating the results of the Harvard step test.
3. Describe the method of conducting and evaluating the results of Coopers test.
4. Describe the method of calculating the maximum oxygen consumption by Astrands monogram and the value PWC170.

## 5.3 Topic content:

**Physical working capacity (PWC)** - potential human ability to manifest maximum physical strength in dynamic, static or mixed work (mechanical work, that a man can execute with maximal intensity).

**Aerobic productivity** - her indexes are a vital capacity of lungs and maximal arbitrary ventilation.

**Tolerance to physical activities** is ability of organism to maintain them no infringement his state.

There are two methods of determination of physical capacity:

- direct (thus investigate frequency of heart-throbs, consumption of oxygen).
- indirect.

These methods can be dangerous for inspected, that is why more often apply indirect methods: PWS170, Harvard step-test.

During realization of veloergometry, indexes are determined a step test:

- PWS170 (physical working capacity) is a physical capacity, that an organism would be able to discover in the conditions of loading that is accompanied by the increase of frequency of heart-throbs to 170/min.

Test is executed as follows : a patient is subject on a veloergometer to two loading of different power (W1 and W2), by duration of 5 min, each with three-minute rest. Loading sneaks up thus, to get a few values of pulse in a range from 120-170 shots/min. On the basis of the obtained data build a chart, where on wasp of abscissas of - indexes power of loading, on wasp of ordinates- corresponding.

Formula:

$$PWS_{170} = W_1 + \frac{(W_2 - W_1)(f_2 - f_1)}{f_2 - f_1}$$

PWS<sub>170</sub> is power of physical activity at frequency of heart-throbs 170 shots/min, W<sub>1</sub> and W<sub>2</sub> is power of the first and second loading; f<sub>1</sub>, f<sub>2</sub> is frequency of heart-throbs last-minute the first and second loading.

Determination of maximal consumption of oxygen:

-MCK- most of oxygen, that a man can use during 1min. It is a measure of aerobic power and integral index of the state of the system of transport of oxygen, id est basic index of the productivity of the cardiorespiratory system. Absolute values and m/ min relatively to mass of body (a ml/of kg is in 1min) taking into account the type of sport.

He is determined by a direct and indirect method. The size of MCK depends on sex, age, physical preparation. Direct determination of MCK is conducted at velergometry, stepergometry and to work on treadmill. General principle of testing are applications of loading, that maximally mobilize the system of the oxygen providing of organism. During realization of test conduct the analysis of air, that a sportsman breathes out by means of gas analyzer. Determine the concentration of oxygen and carbon dioxide in the state of calmness, during loading and rehabilitation period. Investigated the velergometry loading or steppe offer to- a test is during 5 minutes. Frequency of heart-throbs is registered on 5th to the minute of work. The calculation of MCK is conducted on special normogram of Astranda. Gives determination of MCK a direct method more exact results. The investigated executes stepped increasing loading on velergometry.

For the calculation of MCK (ml/min) it is possible to use such formula.:

$$MCK = 1,7 * PWS_{170} + 1240.$$

A large value has determination of MCK (direct or indirect) a method in sport:

- A primary selection of sportsmen is in the types of sport on endurance;
- Criteria of efficiency of different methods of training;
- A selection of highly skilled sportsmen is on responsible competitions;
- Prognostication of results of competitions is with large authenticity.

### **Types of reaction cardiovascular system:**

- normotonic frequency of heart-throbs increases no more than on 100%. Systole pressure ↑ on 15-35 mmHg, and diastolic pressure of remain permanent. Recovery period about 3 minutes.
- hypertensive: frequency of heart-throbs increases more than on 100%. Systole and diastolic pressure ↑ than on 30%. Recovery period about 5 minutes.
- diastonic: frequency of heart-throbs increases more than on 100%. Systole pressure ↑ to 200 mmHg, diastolic is not listened. Meets for people after the carried infectious diseases, with rejections from the side of the nervous system.
- hypotonic: frequency of heart-throbs increases more than on 100%. Systole pressure risessmall, diastolic diminishes. Meets at a heart failure, at an overstrain.
- Reaction with the step getting up : substantial height frequency of heart-throbs, systole pressure on 2th or on 3th to the minute after renewal can be higher, than after the dosed loading. Meets for people with weak functional ability of heart.

## **Basic directions in application of agile tests :**

1. Control of training process, information about his quality and attained results.
2. Information is about the level of development of motive internalss of man.
3. Finding out of efficiency of training methodologies and sub-groups is for their selection.
4. An estimation of testable persons is by means of the special norms within the framework of certain group.
5. Prognostication of sporting achievements of testable persons, that it is possible to expect from them in a certain sentinel interval in the future.
6. Choice of candidates.
7. Comparison of level of physical preparedness of individuals and groups.
8. The use is in a scitech.

***Contra-indications to realization of tests*** with an increase loading divide on: absolute and relative.

### Absolute:

- acute diseases with the increased temperature of body;
- coronarism with the frequent attacks of stenocardia and threat or recently carried heart attack of myocardium;
- active myocarditis;
- paroxysmal tachycardia;
- insufficiency of circulation of blood of II-III of century.,
- thrombophlebitis;
- chronic bronchitis and pneumonia, pulmonary insufficiency;
- anaemia.

### Relative against shows:

- hypertensive illness;
- stable angina;
- pulmonary insufficiency.

### The criteria of threshold of tolerance are:

- a decline of segment of ST is on 1,0-0,2mB;
- an increase of segment of ST is with the concavity directed up;
- increase of voltage of indent of T in the pectoral taking more than on 1mB;
- decline of voltage of indent of T more than on 25% or him negativism during loading;
- decline of voltage of indent of R on 50% or more;
- displacement of segment of TU.

### Parafunction of conductivity.

- appearance of arrhythmia with frequent polytropic extrasystoles, paroxysmal tachycardia;
- appearance of early ventricular extrasystole;
- deepening and expansion of indents of Q;
- increase of systole arteriotony of to 240 mm Hg;
- invariability or decline of systole arteriotony;
- decline of pulse arteriotony; achievement of maximum frequency of heart-throbs.

## Harvard stepp-test:

Before implementation the inspected has a rest 5 minutes. Physical activity is set as ascents on a step in high a 45 cm. The rate of ascent is permanent and 120 steps equal for 1 minute. Every cycle of getting up makes 4 steps: time-getting up one leg on a step, two- the inspected becomes two feet on a step, three- the inspected puts on the floor a leg from that began an ascent, four- the inspected puts the second leg on the floor. Duration of implementation of test folds three minutes.

After implementation of test a patient sits down on a chair. First minute a testing participant has a rest calmly. Then during the first 30 seconds 2-,3-,4-й minutes of renewal on radial arteries the index of frequency of heart-throbs is counted up.

An estimation of size of index is at implementation of the Harvard stepp test.

- Estimation IHST
- Unsatisfactory 55
- Below middle 56-64
- Middle 65-79
- Good 80-89
- Excellent 90

**Tests of Cooper** : the important feature of estimation of physical capacity is dependence of end-point on age investigated. Most loading attribute to aerobic . Loading in the tests of Cooper have "global" character at their implementation in work it is included 2/3 muscular mass. Thus, these loading have an influence not only on the muscular system but also on the systems that provide muscular activity, on cardiovascular and respiratory.

Table of estimation of physical preparedness on the 12-minute running test of Cooper

Physical preparedness Overcame distance, m

Girls

13-19 year Women

20-29 year Women

30-39 year Youths

13-19 year Men

20-29 year Men

30-39 year

Very bad < 1600 < 1550 < 1500 < 2100 < 1950 < 1900

Bad 1600-1900 1550-1800 1500-1700 2100-2200 1950-2100 1900-2100

Satisfactory 1900-2100 1800-1900 1700-1900 2200-2500 2100-2400  
2100-2300

Good 2100-2300 1900-2100 1900-2000 2500-2750 2400-2600 2300-2500

Excellent 2300-2400 2100-2300 2100-2200 2750-3000 2600-2800  
2500-2700

More excellent > 2400 > 2300 > 2200 > 3000 > 2800 > 2700

**Test of Navaki** : execute him by means of veloergometer. Consists in determination of time, during that the investigated can execute loading of certain power, each of that lasts 2 minutes, grows gradually, beginning from 1 W/kg, to the that moment, when the investigated can do work.

**Stepergometry** - most physiology, simple and accessible method. The modified including on a stair, that allows to use loading in ordinary terms at minimum moved investigated, is fixed in basis of him- he in a certain rate rhythmically rises and goes down on a little stair. Different authors offer one, two- and three. Usually use double tails (height each a 23 cm). Climbing ability is controlled by a metronome. Every stage lasts 4 min an arteriotony and pulse count up loading to and then. Deficiency of stepergometry is not high exactness in the dosage of loading, especially at the calculation of power that is related to lowering from lowering from a step.

**Treadmill** - a device allows to design locomotion - walking, hurried in laboratory terms. Investigated only insignificantly moves for vertical lines, that allow to conduct direct registration of physiology indexes. Power of loading is measured out by the change of speed and inclination of sliding ribbon.

The analysis of different types of the dosed physical activity shows that veloergometry is the most advantageous method.

**Veloeometry** - it is a record of electrocardiogram on a background physical activity. Conducted on the special bicycle- veloergometer. A method allows to define the reaction of the cardiovascular system on physical activity, degree of endurance of organism on loading, to find out the hidden pathology of cardiovascular pathology.

This research is conducted with an aim:

1. Diagnostics of the hidden pathology of the cardiovascular system including in default of characteristic symptoms, especially for patients with risk factors- smoking, hyperpiesis, hypercholesterolemia.
2. Provocation of the hidden violations of rhythm.
3. Determination of tolerance to physical activity for healthy people, sportsmen, patients with pathology of breathing, and also for people from cardiac and by extracardiac pathology.
4. For the estimation of risk of operative treatment or estimation of capacity.
5. An estimation of prognosis is in an early postinfarction period.

**Realization of velergometry is obligatory at:**

1. At presence of atypical pain syndrome in a thorax, related to physical activity.
2. At presence of unclear clinical displays of ischemic heart trouble.
3. At the typical stenocardia of tension for determination of tolerance to physical activity.
4. After the carried sharp heart attack of myocardium.
5. At the heterospecific changes of electrocardiogram at a calmness even in default of pain syndrome or atypical character.
6. For the drivers of public transport, pilots.



### **Contra - indication to realization of velergometry :**

1. Complicated sharp heart attack of myocardium (in 3 weeks).
2. Uncomplicated sharp heart attack of myocardium (only in 7-14 days).
3. Unstable angina including making progress and variant, from not rapid relief of pain symptoms.
4. Heart failure of 2B and 3 degrees.
5. Expressed respiratory insufficiency.
6. Dangerous violations of rhythm and conductivity, pair extrasystoles, early extrasystoles, tachycardia more than 100 shots/min.
7. Active used for setting fire diseases (infectious and uninfected, having a fever states, trombophlebitis, endocarditis, pericarditis, myocarditis).
8. Embolia of pulmonary artery, blood clots in the cavities of heart, heart attack of lungs.
9. Critical stenosis of valves.
10. Dissecting of aneurysm aorta, postinfarction aneurysm of the left ventricle from ventricular fibrillation and by clinical death in anamnesis.

### **Materials for self-control.**

#### **Situational (clinical) tasks for self-control:**

##### ***1) Questions for self-control:***

1. Give a definition of general physical performance and exercise tolerance.
2. Direct and indirect methods of determining physical capacity.
3. General description of the functional stress tests for effort.
4. Indications and contraindications to the appointment of stress tests.
5. Describe the conditions for conducting stress tests.
6. Clinical and functional signs of the threshold of tolerance to physical activity.
7. Methods and principles of calculating physical capacity when performing a submaximal test.
8. Definition of the concept of maximum oxygen consumption.
9. Methods for determining the maximum oxygen consumption. Describe the methods of calculating the maximum oxygen consumption.
10. Rufus tests, nawaki test, cooper test, Harvard step test, Coopers test. Methods of conducting and evaluation of results.
11. Physical condition classes and their classification features.
12. Connection of physical working capacity with health indicators.

2) *Typical, standard, classic, have an unambiguous answer, students know the algorithms for their solution - II level.*

Choose one of the most correct answers

**1. The functional criterion of the threshold of tolerance to physical activity is:**

- A. Appearance of sinus tachycardia.
- B. Increase in systolic blood pressure to 180 mm Hg.
- C. Heart rate at 200 minus the patient's age in years.
- D. Increase in diastolic blood pressure to 90 mm Hg.
- E. Loss of balance.

**2. Indications for stress testing in the clinic are all but one:**

- A. Assessment of the functional state and functional capabilities of the organism, selection and correction of motor mode.
- B. Detection of latent forms of the cardio-respiratory system.
- C. Detection and differential diagnosis of diseases of the musculoskeletal system.
- D. Optimization of individual physical rehabilitation programs.
- E. Determination of fitness for work.

**3. Physiological prerequisite for the submaximal test is:**

- A. Linear correlation between load power and heart rate in the optimal range.
- B. Linear correlation between general physical capacity and heart rate of a certain magnitude.
- C. Linear correlation between general physical capacity and heart rate.
- D. Functional reserve of the cardiovascular system during exercise.
- E. Inversely proportional correlation between load power and heart rate within a given mode.

**4. The average level of physical capacity of a practically healthy trained person is characterized by the ability to perform work with power:**

- A. Men – 4,2 W/kg, women – 2,7 W/kg.
- B. Men – 2,4 W/kg, women – 1,7 W/kg.
- C. Men – 1,5 W/kg, women – 1,0 W/kg.
- D. Men – 1,0 W/kg, women – 0,5 W/kg.
- E. Men – 3,5 W/kg, women – 2,5 W/kg.

**5. A clinical sign of reaching the threshold of exercise is:**

- A. Appearance of chest pain.
- B. Frequent and deep breathing.
- C. Increased sweating.
- D. Slight redness of the face.
- E. Increased heart rate.

### **3) Tests for self-control.**

Choose one or more correct answers according to the scheme:

- A) if the answers 1,2,3 are correct
- B) if the answers 1 and 3 are correct
- C) if the answers 2 and 4 are correct
- D) if the correct answer is 4
- E) if the answers 1,2,3,4 and 5 are correct

#### **1. The principle of classification of functional tests is based on:**

- A. Physical loads.
- B. Change the position of the body in space.
- C. Respiratory arrest.
- D. Vital capacity of the lungs.
- E. Resistance to hypoxia.

#### **2. Functional tests allow to estimate:**

- A. Health status.
- B. The level of functional capabilities of the organism.
- C. Reserve capacity of the organism.
- D. Psycho-emotional state and physical development.
- E. Resistance to hypoxia.

#### **3. To the rational type of response to exercise is:**

- A. Hypotonic.
- B. Hypertensive.
- C. Stepped.
- D. Normotonic.
- E. Dystonic.

#### **4. PWC<sub>170</sub> means:**

- A. Work under load on bicycle ergometer.
- B. Work under load on a step.
- C. Work done in 170 seconds.
- D. Load power at a heart rate of 170 beats/min.
- E. Load power on the ergometer.

#### **5. The physiological significance of the cycling ergometric test of athletes does not include the purpose:**

- A. Training and mental stability.
- B. Functional state of the cardiorespiratory system.
- C. Aerobic productivity of the body.
- D. General physical performance.
- E. Work under load on a step.

**6. Indicators for calculating the maximum oxygen consumption by the indirect method after bicycle ergometry include:**

- A. Heart rate before exercises.
- B. Power of the first load in kg/min.
- C. Power of the second load in kg/min.
- D. Maximum heart rate and maximum powerergometric load in kg/min.
- E. Heart rate after exercises.

**7. The clinical criterion for termination of exercise testing is:**

- A. Achieving the maximum allowable heart rate.
- B. Angina attack.
- C. Drop in systole blood pressure or increase in blood pressure more than 200/12 mm Hg.
- D. Pronounced shortness of breath.
- E. Sharp pallor and cold sweat.

**8. Electrocardiographic criteria for termination of the sample with exercise are:**

- A. Reduction of the segment ST.
- B. Partial extrasystole, paroxysmal tachycardia, atrial fibrillation.
- C. Atrioventricular or intraventricular block.
- D. Respiratory arrhythmia.
- E. Significant increase in heart rate.

**9. Methods of assessing physical performance in patients with coronary heart disease include:**

- A. Bicycle ergometry.
- B. Orthostatic test and Letunov test.
- C. Step test.
- D. Test Stange and Genchi.
- E. Clinostatic test.

**10. Optimal heart rate, at which you should stop exercising:**

- A. 120 beats/min.
- B. 140 beats/min.
- C. 150 beats/min.
- D. 170 beats/min.
- E. 200 beats/min.

### **Literature:**

#### **Main**

1. Likuvalna fizkultura ta sportyvna medytsyna: Pidruchnyk / Klapchuk V.V., Dziak H.V., Muravov I.V. ta in.; za red. V.V. Klapchuka, H.V. Dziaka. – K.: Zdorovia, 1995. – 312 s.
2. Likuvalna fizkultura ta sportyvna medytsyna: Testovi zavdannia dlia kontroliu znan studentiv medychnoho ta stomatolohichnoho fakultetiv vyshchych medychnykh navchalnykh zakladiv IU rivniv akredytatsii (Navchalnyi posibnyk) / Abramov V.V., Klapchuk V.V., Mahlovanyi A.V., Smyrnova O.L., ta in.; za red. prof. V.V. Klapchuka ta prof. A.V. Mahlovanoho. – Dnipropetrovsk: Med

akademii, 2006. – 124 s.

3. Osnovy reabilitatsii, fizychnoi terapii, erhoterapii: pidruchnyk / [L.O. Vakulenko, V.V. Klapchuk, D.V. Vakulenko, ta in.]; za zah. red. L.O. Vakulenko, V.V. Klapchuka. – Ternopil: TDMU, 2019. – 372 s.

4. Fizychna reabilitatsiia, sportyvna medytsyna : Pidruchnyk dlia studentiv vyshchykh medychnykh navchalnykh zakladiv / V. V. Abramov, V. V. Klapchuk, O. B. Nekhanevych A.V. Mahlovanyi [ta in.] ; za red. prof. V. V. Abramova ta dots. O. L. Smyrnovoi. – Dnipropetrovsk, Zhurfond, 2014. – 456 s.

5. Sportyvna medytsyna: Pidruchnyk dlia studentiv ta likariv / Za zahalnoi redaktsiiei prof. V.M. Sokruta – Donetsk: «Kashtan», 2013. – 472 s.

6. Mahlovanyi A, Mahlovana H, Mukhin H. Osnovy fizychnoi reabilitatsii. Lviv: Liha-Pres; 2006. 150 s.

7. Mykhaliuk YeL, Cherepok OO, Tkalic IV. Fizychna reabilitatsiia pry zakhvoriuvanniakh khrebt: navch. posib. Zaporizhzhia: ZDMU; 2016. 90 s.

8. Mukhin V.M. Fizychna reabilitatsiia/Mukhin V.M.- Vydannia tretie, pereroblene ta dopovnene.-K.: Olimpiiska literatura, 2009.-488 st.

9. American Council of Academic Physical Therapy Clinical Education Summit Report and Recommendations. <https://www.acapt.org/docs/default-source/pdfs/clinical-education-summit2014-final-report-1.pdf>. Accessed August 10, 2020.

10. Best Practices for Physical Therapist Clinical Education (BPPTCE) 2017 Report to the House of Delegates: Stakeholder Feedback and Recommendations. <https://www.apta.org/uploadedFiles/APTAorg/Educators/CETFExecutiveSummary.pdf>. Accessed August 10, 2020.

11. Timmerberg JF, Dole R, Silberman N, et al. Physical therapist student readiness for entrance into the first full-time clinical experience: A Delphi study. *Phys Ther.* 2019;99:131-146.

#### Additional

1. Filak Ya.F., Filak F.H. Masazh i netradytsiinyi masazh: pidruchnyk / Ia.F. Filak, F.H. Filak – Uzhhorod: FOP Sabov A.M., - 215, - 336 s.

2. International Parkinson and Movement Disorder Society (MDS). Ataksyia [Internet] [tsytovano 2019 Ber.17] Dostupno na: <https://www.movementdisorders.org/MDSFiles1/Education/Patient-Education/Ataxia/pt-Handouts-Ataxia-Russian-v1.pdf> 11. Jonathan. Marsden. Cerebellar ataxia. Balance. Gait, and Falls; 2018: 261-281.

3. MAHLOVANYI ANATOLIY, GRYGUS IGOR, KUNYNETS OLHA [et al.]. Formation of the mental component of the personality structure using physical activity / ANATOLIY MAHLOVANYI, IGOR GRYGUS, OLHA KUNYNETS [et al.] // *Journal of Physical Education and Sport* ® (JPES), Vol 21 (Suppl. issue 5), Art 406 pp 3053 – 3059, Oct 2021 online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 c JPES Published online: October 30, 2021 (Accepted for publication October 15, 2021) DOI:10.7752/jpes.2021.s5406.

4. Foundations of the physical rehabilitation in medicine / Anatoliy Mahlovanyy, Olha Kuninets, Igor Grygus // *Fizychna terapiia, zdorovia, fizychna kultura ta pedahohika : monohrafiia . Fizjoterapia, zdrowie, kultura fizyczna i pedagogika : monografia.* – Rivne : NUVHP, 2021. – S. 147 – 175.

5. GUZII OKSANA, ROMANCHUK ALEXANDER, MAHLOVANYI ANATOLIY, TRACH VOLODYMYR. Post-loading dynamics of beat-to-beat blood pressure variability in highly trained athletes during sympathetic and parasympathetic overstrain formation / OKSANA GUZII, ALEXANDER ROMANCHUK, ANATOLIY.

6. MAHLOVANYI, VOLODYMYR TRACH // *Journal of Physical Education and Sport* DOI:10.7752/jpes.2021.05350 Published online: September 30, 2021 (Accepted for publication September 15, 2021) (JPES), Vol. 21 (5), Art 350, pp. 2622 - 2632, September 2021 online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES.

#### Informational resources

[zakon.rada.gov.ua/go/1556-18](http://zakon.rada.gov.ua/go/1556-18)

<http://www.kmu.gov.ua/control/uk/cardnpd?docid=248719473>

<http://www.kmu.gov.ua/control/uk/cardnpd?docid=248719427> [dsmsu.gov.ua/index/ua/material/16894](http://dsmsu.gov.ua/index/ua/material/16894) [sportbuk.com/.../proekt-novoho-zakonu-ukraji...](http://sportbuk.com/.../proekt-novoho-zakonu-ukraji...)

<http://uareferat.com>

<http://www.lnu.edu.ua/faculty/sport/img>

[mdu.edu.ua/spaw2/uploads/files/19\\_4.pd](http://mdu.edu.ua/spaw2/uploads/files/19_4.pd)

[elibrary.kubg.edu.ua/.../Lyashenko\\_Tumanova](http://elibrary.kubg.edu.ua/.../Lyashenko_Tumanova)    [www.sworld.com.ua/index.php/ru/pedagogy.../18194-213-923](http://www.sworld.com.ua/index.php/ru/pedagogy.../18194-213-923)

<http://lp.edu.ua/node/1347> [zakon.rada.gov.ua/laws/show/z0249-06](http://zakon.rada.gov.ua/laws/show/z0249-06)

[ua.textreferat.com/referat-664.html](http://ua.textreferat.com/referat-664.html)

[www.ukrreferat.com/index.php?referat=61901](http://www.ukrreferat.com/index.php?referat=61901)

[elartu.tntu.edu.ua/handle/123456789/883](http://elartu.tntu.edu.ua/handle/123456789/883)

[nbuv.gov.ua/.../VchdpuPN\\_2013\\_112\(1\)\\_24](http://nbuv.gov.ua/.../VchdpuPN_2013_112(1)_24)

[studme.com.ua/.../programmno-normativnye\\_o..](http://studme.com.ua/.../programmno-normativnye_o..)

#### Methodical

1. Milierian V.Ie. *Metodychni osnovy pidhotovky ta provedennia navchalnykh zaniat v medychnykh VUZakh.* - K., 2004. - 80 s.