

**Federal State Autonomous Educational Institution of Higher Education  
"Peoples' Friendship University of Russia»**

**Medical Institute**

Recommended by the ISSN

**PROGRAM  
STATE FINAL ATTESTATION**

**Level:** training of highly qualified personnel (postgraduate studies)

**Recommended for the direction of training / specialty:** 31.06.01 Clinical medicine

**Program focus (profile):** 14.01.04 Internal disease: heart failure

**Graduate qualification (degree):** Researcher. Teacher-researcher.

**Form of training:** full-time (3 years)

**Place in the OP structure:** Block 4. "State final certification, The basic part.

B4. B. 01. (D) Preparation for and passing of the state exam (108 hours, 3 p. e.)

B4. B. 02 (E). Presentation of a scientific report on the main results of the prepared scientific qualification work (dissertation) (216 hours, 6 s. e.)

The program was discussed at the interdepartmental meeting of RUDN University departments that conduct postgraduate training in the field of training 31.06.01 Clinical Medicine, training profile (orientation) 14.01.04 " Internal disease: heart failure »

2021-2022 years.

## **1. General provisions**

1.1. Responsibility and procedure for preparing and conducting state final tests at RUDN University, as well as the list, sequence, and time frame for passing documents required for state final certification between structural divisions determines the Procedure for conducting final state certification of students. Procedure for organizing and conducting the state (final) audit of the state budget.) certification of students is regulated by the "Regulations on the procedure for conducting state final certification of students in educational programs of higher education in the areas of training scientific and pedagogical personnel in the postgraduate school of the RUDN University»;

1.2 State (final) certification at the basic education program of preparation of scientific and pedagogical personnel in postgraduate study on the profile of training (orientation) "14.01.04 Internal diseases: heart failure" includes training and state examination and submit a scientific report on the main results by the scientific and qualification work (thesis), designed in accordance with requirements established by the Ministry of education and science of the Russian Federation. Students who do not have academic debt and have fully completed the curriculum or individual curriculum for the relevant educational programs are allowed to participate in the state final certification.;

1.3 The results of any of the types of certification tests included in the state final certification are determined by the grades "excellent"," good"," satisfactory", "unsatisfactory". Persons who have mastered the basic professional educational program for training highly qualified scientific and pedagogical personnel in the training profile (orientation) 14.01.04 «Internal diseases: heart failure» and successfully passed the state (final) certification, receive a state-issued document with the qualification" Researcher. Teacher-researcher".

## **2. Goals and objectives of the state final certification**

**2.1. The purpose** of the state final attestation is to determine the compliance of the results of students ' mastering of basic educational programs with the requirements of the OS of Higher Education of the RUDN University.

The state final attestation includes the state exam established by the Academic Council of the University, and the defense of the final qualification work (WRC).

**2.2. The objectives** of the state final certification are::

- checking the quality of personal training in basic natural science laws and phenomena necessary in professional activities;
- determination of the level of theoretical and practical readiness of the graduate to perform professional tasks in accordance with the obtained qualification;
- determination of the degree of a person's desire for self-development, improvement of their skills and skills;
- verification of the formation of a stable motivation for professional activity in accordance with the types of professional activity provided for in the OS of Higher Education Institutions of the RUDN University;
- testing the ability to find organizational and managerial solutions in non-standard situations and the willingness to take responsibility for them;
- ensuring the integration of education and scientific and technical activities, increasing the efficiency of using scientific and technical achievements, reforming the scientific sphere and stimulating innovation;
- ensuring the quality of training in accordance with the requirements of OS HE RUDN University.

## **3. State exam program.**

3.1. State exam in a special discipline corresponding to the profile of the postgraduate training area 14.01.04 "Internal disease: heart failure" is conducted in the form of an oral interview on tickets.

3.2. As part of the state exam, the degree of development of the following competencies by graduates is checked:

1) universal competencies (UC):

- ability to critically analyze and evaluate current scientific achievements, generate new ideas in solving research and practical problems, including in interdisciplinary areas (UC-1);
- the ability to design and carry out complex research, including interdisciplinary research, based on a holistic, systematic scientific worldview using knowledge in the field of history and philosophy of science (UC-2);
- willingness to participate in the work of Russian and international research teams to solve scientific and educational problems (UC-3);
- readiness to use modern methods and technologies of scientific communication in the state and foreign languages, including readiness for communication in oral and written forms in Russian and foreign languages to solve problems of professional activity, possession of a foreign language communicative competence in official business, educational and professional, scientific, socio-cultural, everyday areas of foreign language communication (UC-4);
- ability to follow ethical standards in professional activities (UC-5);
- ability to plan and solve problems of their own professional and personal development (UC-6).

2) general professional competencies (GPC):

- ability and readiness to organize applied scientific research in the field of biology and medicine (GPC -1);
- ability and readiness to conduct applied scientific research in the field of biology and medicine (GPC -2);
- ability and readiness to analyze, summarize and publicly present the results of completed scientific research (GPC -3);
- readiness to implement the developed methods and techniques aimed at protecting the health of citizens (GPC -4);
- ability and readiness to use the laboratory and instrumental base for obtaining scientific data (GPC -5);
- readiness for teaching activities in educational programs of higher education (GPC -6).

3) Professional competencies (PC):

- ability and readiness to organize and conduct applied scientific research in the field of clinical medicine (PC-1);
- ability and readiness to analyze, summarize and publicly present the results of scientific research in the field of clinical medicine (PC-2);
- readiness to implement the developed methods and techniques in the field of clinical medicine in practical activities aimed at protecting the health of citizens (PC-3);
- readiness to use the laboratory and instrumental base for obtaining scientific data (PC-4);
- readiness for teaching activities in the field of clinical medicine in educational programs of higher education (PC-5).

3.3. Scope of the state exam.

The exam in a special discipline is conducted in the form of an oral interview with tickets consisting of 3 questions. Questions (tasks) are formed in accordance with the approved program of the state exam in the profile of training (orientation) 14.01.04 "Internal diseases: heart failure". The number of tickets for the state exam is 50 variants, each ticket includes no 3 questions.

### 3.4. Content of the state exam.

#### **General questions**

1. Evidence-based medicine.
2. Prevalence of major forms of cardiovascular diseases.
3. Morbidity and mortality from cardiovascular diseases.
4. Risk factors for CHD and hypertension.
5. Prevention of CHD in the general population.
6. Prevention of arterial hypertension among the population.
7. Fundamentals of medical genetics. Population-genetic aspects of cardiovascular diseases.
8. Main provisions of statistical analysis; goals, methods, mathematical support, criteria for testing hypotheses, checking the legality of their application, distribution approximation, regression, nonparametric criteria, multiple comparisons, analysis of conjugacy tables.

#### **Atherosclerosis**

1. Current understanding of the etiology and pathogenesis of atherosclerosis.
2. Standards of diagnosis, treatment, and prevention of atherosclerosis.
3. Primary prevention of CHD.
4. Mixed (combined) hyperlipidemia: epidemiology, clinical forms, prognosis.
5. Primary hypercholesterolemia: etiological factors, clinical significance.
6. Familial hypercholesterolemia: epidemiology, etiology and pathogenesis, clinical manifestations, diagnosis, treatment.
7. Secondary hyperlipidemia: etiology, clinic.
8. Principles of treatment of hyperlipidemia.
9. Prevention of atherosclerosis. Diet therapy. Pharmacotherapy of atherosclerosis.
10. Statins. Enterosorbents. Fibrates. Nicotinic acid. Antioxidants.
11. Extracorporeal methods in treatment. Surgical methods of treatment.

#### **Coronary heart disease**

1. CHD risk factors, their prevalence and significance. A combination of risk factors. Prevention of CHD in the general population.
2. Standards for the diagnosis, treatment, and prevention of angina pectoris. Classification of CHD. Differential diagnosis of angina pectoris. Rose G. and Blackburn H. questionnaire.
3. Variants of the clinical course of MI. Standards for the diagnosis, treatment, and prevention of myocardial infarction.
4. Modern principles of treatment of patients with chronic coronary insufficiency.
5. Primary cardiac arrest (sudden death). Sun risk factors. Management tactics for patients who have undergone SUN or have SUN risk factors.
6. Angina pectoris. Modern methods of angina diagnostics. Functional load tests. The concept of sensitivity and specificity of the test. Application of ECG, PES, Holter monitoring, bicycle ergometry. Radioisotope methods of research in CHD. Ultrasound methods in the diagnosis of coronary heart disease. Invasive methods in the differential diagnosis of angina pectoris. Indications, opportunities, and complications.
7. Pharmacotherapy of angina pectoris. The main groups of antianginal drugs. Coronary angioplasty. Coronary stenting. Surgical treatment of chronic coronary heart disease. Indications, contraindications, and complications. Forecast.
8. ECG diagnostics for MI. The role of radioisotope methods in diagnostics. Enzyme diagnostics. Ultrasound diagnostic methods. Coronary angiography.
9. Complications of myocardial infarction. Heart rhythm and conduction disorders. Cardiogenic shock. Acute left ventricular failure. Thromboembolism. Heart aneurysm. Heart failure in MI. The Dressler syndrome.
10. Treatment of THEM. Specialized department for the treatment of IM patients. Modern principles of treatment of "uncomplicated" MI. Anticoagulant and fibrinolytic therapy in acute

MI. Treatment of anginal attack in MI. Therapeutic measures for MI complications: treatment of cardiogenic shock, arrhythmias and conduction disorders, cardiac asthma and pulmonary edema, pulmonary embolism. Medical tactics for cardiac arrest. Resuscitation techniques. Defibrillation. Electrocardiostimulation. Heart failure in MI. Diagnostics. Surgical methods in the treatment of MI.

### **Circulatory failure**

1. Epidemiology of CHF (prevalence, survival, prognosis). The main causes of CHF. Pathogenesis of CHF. Evolution of scientific views (cardiac model, cardiorenal, hemodynamic, neurohumoral, myocardial model of CHF).
2. Pathogenesis of CHF. Role of activation of tissue neurohormones.
3. Standards for the diagnosis, treatment, and prevention of CHF.
4. Clinical methods for assessing the severity of CHF (assessment of the clinical condition, dynamics of functional class, exercise tolerance, quality of life assessment)
5. Principles of treatment of CHF. Treatment goals. Non-medicinal components of treatment.
6. Principles of treatment of CHF. Drug therapy. The main classes of drugs used. Basic, additional and auxiliary medicines for the treatment of CHF. Principles of combined use of medications.
7. ACE inhibitors in the treatment of CHF: mechanism of action. The impact of ACE inhibitors used in Russia on the course and prognosis of CHF. Data from multicenter clinical trials (CONSENSUS, AIRE, SAVE, SOLVD)
8. ACE inhibitors in the treatment of CHF. Indications, contraindications, and side effects. Rational dose selection.
9. Diuretics in the treatment of CHF. General characteristics. Indications for diuretic therapy in patients with CHF. Osmotic diuretics and carbonic anhydrase inhibitors.
10. Combinations of various diuretics. Overcoming resistance to diuretics. Extracorporeal methods in the treatment of refractory edematous syndrome.
11. Cardiac glycosides in the treatment of CHF. Mechanisms of action. Groups. Indications for use. Impact on the forecast. Optimal doses in the treatment of CHF. Clinic of glycoside intoxication and its treatment.
12. Non-glycoside inotropic agents in the treatment of patients with severe CHF.
13. B-drenoblockers (BAB) in the treatment of CHF. Evolution of views on the possibility and indications for the use of BAB in CHF. Mechanisms of positive action of BAB in patients with CHF.
14. Results of clinical trials (CIBIS-II, MERIT-HF, BEST, COPERNICUS)
15. Pharmacological groups. Indications and contraindications. Application tactics.
16. Antagonists of AT-II receptors. Application prerequisites. Pharmacological mechanisms of action. Data from international clinical trials. Place in the medical treatment of CHF.
17. Principles of antiarrhythmic treatment in CHF. Influence of various classes of antiarrhythmic drugs on the prognosis of patients.
18. Peripheral vasodilators. Classification by location of the preferred effect. Classification by mechanism of action. Historical background to their use in CHF. Impact on the forecast. Modern ideas about the place of PVD in the treatment of CHF.
19. Infectious endocarditis. Etiology, pathogenesis, clinic, diagnosis and treatment.
20. Cardiomyopathy: etiology, pathogenesis, classification, clinic, diagnosis, treatment. Pathomorphological changes in the myocardium.
21. Myocarditis. Classification. Clinical course. Forecast.
22. Dry (fibrinous) pericarditis. Etiology, pathogenesis, classification.
23. Non-specific myocarditis (idiopathic Abramov-Fiedlermyocarditis). Clinic, diagnosis, and treatment.
24. Pericarditis: etiology, pathogenesis, classification, clinic, diagnosis, treatment.
25. Differential diagnosis of dilated cardiomyopathies.

26. Constrictive pericarditis. Clinic, diagnosis and treatment Mechanisms of circulatory insufficiency development.
27. Dilated (congestive) cardiomyopathy. Clinic, diagnosis, and treatment. Forecast
28. Differential diagnosis of hypertrophic cardiomyopathies.
29. Indications for surgical treatment of cardiomyopathies.
30. Heart tumors. Classification, diagnosis, and treatment.
31. Rheumatism: modern concepts of etiology and pathogenesis. Classification, determination of activity, clinical course. Clinic and treatment of acute and sluggish rheumatism. Prevention of rheumatism.
32. Congenital heart defects: classification. Clinical characteristics of the main defects.
33. Heart disease — mitral valve insufficiency. Etiology. Mechanisms of compensation and decompensation of blood circulation. Clinic, diagnosis, and treatment. Forecast.
34. Heart disease — aortic valve insufficiency. Etiology. Mechanisms of compensation and decompensation of blood circulation. Clinic, diagnosis, and treatment. Forecast.
35. Heart disease – stenosis of the left atrioventricular opening (mitral stenosis). Etiology. Mechanisms of compensation and decompensation of blood circulation. Clinic, diagnosis, and treatment. Forecast.
36. Heart disease — aortic stenosis. Etiology. Mechanisms of compensation and decompensation of blood circulation. Clinic, diagnosis, and treatment. Forecast.
37. Differential diagnosis of aortic heart defects.
38. Differential diagnosis of mitral valve defects.
39. Дефект Atrial septal defect. Clinic, diagnosis, and treatment.
40. Ventricular septal defect. Clinic, diagnosis, and treatment.
41. Open aortic duct. Clinic, diagnosis, and treatment.
42. Prolapse of the mitral valve leaf. Etiology. Clinic. Management of patients.
43. Acquired defects of the 3-fold valve. Clinical characteristics. Diagnosis and treatment.
44. Primary pulmonary hypertension. Etiology, pathogenesis, clinic, diagnosis.
45. The pulmonary heart. Etiology. Pathogenesis. Clinic, diagnosis, and treatment.

### **Cardiac rhythm and conduction disorders**

1. Modern methods for the diagnosis of rhythm and conduction disorders. Characteristics of the method.
2. Classification of arrhythmias. Extrasystole. Classification. Diagnosis and treatment.
3. Mechanisms of action of antiarrhythmic drugs. (The Sicilian Gambit). Classification. Main characteristics of each group.
4. Paroxysmal supraventricular tachycardia. Diagnostics. Relief of paroxysms. Preventive treatment.
5. Wolf-Parkinson-White syndrome. Diagnostics. Features of treatment of rhythm disorders in this syndrome. Preventive treatment. Indications for surgical treatment.
6. Syncopal states. Differential diagnosis. Chronic tachyarrhythmias. Patient management tactics.
7. Classification of ventricular LDC. Paroxysmal ventricular tachycardia. Ventricular fibrillation and flutter. Clinic, diagnosis and treatment.
8. Sinus node dysfunction. Sinus node weakness syndrome. Clinic, diagnosis and treatment.
9. Differential diagnosis of paroxysmal cardiac arrhythmias.
10. Electro-pulse therapy of arrhythmias. Indications and contraindications. Technique of carrying out.
11. Constant electrical stimulation of the heart. Indications. Tactics of managing patients with an artificial pacemaker.
12. Electrophysiological study in the diagnosis of arrhythmias. Indications. Technique of carrying out.
13. Violation of intraventricular conduction. Diagnosis and treatment.
14. Atrial fibrillation and / or flutter. Diagnostics. Relief of paroxysms.

15. Principles of treatment of ventricular LDC.
16. Surgical treatment of arrhythmias.

### **Arterial hypertension**

1. Etiology of hypertension. The main risk factors. The role of RAAS in the formation of hypertension and the progression of target organ damage. The role of SAS in the pathogenesis of hypertension and the progression of target organ damage.
2. Endothelial dysfunction and its role in the formation of hypertension and the progression of target organ damage.
3. The concept of CVS remodeling. Functional consequences of heart and vascular remodeling in hypertension.
4. Epidemiology of arterial hypertension and its complications (prevalence in different gender and age groups, geographical distribution; frequency of detection and treatment; natural course of "untreated" hypertension. Risk of cardiovascular complications depending on the levels of systolic blood pressure, diastolic blood pressure, pulse blood pressure.
5. Standards for the diagnosis, treatment, and prevention of hypertension. Modern classification of hypertension. Types of hypertension, degrees of hypertension. "Optimal", normal " BP. Definition of hypertension. Target AD value.
6. Risk — stratification of patients with hypertension and management tactics depending on the individual risk of developing cardiovascular complications.
7. Clinical variants of hypertension.
8. Heart damage in hypertension: LVH (prevalence, risk of cardiovascular diseases, types of LVH, diagnosis). Violation of diastolic function of the left ventricle. Chronic heart failure of systolic and diastolic type. The concept of "hypertensive heart".
9. Brain damage in hypertension: risk factors for stroke; types of brain damage in hypertension (ONMC, hypertensive encephalopathy). Hypertensive crisis.
10. Kidney damage in hypertension. Methods for diagnosing kidney function. Microalbuminuria (meaning, diagnosis). Morphological types of kidney damage in hypertension. The effect of drug therapy on the severity of renal dysfunction.
11. Peripheral vascular damage in hypertension: the role of vascular wall remodeling as a compensatory response in hypertension; microcirculation disorders in hypertension. Hypertensive retinopathy.
12. Principles of examination of patients with hypertension. Measurement of blood pressure by the Korotkov method: methodological requirements, typical errors, limitations of the method. Outpatient daily blood pressure monitoring: indications, advantages, disadvantages, and typical errors. Average daily blood pressure and risk factors for cardiovascular complications. Daily blood pressure profile, assessment of the type of curve in the definition of tactics.
13. Blood pressure variability. The value of the morning rise in blood pressure. Evaluation of the effectiveness of antihypertensive therapy by daily blood pressure monitoring.
14. Principles of primary prevention of hypertension. Risk factors.
15. Treatment of hypertension. Goals and objectives.
16. Non-drug treatment of hypertension. Indications, effectiveness.
17. Medical treatment of hypertension. Choosing the type of treatment depending on the risk of cardiovascular complications. Principles of medical treatment. The main classes of antihypertensive agents. Individual selection of therapy.
18. Principles of combined antihypertensive therapy. Preferred and non-recommended combinations.
19. Diuretics. Main groups and mechanisms of action. Indications and contraindications. Rational combinations. Mistakes in diuretic treatment.
20. B-adrenoblockers. Mechanisms of antihypertensive action. Classes. Indications for use. Contraindications. Side effects. Combinations with other classes of antihypertensive agents.

21. ACE inhibitors. Classification. Clinical pharmacology. Mechanisms of antihypertensive action. Indications and contraindications. Side effects.
22. Antagonists Ca-channels. Main groups. Classification. Mechanisms of action. Impact on the forecast. Indications and contraindications.
23. Alpha-blockers. Classification. Mechanisms of action. Indications and contraindications for use in patients with hypertension.
24. AT1-receptor blockers. Classification. Mechanism of antihypertensive action. Indications and contraindications. Side effects.
25. Antihypertensive drugs of central action. Classification. Mechanism of action. Pharmacological effects.
26. MUSIC RESEARCH: goals and objectives. Results.
27. Secondary hypertension. Classification and pathogenesis.
28. Renovascular hypertension. Clinic, diagnosis, and treatment.
29. Primary aldosteronism (c.Conn). Clinic, diagnosis, and treatment.
30. Hypertension of endocrine origin. Classification. Itsenko-Cushing's disease and syndrome. Clinic, diagnosis, and treatment.
31. Pheochromocytoma. Clinic, diagnosis, and treatment.
32. Cardiovascular (hemodynamic) hypertension. Hypertension in коартацияaortic coartation. Clinic, diagnosis, and treatment.
33. ECG changes in hypertension.
34. Malignant hypertension syndrome. Principles of diagnosis and treatment.

#### **Vascular diseases**

1. Obliterating arteritis of large arteries (diseaseTakayasu). Etiology. Pathogenesis. Clinical options. Diagnostics. Forecast. Treatment.
2. Obliterating thrombangiitis (diseaseWinnivarter-Burger). Etiology and pathogenesis. Clinical options. Diagnostics. Course. Forecast. Treatment.
3. Syphilitic aortitis. Clinic. Diagnosis and treatment.
4. Aortic aneurysm. Diagnosis and treatment.
5. Diseases of the venous system. Phlebitis, thrombophlebitis, phlebothrombosis. Varicose veins of the lower extremities. Chronic venous insufficiency. Etiology. Pathogenesis. Clinic. Diagnostics. Methods of treatment.

#### **Clinical pharmacology**

1. Basic concepts of clinical pharmacology. Methods for studying the pharmacodynamics and pharmacokinetics of drugs.
2. Nitrates. Mechanism of action, application areas. Characteristics of the group's representatives.
3. Beta blockers. Mechanism of action, application areas. Characteristics of the group's representatives.
4. Cardiac glycosides. Mechanism of action, application areas. Characteristics of the group's representatives.
5. Calcium antagonists. Mechanism of action, application areas. Characteristics of the group's representatives.
6. Diuretics. Mechanisms of action, areas of application. Characteristics of the group's representatives.
7. Peripheral vasodilators. Mechanism of action, application areas. Characteristics of the group's representatives.
8. Angiotensin-converting enzyme inhibitors. Mechanism of action, application areas. Characteristics of the group's representatives.
9. Use of anticoagulants and fibrinolytic agents in cardiology. Mechanisms of action, areas of application. Characteristics of the group's representatives.



10. Hypolipidemic agents. Classification. Mechanisms of action, areas of application. Characteristics of the group's representatives.
11. Antiarrhythmic drugs. Classification. Mechanisms of action, areas of application. Characteristics of the group's representatives.

### **Methods of instrumental diagnostics**

1. *Electrocardiography*. ECG elements and the mechanism of their formation. Lead systems. Electrical position of the heart. The electrical axis of the heart and its deviations. ECG for hemodynamic overload of various parts of the heart.
2. ECG - signs of hypertrophy of various parts of the heart.
3. ECG for violations of sino-atrial and atrioventricular conduction. ECG for intraventricular blockages.
4. Complete atrioventricular block and its variants.
5. ECG - signs of heart rhythm disorders. Nontopic violations of automatism. Sinus tachycardia, bradycardia, arrhythmia. Heterotopic rhythms. Atrial fibrillation. Extrasystole. Paroxysmal tachycardia.
6. ECG in предвозбужденияventricular preexcitation syndromes.
7. ECG changes in patients with chronic coronary insufficiency. ECG during an angina attack.
8. ECG for myocardial infarction. Topical ECG diagnostics of myocardial infarction. Myocardial infarction with blockage of the branches of the pechka Gis and other conduction disorders. ECG for cardiac aneurysm.
9. Infarct-like ECGs for acute pericarditis, acute pulmonary heart disease, myocarditis and other diseases. ECG-picture of electrolyte balance disorders and under the influence of medications.
10. Electrocardiographic tests with physical activity. Physiological bases. Indications and contraindications. Method of conducting. Necessary equipment. Criteria for a positive test with a submaximal load on a bicycle ergometer. Clinical and electrocardiographic criteria for stopping the exercise test. Pharmacological ECG tests.
11. Long-term ECG recording on magnetic tape (Holter ECG monitoring).
12. *Study of the function of external respiration*. Physiological bases. Methods of studying external respiration. The main indicators of the state of external respiration: respiratory volume, reserve volume of inspiration and exhalation, V<sub>EL</sub>, residual volume, functional residual capacity, MOD, total lung capacity. Violations of the main indicators of external respiration function in various diseases and their significance for diagnosis.
13. *Radiological research methods in cardiology*. Opportunities and tasks of the radiological research method in cardiology.
14. X-ray contrast techniques. Types of research. Diagnostic capabilities. Indications and contraindications. Complications.
15. X-ray computed tomography in cardiology. Principle of the method. Dynamic computed tomography of the heart (kino-CT). Diagnostic capabilities. Indications and contraindications.
16. Electron-beam therapy: principles, indications, diagnostic capabilities.
17. *Radioisotope methods in cardiology*. The method's essence. Types of research. Diagnostic capabilities and limitations.
18. *Ultrasound diagnostics*. Fundamental principles of using ultrasound in medicine. The echocardiogram is normal. M-mode echocardiography, two-dimensional Echocardiography. Doppler echocardiography.
19. Possibilities of ultrasound diagnostics in various diseases of the heart and blood vessels.
20. *Magnetic resonance imaging*. The essence of the nuclear magnetic resonance phenomenon. Possible applications in medicine. Types of research used in cardiology clinics. Diagnostic capabilities. Indications. Contraindications.

## **4. Methodological recommendations for the preparation and passing of the final state exam**

### **a) basic literature**

1. D. Zipes, P.Libby et all. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine, 2-Volume Set, 11th Edition. Elsevier, 2018. – 2128.
2. Hurst's The Heart, 14th Edition. V. Fuster, R.A. Harrington, J. Narula, Z. J. Eapen. McGraw-Hill Education, 2017. - 2208
3. Heart Failure: A Companion to Braunwald's Heart Disease, 3th Edition. D. Mann, G. M. Felker. Saunders, 2015. - 784
4. Harrison's Principles of Internal Medicine, 20th Edition. D. Kasper, A. S. Fauci, S. L. Hauser, D. L. Longo, J. L. Jameson, J. Loscalzo. McGraw-Hill Education / Medical, 2018.
5. Davidson's Principles and Practice of Medicine, 23th Edition. S. H. Ralston, I. D. Penman, M. W. J. Strachan. Elsevier, 2018. - 1440
6. Feigenbaum's Echocardiography. 8th Edition. W. F. Armstrong, T. Ryan. Wolters Kluwer. 2018. – 2841.
7. Evidence-Based Medicine - 5th Edition. S. Straus, P. Glasziou, S. Richardson, B. Haynes. Elsevier, 2018. – 336.
8. Internal diseases with the basics of evidence-based medicine and clinical pharmacology: A guide for doctors / Moiseev V. S., Kobalava Zh. D.; Ed. V. S. Moiseeva. - M. :, Moscow: GEOTAR-Media, 2008, 832 p.
9. Moiseev V. S., Moiseev S. V., Kobalava Zh. Heart Diseases, Moscow: "Medical Information Agency", 2008. -528.
10. Guidelines for the diagnosis and treatment of chronic heart failure. European Heart Journal (2008) 22, 1527–156.
11. American College of Cardiology/European Society of Cardiology Clinical Expert Consensus Document on Hypertrophic Cardiomyopathy European Heart Journal (2010) 24, 1965–1991
12. Guidelines on Prevention, Diagnosis and Treatment of Infective Endocarditis Executive Summary European Heart Journal (2009) 25, 267–276
13. ACC/AHA/ESC guidelines for the management of patients with atrial fibrillation. European Heart Journal (2010) 22, 1852–1923
14. Guidelines on diagnosis and treatment of pulmonary arterial hypertension European Heart Journal (2010) 25, 2243–2278
15. Moiseev V. S. , Kiyakbaev G. K. Cardiomyopathies and myocarditis. Moscow, GEOTAR-Media.- 2013 352s
16. Acute heart failure / V. S. Moiseev. - Moscow : Medical Information Agency, 2012, 328 p. (in Russian)
17. Emergency conditions in the internal medicine clinic. Edited by P. P. Ogurtsov, V. E.DvornikovStreet . Moscow. RUDN University, 2013. 571s.
18. Fundamentals of internal medicine / Zh. D.Kobalava, S. V. Moiseev, V. S. Moiseev; Ed. V. S. Moiseeva. - Electronic text data. Moscow: GEOTAR-Media Publ., 2014, 888 p.
19. Guidelines for the treatment of patients with atrial fibrillation. [www. cardiosite.ru](http://www.cardiosite.ru)
20. Expert Consensus Document on the Use of Antiplatelet Agents. European Heart Journal (2014) 25, 166–181.
21. Kobalava railway station.,Villeva S. V., Efremovtseva M. A. (ed. Kobalva Zh. D., Moiseev V. S.). Fundamentals of cardiorenal medicine. Moscow, GEOTAR-Media.- 2014. 256c.
22. Internal diseases in 2 volumes: textbook / Ed. N. A. Mukhina, V. S.Moiseeva, A. I. Martynova. Moscow, GEOTAR-Media Publ., 2014.
23. Cardiology. National guidelines. Edited by E. V. Shlyakhto Geotar-Media. 2015. 800 p.
24. ESC Guidelines for the management of patients with infectious endocarditis, 2015. Available on the website: <http://www.scardio.org/guidelines>
25. Fundamentals of internal medicine. Guidebook in 2 volumes/ ed. V. S. Moiseev, Zh. D. Kobalava, I. V.Mayev, A.D.Kaprin, E. I. Gusev, M. V. Shestakova, and S. V. Moiseev. 2nd ed., reprint. and add. Moscow. Medical Information Agency LLC, 2020.

## **b) additional literature**

1. The ESC Textbook of Cardiovascular Medicine. T. F. Lüscher, J. A. Camm, G. Maurer, P. Serruys. Oxford University Press, 2018.
2. Oxford Textbook of Advanced Heart Failure and Cardiac Transplantation - Oxford Medicine. M. J. Domanski, M. R. Mehra, M. A. Pfeffer. Oxford University Press, 2016. – 442.
3. The ESC Textbook of Intensive and Acute Cardiovascular Care. M. Tubaro, P. Vranckx, S. Price, C. Vrints. Oxford University Press, 2015. – 799.
4. The EHRA book of Pacemaker, ICD, and CRT Troubleshooting. H. Burri, C. Israel, J.-C. Deharo. Oxford , 2015. - 310.
5. The EACVI Textbook of Cardiovascular Imaging. J L Zamorano et al. Oxford University Press, 2015. – 678.
6. The ESC Handbook on Cardiovascular Pharmacology. J. C. Kaski, K. P. Kjeldsen. Oxford University Press, 2019. -960.
7. How to Read a Paper: The Basics of Evidence-based Medicine and Healthcare, 6th Edition | Trisha Greenhalgh. T. Greenhalgh. Blackwell Bmj Books, 2006. – 229.
8. Internal diseases. Ed. A. I. Martynov, N. A. Mukhin, V. S. Moiseev-Moscow: "Geotar-media", 2001
9. Emergency care in therapy and cardiology / Edited by Yu. I.Greenstein, M. GEOTAR-Media, 2009. - 224 p.
10. Internal diseases. Cardiovascular system / Roitberg G. E., Strutynsky A.V. – MEDpress-inform , 2011.

## **c) journals:**

1. Journal of the American College of Cardiology.
2. JACC: Heart Failure.
3. JACC: Cardiovascular Imaging.
4. Circulation.
5. Circulation: Heart Failure.
6. European Heart Journal.
7. European Journal of Heart Failure.
8. European Heart Journal – Cardiovascular Imaging.
9. EP-Europace.
10. JAMA: Cardiology
11. JAMA: Internal Medicine.

## **Online resources:**

1. PortalAll-Russian Scientific Society of Cardiology and the Association of Pediatric Cardiologists of Russia. [http://www. cardiosite.ru/](http://www.cardiosite.ru/)
2. Portal of the European Association of Cardiology. <http://www.escardio.org/>
3. Website of the American Heart Association. <http://www.heart.org/HEARTORG/>, [www.acc.org](http://www.acc.org)
4. RUDN University Electronic Library System;
5. RUDN University Training Portal (<http://web-local.rudn.ru>);
6. Scientific Electronic Library (<http://elibrary.ru/defaultx.asp>);
7. Universal Library ONLINE (<http://biblioclub.ru>);
8. BENTHAM OPEN Library of Electronic Journals OPEN(<http://www.benthamscience.com/open/a-z.htm>);
9. Elsevier Electronic Magazine Library Elsevier(<http://www.elsevier.com/about/open-access/open-archives>)
10. MedLib Online Medical Library MedLib(<http://med-lib.ru>);
11. Recommendations of the Russian Society of Cardiology <url>[scardio.ru](http://scardio.ru)
12. U.S.National Library of Medicine National Institutes of Health: <http://www.ncbi.nlm.nih.gov/pubmed/>

13. Scientific electronic library: <http://library.ru/defaultx.asp>

**5. Evaluation tools** designed to establish compliance/non-compliance with the level of training of graduates who have completed the development of OP HE in the direction of 14.01.04 during certification tests "Internal diseases: heart failure", the requirements of the corresponding OS in the RUDN.

list of competencies that students should master as a result of mastering the educational program 14.01.04 "Internal diseases: heart failure": UC-1, UC-2, UC-3, UC -4, UC -5, UC -6, GPC -1, GPC -2, GPC -3, GPC -4, GPC -5, GPC -6, PC-1, PC-2, PC-3, PC-4, PC-5

evaluation criteria:

**Rating "5" (excellent)** entered if:

- *полностью the content of the exam card material is fully disclosed;*
- *the material is presented correctly, in a certain logical sequence;*
- *system and deep knowledge of the program material is demonstrated;*
- *the exact terminology used is;*
- *it demonstrates the assimilation of previously studied related issues, the formation and stability of competencies, skills and abilities;*
- *the answer came out on its own, without leading questions;*
- *knowledge of modern educational and scientific literature is demonstrated;*
- *there are one or two inaccuracies in the coverage of minor issues, which are corrected based on the comment.*

**A rating of " 4 "(good)** is given if:

- *questions of the exam material are presented in a systematic and consistent manner;*
- *the ability to analyze the material is demonstrated, but not all conclusions are reasoned and evidence-based;*
- *the assimilation of the main literature is demonstrated.*
- *the answer mostly meets the requirements for a rating of "5", but it also has one of the disadvantages:*
- *there were small gaps in the presentation that did not distort the content of the response;*
- *there were one or two shortcomings in the coverage of the main content of the answer, corrected by the examiner's comment;*
- *an error or more than two errors were made when covering secondary questions, which are easily corrected by the examiner's comment.*

**Rating "3" (satisfactory)** entered if:

- *the content of the material is incomplete or inconsistent, but the general understanding of the issue is shown and the skills sufficient for further assimilation of the material are demonstrated.;*
- *the main categories on the considered and additional questions are mastered;*
- *there were difficulties or mistakes in the definition of concepts, use of terminology, corrected after several leading questions;*
- *with incomplete knowledge of the theoretical material, insufficient formation of competencies, skills and abilities is revealed, and the student cannot apply the theory in a new situation;*
- *the assimilation of the main literature is demonstrated.*

**Rating "2" (unsatisfactory)** entered if:

- *the main content of the training material is not disclosed;*
- *ignorance or lack of understanding of most or the most important part of the training material was detected;*
- *mistakes were made in defining concepts and using terminology that were not corrected after several leading questions.*
- *competencies, skills and abilities are not formed.*

**Compliance of assessment systems (previously used assessments of final academic performance, ECTS assessments and the point-rating system (BRS) of academic performance assessments)**

(In accordance with the Rector's Order No. 420 dated 05.05.2016.):

BRS Points	Traditional grades in the Russian Federation	Points for translating grades	Ratings	Оценки ECTS scores
86-100	Excellent	95 - 100	5+	A
		86-94	5	B
69 - 85	Good	69-85	4	C
51-68	Satisfactory	61 - 68	3+	D
		51 - 60	3	E
0-50	Conditionally unsatisfactory	31 - 50	2+	FX
	Unsatisfactory	0-30	2	F

**6. Requirements for the final qualification work**

6.1. A student who has passed the state exam is allowed to defend the thesis. The defense of the thesis is held at an open meeting of the State Examination Commission (SEC).

The state final certification is conducted in the form of an oral presentation of the thesis, followed by oral answers to questions from members of the HEC in accordance with the University's Regulations on the thesis. The report and / or answers to the questions of the members of the HEC may be in a foreign language.

6.2. In the framework of the protection of scientific and qualification work (thesis) checks the degree of development of the graduates of the following competencies: UC-1, UC-2, UC-3, UC - 4, UC -5, UC -6, GPC -1, GPC -2, GPC -3, GPC -4, GPC -5, GPC -6, PC-1, PC-2, PC-3, PC-4, PC-5

6.3. List of sample WRC topics:

- 1) *Iron deficiency in patients with chronic heart failure, clinical associations and prognostic significance. Effects of iron carboximaltosate application*
- 2) *Prevalence, predictors, and prognostic value of kidney damage in the new coronavirus infection COVID 19.*
- 3) *Phenotyping of arterial hypertension in a multiethnic cohort of young people*
- 4) *Prognostic and diagnostic significance ремоделированияof cardiac remodeling and residual pulmonary congestion in the development of chronic heart failure in patients with primary myocardial infarction (with a high risk of recurrent myocardial infarction).*

5) *Characteristics of the daily profile of central arterial pressure, arterial rigidity and Speckle tracking of echocardiography in detecting subclinical left ventricular involvement in young patients with type 1 diabetes mellitus without CHD.*

6.4. Tasks that the student must solve in the course of performing the following tasks::

- ensuring the development of professional research thinking of graduate students, forming a clear understanding of the main professional tasks and ways to solve them;
- developing skills to develop work plans and programs for conducting scientific research;
- preparing data for reviews, reports, scientific reports and publications;
- formation of skills and abilities to conduct a scientific discussion, present research results in various forms (presentation, abstract, essay, analytical review, critical review, report, message, speech, scientific article of a review, research and analytical nature, etc.);
- acquisition of experience in independent organization of research activities.

6.5. Stages of completion of the final qualification work( WRC), conditions

student's admission to the defense procedure, requirements for the structure, volume, content and design, as well as the list of mandatory and recommended documents submitted for defense are indicated in the methodological instructions approved in accordance with the established procedure:

- stages of WRC implementation: the main form is to conduct scientific research. Upon completion of scientific research, the main task of the student is to prepare a candidate's thesis, collect, analyze and summarize the collected material, test the conclusions obtained, and prepare the final qualification work (candidate's thesis).

- conditions of admission: applicant provides information about scientific publications containing the main provisions of the research in journals included in the list of PFUR and RISC, WoS and Scopus, presentations at scientific conferences, including international, seminars, round tables, participation in the scientific work of the Department of education, represented by a scientific report on the main results by the scientific and qualification work (thesis), designed in accordance with the requirements set by the Ministry of education and science of the Russian Federation. The State Examination Commission, approved by the order of the RUDN University Rector, takes the exam.

Students who have successfully passed the state final certification are issued a state-issued document with the qualification "Researcher. Teacher-researcher".

- requirements for the thesis: the topic of scientific research should correspond to the priority areas of scientific research; the research should solve a problem that is relevant for the relevant profile of clinical medicine; the results of the study have been tested in clinical practice, the results of the study do not вызывають cause doubts about their reliability.

Keeping structure WRC - ready text of the research in the amount of not less than 100 pages, including mandatory chapters (introduction, literature review, materials and methods, research results, discussion of the results, limitations of the research, conclusions, practical recommendations, list of abbreviations and references), is observed. For the defense of the thesis, the graduate student prepare a scientific report and presentation on the conducted scientific research.

- mandatory criteria for entering the defense in KR: 100% readiness of the thesis, availability of publications on the main results of the dissertation research - 4 published articles, including 2 RUDN, 2 WoS/Scopus; the results of the research were reported at conferences, including international congresses.

6.6 Evaluation tools.

**Table 1. Final qualification work evaluation criteria**

Full Dissertation Test (WRC)	30
Publication of scientific articles on the topic of the dissertation for at least 4 years. Of these, 2 scientific articles on the research topic in a publication included in the RUDN University list and 2 Wos/Scopus	20
Presentation of reports at scientific conferences on the training profile of at least 2	20
DoReport and presentation on the conducted scientific research	30
<b>Total</b>	<b>100</b>

Assessed competence	Evaluation tool	Evaluation criteria	Evaluation of results indicators		
			0 points	50 % from four-sabout	100 % from a high of
UC-1, UC-2, UC-3, UC -4, UC -5, UC -6, GPC -1, GPC -2, GPC -3, GPC -4, GPC -5, GPC -6, PC-1, PC-2, PC-3, PC-4, PC-5	Dissertation preparation (WRC)	Completeness of the main results and conclusions of the study	The WRC does not fully reflect the main results of the study, does not contain conclusions and recommendations	Only a part of the research results and conclusions are presented	InThe report details the main results and conclusions of the study
		Matching the design structureWRC	WRC issuedby a with gross violations	There are separate comments	The WRC is issueda in full compliance with the requirements
UC-1, UC-2, UC-3, UC -4, UC -5, UC -6, GPC -1, GPC -2, GPC -3, GPC -4, GPC -5, GPC -6, PC-1, PC-2, PC-3, PC-4, PC-5	Preparation of the final scientific report, presentation on the results of the study	Content of the scientific report	The content of the report does not allow us to convey the main goals, objectives and results of the study	There are some shortcomings	The content of the report fully allows you to convey the main goals, objectives and results of the study

**Table 2. Compliance of assessment systems (previously used assessments of final academic performance, ECTS assessments and the point-rating system (BRS) of academic performance assessments).(In accordance with the Rector's Order No. 420 dated 05.05.2016.):**


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		86-94	5	B

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51-68	Satisfactory	61 - 68	3+	D
		51 - 60	3	E
0-50	Conditionally unsatisfactory	31 - 50	2+	FX
	Unsatisfactory	0-30	2	F

**The program is designed in accordance with the requirements of the RUDN University OS.**

**Developers:**

Associate Professor of Department Internal diseases  
with a course of cardiology and functional  
diagnostics named after V. S. Moiseev  
position, department name

  
signature

E.O.Kotova.  
initials, surname

Head of the Department of Internal diseases  
with a course of cardiology and functional  
diagnostics named after V. S. Moiseev  
position, department name

  
signature

Kobalava Zh. D.  
initials, surname

**Program Manager**


Head of the Department of Internal diseases  
with a course of cardiology and functional  
diagnostics named after V. S. Moiseev  
position, department name

  
signature

Kobalava Zh. D.  
initials, surname

**Head of the Department**

Head of the Department of Internal diseases  
with a course of cardiology and functional  
diagnostics named after V. S. Moiseev  
position, department name

  
signature

Kobalava Zh. D.  
initials, surname