MINISTRY OF HEALTH CARE OF UKRAINE

KHARKIV NATIONAL MEDICAL UNIVERSITY

II medical faculty

Department of Internal Medicine №2, Clinical Immunology and Allergology

named after academician LT Malaya

SYLLABUS

SELECTIVE COURSE

"INTERPRETATION OF ELECTROCARDIOGRAPHY"

Area of knowledge 22 "Health"

Specialty 222 "Medicine"

Educational-professional program Medicine of the second (master's) level of higher education

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| The syllabus was considered at the  Department of Internal Medicine №2,  clinical immunology and allergology  named after Academician LT Malaya meeting  Protocol № 23 from  “28” August 2020  Head of the department  \_\_\_\_\_\_\_\_\_\_\_\_\_\_professor Kravchun P.G. | Approved by the methodical commission of KhNMU on problems of therapeutic profile professional training disciplines  Protocol № 1 from  “31” August 2020  Head  \_\_\_\_\_\_\_\_\_\_\_\_\_\_professor Kravchun P.G. |

Information about teachers:

The developer of the syllabus is Dobrovolska Inna Mykolayivna, Associate Professor of the Department of Internal Medicine №2, Clinical Immunology and Allergology named after Academician LT Malaya, Candidate of Medical Sciences :

1) Dobrovolska Inna Mykolayivna - Associate Professor of Internal Medicine №2, Clinical Immunology and Allergology named after Academician LT Small, Ph.D.

Occupational interests: myocardial infarction, essential hypertension, acquired heart defects, cardiovascular diseases in combination with pathologies of the endocrine system (eg, diabetes, hyperthyroidism), arrhythmias and conduction of the heart, clinical electrocardiography, cardiovascular disease.

• Awarding the academic title of associate professor from 02/26/15

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Consultations: face-to-face - by prior arrangement; online - Wednesday (1600-1730), Friday (1500-1730), Zoom (personal ID - 228 866 6449; ask for the current password by phone), Moodle ().

Location - "CCH № 27" Kharkiv City Council, Kharkiv, st. Pushkinskaya, 41

**Discipline information:**

1. Description of the discipline:

The course -5

Year of preparation - 5, semester - 9

Number of credits - 3

The total number of hours - 90

Hours for full-time study: classes - 20, independent student work - 70

General characteristics of the discipline: The discipline "Interpretation of electrocardiography" consists of seven sections, namely: "Bioelectric bases of electrocardiography", "Methods of electrocardiogram registration", "Normal electrocardiogram", "General scheme of ECG interpretation", "Cardiac electrocardiogram in disorders" Electrocardiogram in conduction disorders "," Electrocardiogram in hypertrophy of the heart ".

The role and place of the discipline in the system of training: The course "Interpretation of electrocardiography" is an important component of training specialists in both therapeutic and cardiac profiles, as it forms the necessary practical skills of electrocardiographic diagnostics in future professionals.

2**. The purpose and objectives of the discipline:**

The purpose of teaching the discipline "Interpretation of electrocardiography" is to form students' ability to make a plan of examination of the patient in the typical course of the disease, methodically correct ECG diagnosis in the clinic of internal medicine and interpret its results according to modern algorithmic protocols.

The main tasks of studying the discipline "Interpretation of electrocardiography" are:

• acquisition by students of knowledge of normal and pathological ECG;

• mastering the skills of ECG recording in the conventional 12 leads;

• mastering the skills of analysis of normal and pathological electrocardiogram and clinical interpretation of the obtained data;

• mastering the skills of writing the ECG report of the conclusion;

• acquisition of knowledge on ECG changes in disorders of automatism, excitability and conductivity;

• study of ECG signs of hypertrophy of the heart.

**Discipline status -** selective; discipline format - mixed.

3. Teaching methods: lectures (using multimedia support), practical classes, VTS; methodical recommendations (see below), presentations; distance learning (Internet conferences on the Zoom network).

**4. Recommended reading:**

I. Shved MI, Grebenik MV Fundamentals of practical electrocardiography: a textbook. - Ternopil: Ukrmedbook, 2000. -

II. ECG in practice a textbook / John R. Hampton; translation of the 6th English. edition, trilingual. - All-Ukrainian specialized edition "Medicine", 2018. - 560 p. - ISBN978-617-505-713-1.

III. Electrocardiography. Functional ECG tests. Daily blood pressure monitoring. Holter ECG monitoring. Analysis of heart rate variability (HRV). Functional diagnostics in pulmonology: teaching method. way. to practice. classes on functional diagnostics for students of VI course med. f-tu / way. VA Vizir, IB Prikhodko, OV Demidenko [etc.]. - Zaporozhye, 2014. - 116 p.

IV. Electrocardiography: textbook. manual / VV Murashko, AV Strutynsky. - 14th ed., Reworked. - М .:

V. Electrocardiographic method of research. Methods of registration and decoding of the electrocardiogram: methodical instructions to practical occupations of students on propaedeutics of internal medicine / comp .: TV Ascheulova, ON Kovaleva, NA Safargalina-Kornilova. - Kharkiv: KhNMU, 2016. - 16 p.

VI. ECG - signs of disorders of automatism, excitability of the myocardium: guidelines for practical training of students in propaedeutics of internal medicine / compilers: TV Ascheulova, TM Ambrosova. - Kharkiv: KhNMU, 2018. - 26 p. (http://repo.knmu.edu.ua/handle/123456789/22014)

VII. ECG - signs of conduction function disorders: methodical instructions for practical classes of students in propaedeutics of internal medicine / TV Ascheulova, TM Ambrosova. - Kharkiv: KhNMU, 2018. - 11 p. (http://repo.knmu.edu.ua/handle/123456789/22076)

5. **Prerequisites:** medical physics, normal anatomy; normal physiology; topographic anatomy; pathological anatomy; pathological physiology; biochemistry.

6. **Studying outcomes:** After passing the discipline the student must know:

• the principle of the ECG method and its anatomical and physiological basis (basic concepts of electrophysiology of the heart, the structure of the conduction system of the heart);

• modern methods of clinical, laboratory, instrumental examination of patients with pathology of the cardiovascular system;

• general scheme of interpretation of electrocardiography;

• mechanisms of arrhythmias, ECG signs of disorders of automaticity and excitability, the principles of emergency care for paroxysms and tachyarrhythmias;

• ECG signs of block

• classification of arrhythmias and conduction of the heart;

• ECG changes in hypertrophy of the heart.

**After passing the discipline the student must be able to:**

• collect data of patient complaints, medical history, life history, conduct and evaluate the results of physical examination;

• evaluate information about the diagnosis, using a standard procedure based on the results of laboratory and instrumental studies;

• establish a preliminary and clinical diagnosis;

• record the ECG in the standard 12 leads;

• interpret normal and pathological electrocardiogram;

• diagnose arrhythmias and conduction of the patient by clinical manifestations and electrocardiogram, provide emergency care for arrhythmias;

• detect ECG signs of hypertrophy of the heart and assess the primary disorders of repolarization ("systolic overload") in left ventricular hypertrophy;

• form goals and determine the structure of personal activities;

• keep medical records of the patient (ECG report) on the basis of regulatory documents;

• adhere to a healthy lifestyle, use the techniques of self-regulation and self-control;

• be aware of and guided in their activities by civil rights, freedoms and responsibilities, raise the general cultural level;

• adhere to the requirements of ethics, bioethics and deontology in their professional activities;

• organize the necessary level of individual safety (one's own and those cared for) in case of typical dangerous situations in the individual field of activity.

**The discipline content**

**Topics of practical classes**

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| **No theme** | **Theme** | **Number of hours** |
| 1. | General principles of ECG. Technique of recording ECG. Normal electrocardiogram. Formation of ECG-conclusion. | 5 |
| 2. | Heart rate and its disorders. Conductivity of the heart and its violation. | 5 |
| 3. | Hypertrophy of the atrium and ventriculars | 5 |
| 4. | ECG with myocardial infarction | 5 |

**Independent students work**

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| **No theme** | **Theme** | **Number of hours** |
| 1. | Membrane theory of biopotentials. | 3 |
| 2. | Main functions of the heart | 2 |
| 3. | Formation of an electrocardiogram when a wave of excitation spreads through the heart. Depolarization and repolarization of the ventricles. | 2 |
| 4. | Six-axial coordinate system | 2 |
| 5 | Determination of the position of the electrical axis of the heart. Analysis of the main teeth. | 3 |
| 6 | Analysis of cardiac regularity. Counting the number of heart attacks. Determination of the source of excitation (sinus, atrial, idioventryculary rhythm, rhythms with AV-connection). Conductivity function estimation | 3 |
| 7 | The main electrocardiographic signs of sinus arrhythmias: sinus tachycardia, sinus bradycardia, sinus arrhythmia, sinoatrial node weakness syndrome | 3 |
| 8 | Slow and accelerated ectopic rhythms and complexes. Non-paroxysmal tachycardia. Migration of the supraventricular rhythm driver. | 3 |
| 9 | The concept of PC, as the premature appearance of the heart cycle, and the mechanisms of its development. Various forms of extrasystols (atrium, ventricular, with AV-compound) and their reflection on the electrocardiogram. | 3 |
| 10 | Prognostic-dangerous variants of extra systolic arrhythmias | 5 |
| 11 | Paroxysmal tachycardia. The most characteristic ECG are signs of atrial, ventricular and atrioventricular forms of paroxysmal tachycardia. | 4 |
| 12 | Atrium fluttering. Illustration on the electrocardiogram of the correct (regular) and irregular (irregular) forms. | 2 |
| 13 | Atrium fibrillation (flashing arrhythmia) as consequences of the appearance of several ectopic impulse foci. Paroxysmal, persistent and constant nature of atrial fibrillation. The most characteristic ECG criteria are flashing arrhythmia. | 3 |
| 14 | Fluttering and fibrillation of the ventricles as an emergency. Characteristic differential-diagnostic ECG signs of fluttering and fibrillation of the ventricles. | 3 |
| 15 | The concept of heart blocks. Pathogenesis of sinoatrial block. Frequency of detection in clinical practice of interatrial blocks. | 3 |
| 16 | ECG characteristic of atrioventricular block of the 1st degree. Three types of AV blockades of the SECOND degree: typeI Mobytts, type II Mobytts, type III (high- level blockade). | 3 |
| 17 | Complete AV block (AVblock of the third degree). Differential diagnosis of degrees of atrioventricular blockades according to the interpretation of electrocardiograms.- | 3 |
| 18 | The ECG phenomenon of Frederyk syndrome as a combination of complete AVblock with fibrillation or flutter. | 2 |
| 19 | An unusual course of arousal in the myocardium of the ventricles of the heart as consequences of a complete block of the right or left leg of the his. The variability of the ECG forms of the ventricle complex during the blocks of bundle of his. | 3 |
| 20 | The concept of an incomplete blocks. Electrocardiographic criteria of incomplete block of the right leg or front or rear branch of the left leg.  Focal intraventricular blockade. | 3 |
| 21 | Factors of variability of electrocardiographic changes manifested in hypertrophy of different parts of the heart. The boundary between ecg manifestations of hypertrophy of the left and right atriums. Overload of hypertrophic atriums as a manifestation of their transient hyperfunction. | 3 |
| 22 | Heart hypertrophy as compensatory myocardial reaction | 3 |
| 23 | The most accurate ECG signs of hypertrophy of the left and right ventriculs | 3 |
| 24 | Features of diagnostic tactics for combined hypertrophy of both ventriculs. | 3 |

**Individual tasks**

Writing abstracts (with multimedia presentations). Requirements: the presence of all structural units, appropriate design, expression of opinion in the conclusions, processing of at least 6 sources of literature, public protection of the main provisions, the presence of media coverage.

Approximate topics of abstracts:

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| 1 | Criteria for the validity of setting an artificial pacemaker in SSN sick sinus node syndrome |
| 2 | Mechanism re-entry as a trigger for the formation of heterotopic cycles and rhythms, mainly not associated with violations of automatism |
| 3 | Clinical case of Morgan-Adams-Stokes syndrome in patients with heart conductivity disorders |
| 4 | Frederyk phenomenon in gerontology |
| 5 | Mital heart defects as the prevailing cause of hypertrophy of the myocardium of the left atrium and right ventricle |

**Discipline status and values**

To achieve the goals of training and successfully complete the course, you must:

1) From the first day to join the work.2) Attend lectures regularly.3) Read the material in advance, before its consideration in a practical lesson.4) Do not be late and do not miss classes.5) Come to the department dressed in a medical gown, in changeable shoes, have a phonendoscope, notebook, pen.6) Perform all necessary tasks and work every day.7) Be able to work with a partner or in a group.8) Ask for help and get it if necessary.

**Academic mobility, interchangeability of credit credits** (volume of 1 credit 30 hours) is provided.Students have the right to discuss various tasks, but their performance is strictly individual.It is strictly forbidden to write down, use any software, tips, mobile phone, tablet or other electronic gadgets during the lesson. If a student is noticed to be written off in a practical lesson, the teacher has the right to remove him from the classroom with a grade in the journal "unsatisfactory", the order of which is identical to the practice of missed classes.

Students with special needs must meet with the teacher in advance or warn him before the start of classes, at the request of the student it can be done by the head of the group.The program of the discipline provides for the calculation of incentive points for participation in student scientific conferences, competitions, research, writing articles in scientific journals in the amount of 3 to 20 points per semester, but only if the total number of points for the discipline does not exceed 200 points.

In case of changes in the syllabus, the current version will be available on the discipline page in Moodle, indicating the date of the last edit.

**Evaluation policy**

Organization of current control.

Assimilation of the topic (current success) is controlled in a practical lesson in accordance with specific goals. The following tools are used to assess the level of preparation of students: computer tests, solving situational problems, monitoring the acquisition of practical skills, the current survey. The final lesson (SO) must be conducted in accordance with the curriculum during the semester on a schedule, during classes. Acceptance of software is carried out by the teacher of the academic group. Assessment is carried out according to the traditional 4-point system: "excellent", "good", "satisfactory" and "unsatisfactory". The final score for the current learning activity (PND) and the final classes (PZ) is defined as the arithmetic mean of the traditional grades for each class and PZ, rounded to 2 decimal places and converted into a multi-point scale in accordance with Table 2.

The minimum number of points that a student must score for the current activity during the study of the section is 120 points, the maximum number of points - 200 points.

Assessment of students' independent work.

Independent work of students, which is provided by the topic of the lesson along with the classroom work, is assessed during the current control of the topic in the relevant lesson.

Assessment of individual student tasks is carried out under the conditions of the teacher's tasks (report of the abstract in a practical lesson). Points (not more than 10) are added as incentives. The total amount of points for the current educational activity may not exceed 200 points.

The organization of the final control - credit. The test is conducted by the teacher of the academic group at the last lesson in the discipline and involves taking into account the IPA and checking the mastering of all topics in the discipline in the form of an interview. The grade is determined in points from 120 to 200 and marked - "credited", "not credited". "Not credited" is given to students who have not completed the program in full (have unsatisfactory grades or unfulfilled academic arrears). , "D", "E") and the traditional system ("satisfactory", "good", "excellent")

4). According to the number of points obtained, the statement of success of students in the discipline and the appendix with the personal account of students who did not meet the requirements of the curriculum of disciplines (F, FX). The FX grade is given to students who were admitted to the test but did not pass it. A grade of F is given to students who are not admitted to the test.

Grade from the discipline. The discipline is studied during the 1st semester, the grade for the discipline is defined as the arithmetic mean of the points for the semester during which the discipline was studied, which are translated into a 200-point ECTS scale (Table 2).

The maximum number of points that a student can score for studying the discipline - 200 points. The minimum number of points is 120 points.

The grade in the discipline is given only to students who have passed all practical classes and tests. If the test is not passed, the dates of rescheduling during the holidays are set, until the beginning of the next semester.

Students who have not been admitted to the test or have not passed it, have the right to liquidate the current account

Students who have not been admitted to the credit or have not passed it, have the right to liquidate the current academic debt and reschedule the credit within the current semester, as well as within the approved schedule for two weeks during winter or summer vacation after completion. semester, or academic year.

Elimination of academic debt. Omissions of practical classes are worked out hour by hour to the teacher of group or the next teacher. Admission and consultations are held by prior arrangement with the teacher of the group, daily from 1500 to 1730 regular teacher, on Saturdays according to the "Regulations on the procedure for students to study" from 07.12.2015 № 415, as well as online on Wednesdays from 1600 to 1730, on Fridays from 1500 to 1730 in Zoom and Moodle networks.

Rules for appealing the assessment. If a student does not agree with the received grade on the topic / section / exam / discipline, he has the right to require re-assessment of his knowledge and skills by a commission consisting of the head of the department responsible for educational work at the department and several teachers.

LIST OF THEORETICAL QUESTIONS FOR PREPARATION FOR THE CREDIT

• Membrane theory of the origin of cardiac biopotentials.

• Basic heart functions.

• Main teeth, segments and intervals on a normal electrocardiogram.

• General scheme of ECG interpretation.

• General classification of cardiac arrhythmias.

• Pathogenetic mechanisms of arrhythmia formation.

• The main electrocardiographic signs of sinus arrhythmias.

• Slow and accelerated ectopic rhythms and complexes.

• Different forms of extrasystole and their reflection on the electrocardiogram.

• The most characteristic ECG signs of atrial, ventricular and atrioventricular forms of paroxysmal tachycardia.

• Illustration on the electrocardiogram of the correct and incorrect forms of atrial fibrillation.

• The most characteristic ECG criteria for atrial fibrillation.

• Ventricular fibrillation and fibrillation as an emergency.

• The concept of heart block.

• Differential diagnosis of degrees of atrioventricular block according to the interpretation of the electrocardiogram.

• Morgan-Adams-Stokes syndrome as a clinical syndrome - "satellite" AV-blockade.

• Variability of ECG forms of the ventricular complex during blockade of the legs of the His bundle.

• The concept of incomplete blockade of the legs of the His bundle.

• Factors of variability of electrocardiographic changes found in hypertrophy of different parts of the heart.