

Государственное бюджетное образовательное учреждение высшего  
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«КАЗАНСКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ»  
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КАФЕДРА ПРОПЕДЕВТИКИ ВНУТРЕННИХ БОЛЕЗНЕЙ

**УЧЕБНО–МЕТОДИЧЕСКОЕ ПОСОБИЕ  
ПО ДИСЦИПЛИНЕ  
«ПРОПЕДЕВТИКА ВНУТРЕННИХ БОЛЕЗНЕЙ,  
ЛУЧЕВАЯ ДИАГНОСТИКА»  
ДЛЯ ОБУЧАЮЩИХСЯ НА ЯЗЫКЕ-ПОСРЕДНИКЕ**

**Том 1**

**INTRODUCTION TO INTERNAL DISEASES, RADIOLOGY  
METHODS HANDBOOK  
FOR THE GENERAL MEDICINE FACULTY STUDENTS**

**Volume 1**

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Учебно-методическое пособие по дисциплине «Пропедевтика внутренних болезней, лучевая диагностика» для обучающихся на языке-посреднике. Том 1. Introduction to Internal Diseases, Radiology. Methods Handbook for General Medicine faculty students. Volume 1 / В.Н.Ослопов, А.Р.Садыкова, А.Р.Шамкина, О.В.Богоявленская, А.Ф.Юсупова. – Казань: КГМУ, 2012. – 122 с.

Учебно-методическое пособие составлено в соответствии с Государственным образовательным стандартом высшего профессионального образования (2010), Государственными требованиями к минимуму содержания и уровню подготовки выпускника вуза по специальности 060101 «Лечебное дело», рабочей программой по дисциплине.

Пособие содержит материал, необходимый для преподавания дисциплины «Пропедевтика внутренних болезней, лучевая диагностика» студентам II и III курсов лечебного факультета медицинского университета. Пособие является учебно-методическим комплексом: в него включены рабочая программа по пропедевтике внутренних болезней, методические указания по проведению лекций и практических занятий, изложены порядок изучения дисциплины, система балльно-рейтинговой оценки знаний студентов.

Ослопов В.Н., Садыкова А.Р., Шамкина А.Р., Богоявленская О.В., Юсупова А.Ф., 2012  
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## TABLE OF CONTENTS

Introduction .....	4
Curriculum on «Introduction to Internal Diseases, Radiology» for the General Medicine faculty students .....	29
Plan of the lectures on «Introduction to Internal Diseases, Radio- logy».....	35
Program of the lecture course .....	44
Forms of the control of «Introduction to Internal Diseases, Radiology» discipline mastering.....	100
Criteria of an exam student evaluation .....	114
Supplements .....	117
Supplements 1. Educational and methodological materials on Introduction to Internal Diseases.....	117
Supplements 2. Educational and methodological materials on Radiology.....	121

## INTRODUCTION ADDRESS TO STUDENTS

Dear students!

You start learning the fundamental medical subject – Propaedeutics of Internal Diseases.

Propaedeutics of Internal Diseases means Introduction to Internal Diseases (IID) (Greek. “*pro*” – before, “*paideuo*” – teaching, i.e. “preliminary teaching”). IID is divided on the general diagnostics and clinical pathology. On its turn, the diagnostics consists of methodology of diagnosis and semiotics, or symptomatology.

Outstanding Russian physician S.P.Botkin wrote “Medicine as a science gives a certain sum of knowledge but knowledge itself does not give a skill to apply it in the practice”. This skill is acquired by the experience or, as M.Ya. Mudrov said “by own exercises by the patient’s bed” (quoted by M.V. Chernorutsky, 1954). The main task of the IID course is to teach you the diagnostic methods, rules of diagnostics and to lay the basis for this skill of medical practice.

Despite the expansion of modern instrumental and laboratory diagnostic methods five classical methods of direct patient examination constitute the basis of clinical diagnostics: patient’s interview, inspection, palpation, percussion, and auscultation, and you will learn them during our course.

You enter the clinic on your 2<sup>nd</sup> year of education and start contacting patients from the physician’s position. From your first step you have to overmaster a very difficult and important science of the patient-physician relationships, the only goal of which is to cure a patient. «The doctor trade is a feat. It demands self-neglecting, clear soul and clear thoughts”, A.P. Chekhov wrote.

In spite of continuing mechanization of a patient examination the importance of classical diagnostic tools – detailed patient’s interview and methodical thorough physical examination – has been remaining very significant. Mastery of these skills and their effective use, on one hand, certainly determines professional culture of a physician, on the other hand, it creates a special confidential atmosphere of the patient-physician relationships, that compliance defining the success of a

treatment.

You will independently collect interviewing data, will perform patients examination, you will learn technique of palpation, percussion, auscultation, you will learn to interpret obtained data in a correct way in order to establish diagnosis, to complete case reports. But you have to work hard to get your practical skills, essential for the new-day physicians. Hippocrates emphasized that only serious learning is the condition of a physician's successful practice, and "it is necessary to add years long diligence so that knowledge engrained deeply will bring mellow fruits". You will realize that «To be a good doctor you have to work hard, and only a physician doing his best to match the current level of medicine may be considered conscientiously duteous» (N.Ya. Chistovich).

Learn and enjoy the Propaedeutics! Wish you good luck!

#### COURSE OBJECTIVE

Course objective of the Introduction to Internal Diseases, Radiology is teaching students the examination methods and the rules of internal diseases diagnostics in the process of clinical training of a new medical specialist, formation of significant professional skills of patient's physical examination, foundations of clinical thinking and medical ethics.

#### PLACE OF THE SUBJECT IN THE STRUCTURE OF FEDERAL STATE EDUCATIONAL STANDARD OF THE HIGHER PROFESSIONAL EDUCATION (FSES HPE)

Discipline "Introduction to Internal Diseases, Radiology" is referred to professional cycle of disciplines (C.3).

The basic knowledge indispensable for learning of our subject are forming:

- in the cycle pertaining to the humanities, social and economic disciplines (C.1), including learning of philosophy, medical ethics, psychology and pedagogics, history of medicine, Latin;

- in the cycle pertaining to mathematics, natural science (C.2), including learning of physics, mathematics, medical computer science, chemistry, biology, biochemistry, and normal anatomy.

IID is preceding subject for the learning of follow disciplines: internal diseases, infectious diseases, medical rehabilitation, physiotherapy, clinical pharmacology, and for practical trainings of students “Nurse assistant”, “Doctor assistant”.

### PECULIARITY OF DISCIPLINE LEARNING, MEANING OF LEARNING DISCIPLINE FOR PRACTICAL ACTIVITY OF A SPECIALIST

The major requirements of qualitative medical education are succession and continuity, and IID is playing the special role. This discipline is integral fundamental part of clinical training of a new medical specialist. As a result of its learning students acquire important professional skills of a patient examination, foundations of the clinical thinking and medical ethics because they start working by a patient bed. It is difficult to expect qualitative training of the senior students without perfect mastering of these main components of Propaedeutics.

Full-fledged adoption of educational material of the IID and Radiology subject is an indispensable condition of further successful learning on the Faculty Internal Disease Department, Hospital Internal Disease Department with course of Endocrinology, Infectious Disease Department, and surgical profile departments.

### LEARNING RESULTS IN INTEGRAL LINKAGE WITH ADOPTED KNOWLEDGE, SKILLS AND ACQUIRED COMPETENCIES ON THE BASE EDUCATIONAL PROGRAMME

Objective of Introduction to Internal Disease, Radiology tuition is solution of the following questions:

- a mastering of patient examination technique, in the first place, physical examination methods, acquisition of the practical skills;

- a learning of semiotics, separate signs, obtained in patient examination, understanding of their pathogenesis;
- a combination of found signs to the syndromes, preparation for clinical thinking;
- an acquaintance with the main nosological forms of diseases (“clinical pathology”);
- an ability to interpret results of laboratory tests;
- an acquaintance with bases of electrocardiography,
- an acquaintance with fundamentals of diagnostic radiology.

List of objectives that students have to solve after Introduction to Internal Diseases, Radiology course:

- patient’s physical examination (interview, inspection, palpation, percussion, auscultation, blood pressure measurement, pulse taking);
- knowledge of the main clinical signs and syndromes of the internal diseases and pathogenesis of their origin;
- knowledge of symptomatology of the main internal diseases in their typical (classical) form;
- interpretation of the results of laboratory and instrumental diagnostics of internal diseases (CBC, biochemical blood test, urinalysis, pleural fluid analysis, sputum analysis, feces analysis, ECG, radiologic diagnosis);
- working knowledge of the main skills of diagnostic process (bases of clinical thinking);
- knowledge of the main principles of medical ethics.

List of the approved by FSES HPE cultural (CC), and professional (PC) competencies on the 060101.65 General Medicine specialty, that should be formed as a result of Introduction to Internal Diseases, Radiology discipline learning:

- ability and readiness to analyze socially meaningful problems and processes, to use in practice methods of science pertaining to the humanities, natural, medico-biological and clinical sciences in different kinds of professional and social activities (CC-1);
- ability and readiness to carry out ethical and deontology aspects of medical activity in the communications with colleagues, nurses and

medical staff, patient's relatives (PC-1);

- ability and readiness to form systemic approach to the medical information analysis on the base of comprehensive principles of evidence-based medicine, founded on the search of decisions with use of theoretical knowledge and practical skills in order to mastery professional activities (PC-3);

- ability and readiness to perform and interpret interview, physical inspection, clinical examination, results of modern laboratory and instrumental investigations, morphologic analysis of biopsy, operative and sectional materials in patients; to complete medical card in outpatient department and case report in the hospital (PC-5);

- ability and readiness to use methods of asepsis and antiseptics, to use medical instruments, to perform cleansing of medical and diagnostic rooms in the medical institutions, to have skills of taking care for a patient (PC-7);

- ability and readiness to perform forensic medical examination of a live person; to interpret results of laboratory investigations of the objects of forensic medical examination in a case of participation in legal proceedings in the role of expert (PC-8);

- ability and readiness to employ modern social-hygienic methods of collection and medical statistic analysis of information of health indicators among population on the level of different subdivisions of medical institutions (obstetric, therapeutic village medical district) in order to develop science-based arrangements on the improvement and maintenance of good health condition in population (PC-10);

- ability and readiness to use methods of natural and medico-social environmental factors evaluation in the development of disease in population, to perform their correction, to perform preventive actions against infectious, parasitic, and non-infectious diseases, to run sanitary education on hygienic problems (PC-11);

- ability and readiness to способность to run preventive actions in population against the most widespread diseases; to put into practice health-improving actions on development of healthy lifestyle with a glance to risk factors, to order the proper diet, to assess an efficacy of healthy and sick persons monitoring (PC-12);

- ability and readiness to organize tuberculin diagnostics and

fluorography in population in order to reveal tuberculosis in its early stage, to assess their results; to select persons for BCG vaccination and revaccination with a glance to results of mass tuberculin diagnostics, to assess its results (PC-13);

- ability and readiness to perform antiepidemic actions, to protect population in the nidus of special danger infections, in worsening of nuclear environment, and in natural calamities (PC-14);

- ability and readiness to formulate a diagnosis on the ground of the results of biochemical tests of the biological fluids adjusted to the rules of pathology course in the organs, systems of organs, and the whole organism (PC-15);

- ability and readiness to analyze appropriateness of separate organs and systems functioning, to use knowledge of the anatomy and physiology, to use the main techniques of clinical immunologic examination of patients and assessment of the patient's organism functional condition for timely diagnostics of diseases and pathologic processes (PC-16);

- ability and readiness to reveal the main pathologic signs and syndromes in patients using knowledge of medico-biologic and clinical disciplines foundations taking into account the rules of pathology course in the organs, systems of organism in the whole, to analyze patterns of various organs and systems functioning in different diseases and pathologic processes, to use algorithm of diagnosis formulation (main, accompanying, complications) with the aid of International Classification of Diseases (ICD), to run the main diagnostic actions to reveal urgent and life-threatening conditions (PC-17);

- ability and readiness to analyze and interpret results of current diagnostic technologies in different age and gender groups adjusted to their organisms physiologic peculiarities for successful medioprophy-lactic activities, to diagnose physiologic pregnancy, to take part in forensic medical examination (PC-18);

- ability and readiness to perform the main medical arrangements in the most common diseases and conditions in adults, that can cause severe complications and (or) fatal outcome: diseases of the nervous, endocrine, immune, cardiovascular, respiratory, gastrointestinal, genitor-urinary and blood systems; to reveal life-threatening conditions in time

(acute hemorrhage, respiratory disorders, cardiac arrest, coma, shock), to use of their immediate elimination, to run anti-shock activities (PC-19);

- ability and readiness to order proper treatment (operative and therapeutical) for the patients in compliance with established diagnosis, to implement optimal pharmacological and non-pharmacological treatment algorithm to patients with infectious and non-infectious diseases, to manage physiologic pregnancy, to deliver a child (PC-20);

- ability and readiness to implement the first medical care of adult population in the urgent and life-threatening conditions, in the extreme conditions of epidemic, in the mass hazard areas, to hospitalize patients in emergency and systematic order, to run medical evacuation in emergencies (PC-21);

- ability and readiness to prescribe and to use medications, to follow rules of their storage (PC-22);

- ability and readiness to implement various rehabilitation activities (medical, social, and professional) among adults and adolescents in the most widespread pathological conditions and body injuries, to determine indications for patients transfer to the specialized exercises groups after undergone disease (PC-23);

- ability and readiness to recommend optimal physical activity in accordance to morphologic and functional status, to determine indications and contraindications for administering of exercises, physiotherapy, reflexology, herbal therapy, homeopathy and other tools of the non-pharmacological treatment, to use the main health resort factors in treatment of adults and adolescents (PC-24);

- ability and readiness to explain the rules of sanitary and hygienic regimen of the patients and their family members stay in the medical organizations to the medical staff, to explain the elements of healthy lifestyle to the patients (PC-25);

- ability and readiness to educate adults, adolescents and their relatives in rules of medical behavior, in implementation of hygienic procedures, in formation of wellness habits (PC-26);

- ability and readiness to use healthcare regulatory documentation (legislation of Russian Federation, technical regulations, international and national unit systems (SI), actual international classifications), and

also documentation for quality rating and efficacy assessment of the medical organizations (PC-27);

- ability and readiness to use knowledge of framework, administrative and economic functioning of different medical institutions in taking care of adults and adolescents, to analyze performance of their structural units, to assess efficacy of modern medico-administrative and socio-economic technologies in medical service of patients (PC-28);

- ability and readiness to provide rational organization of nurses and paramedical personnel work in the medical institutions (PC-29);

- ability and readiness to perform working capacity examination (stable and temporary) in patients, to make up a proper documentation, to determine a necessity of a patient referral to the medico-social assessment, to perform preventive measures to avoid disability in adults and adolescents (PC-30);

- ability and readiness to study scientific medical information, the subject matter experience in our country and abroad (PC-31);

- ability and readiness to take part in implementation of modern theoretical and experimental researching methods for the purpose to create new perspective means, in organization of practical use and implementation of the research results (PC-32).

List of questions, qualifying requirements that students must know and must be able to perform, that must handle after finishing the discipline learning:

1) as a result of learning the discipline student must *know*:

- anatomo-physiologic, age-related and gender peculiarities of healthy and sick persons;

- etiology of the main pathologic processes in the human organism and mechanisms of their development;

- main clinical signs and syndromes of internal diseases and mechanisms of their development;

- symptomatology of the most common internal diseases in their typical course;

- main principles of treatment of patients with respiratory, cardiovascular, gastrointestinal, and urinary system diseases;

- symptomatology and main principles of the first medical aid in

some main emergencies;

2) as a result of learning the discipline student must *be able*:

- to take medical history of patient (and/or) of relatives and to obtain full information about diseases ascertaining possible reasons of its origin in typical cases;

- to perform physical examination of a patient (inspection, palpation, percussion, auscultation, BP measurement, taking pulse etc.) and to reveal signs of disease;

- to draw up a plan of additional laboratory and instrumental investigations of a patient;

- to diagnose the main clinical syndromes independently and to justify the diagnosis;

- to establish clinical diagnosis of the most common internal diseases in their typical form and to justify the diagnosis;

- to read and analyze typical ECG in 12 leads of a healthy person and also of patients with simple arrhythmias, ventricular and atrial hypertrophy, acute myocardial infarction, and with chronic forms of ischemic heart disease;

- to interpret results of the CBC, urinalysis, sputum and feces analysis, gastric juice and duodenal content analysis, pleural fluid analysis, and biochemical blood test;

- to state results of the patient examination in the form of a medical case report with symptoms and signs explanation and justification of the diagnosis;

- to give emergency aid in the most common urgent conditions.

3) as a result of learning the discipline student must *have skills* in general clinical examination of patient and in interpretation of the results of laboratory and instrumental diagnostic methods:

- patient's interview (taking medical history),

- general inspection,

- chest inspection,

- chest palpation,

- comparative percussion of the lungs,

- topographic percussion of the lungs,

- lungs auscultation,

- inspection of the precordium,

- palpation of the precordium,
- percussion of the heart (determination of the relative and superficial cardiac dullness borders),
- heart auscultation,
- examination of peripheral arteries and veins,
- taking pulse,
- measurement of BP by the Korotkov's method (on the arms and on the legs),
- inspection of the abdomen,
- percussion of the abdomen,
- superficial palpation of the abdomen,
- methodical deep sliding palpation after V.P. Obratsov and N.D. Strazhesko,
- auscultation of the abdomen,
- inspection of liver and spleen projection areas,
- percussion of the liver and gall bladder projection point,
- palpation of liver and gall bladder,
- spleen percussion,
- spleen palpation,
- inspection of lumbar and suprapubic areas,
- kidneys palpation,
- thyroid gland palpation,
- interpretation of sputum analysis,
- interpretation of pleural fluid analysis,
- interpretation of gastric juice analysis,
- interpretation of duodenal intubation analysis,
- interpretation of coprology analysis,
- interpretation of biochemical blood test,
- interpretation of urinalysis, Nechiporenko test, Addis-Kakovsky test,
- interpretation of complete blood test,
- anthropometric examination,
- thermometry, recording and interpretation of temperature curves,
- technique of ECG recording in 12 leads,
- ECG analysis, completing of ECG report,
- reading and interpretation of radiologic examination results,

- reading and interpretation of ultrasound examination results,
- reading and interpretation of radionuclide imaging,
- reading and interpretation of computed tomography and magnetic resonance imaging results.

NUMBER OF CREDIT UNITS AND VOLUME OF HOURS, stipulated by FSES HPE, by curriculum on 060101.65 General Medicine specialty given to “Introduction to Internal Diseases, Radiology” learning.

Total workload of discipline makes 11 credit units.

Total volume of hours – 396 h.

Total volume of auditory hours – 240 h.

Volume of lectures hours – 68 h.

Volume of practical class hours – 172 h (and 8 h – on interactive forms of tuition).

Volume of self-dependent work hours – 120 h.

#### MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

Lectures on the “Introduction to Internal Diseases, Radiology” are delivered in KSMU auditoria according to schedule

Practical classes are held in the clinical city hospitals of Kazan according to schedule:

- 1) hospital №11: Maximova str., 34/24 (2 classrooms);
- 2) hospital №2: Muzykalnaya str., 13 (1 classroom);
- 3) hospital №9: Gagarina str., 95 (2 classrooms);
- 4) hospital №7: Chuykova str., (1 classroom).
- 5) Republican clinical hospital of Tatarstan Republic Healthcare Ministry: Orenburgsky tract, 138 (classroom according to schedule in the educational methodological block for radiology classes);
- 6) children hospital №1: Decabristov str., 125A (classroom for radiology classes).

List of visual training aids used in the learning process:

- 1) charts on all themes of IID, Radiology (583 items);
- 2) ECGs, X-ray films.

Pneumatic tonometers A&D UA-201(1997), Digital sphygmo-manometer (A&D Medical) mercury-free: A&D UA-101 (2008), A&D UA-201(2008); phonendoscopes A&D (1997), A&D (1999), A&D (2003), A&D (2004), A&D (2005), A&D (2008); electronic thermometers A&D (2008) 2 X-ray films projectors HC-2MA (1975, 1983).are using in the learning process.

#### List of educational video films:

- “Propaedeutics of Internal Diseases” (author E. Guseva, senior scientific consultant professor V.V. Murashko, scientific consultants professor A. V. Strutynsky, professor S.B. Feldman; 30 min.),
- “Diagnostics of hypertensive disease” (author E.I. Chasov),
- “Electrocardiography” (authors A Chebyshev, Yu. Rozinov, scientific consultant professor I.I. Sivkov; 18 min.),
- interactive atlas “The basics of internal diseases diagnostics”,
- audio manual for students “The heart sounds and murmurs”,
- audio manual for students “Physiology and pathologic physiology of the heart sounds and murmurs”,
- video atlas on Hematology,
- videos on Echocardiography (3),
- computer presentations and overhead slides for the lectures.

#### List of equipment:

Computer – Celeron with monitor, overhead Quadra Vega F, scanner Epson Perfection 1260, videotape recorder Panasonic, TV set «Rubin», printer Samsung SCX4200, notebook Acer AS5102 WLMi, projector LG DX130 DLP, DVD player Samsung V5500, remote controller Logitech, audio amplifier portable system Fender Passport PD150, radio microphone system with lavalier microphone Shure ETPO, radio microphone system with handheld microphone Shure ETV58D, scanner Epson 3590.

#### List of available e-libraries:

- e-library of the KSMU,
- Cardiosource – access to the cardiologic journals, <http://www.cardiosource.com>,

- American College of Cardiology (ACC). <http://www.acc.org/>,  
 - cardiologic site with demonstrations <http://www.med.umich.edu/lrc/cardiex/cardiexnew/cardiex.html>,  
 - ЭКГ.ru – information resource in electrocardiography - standards, books, conferences, publications etc. <http://www.ecg.ru>,  
 Wiley Online Library [www.interscience.wiley.com](http://www.interscience.wiley.com),  
 Patent database of the Questel company [www.orbit.com](http://www.orbit.com),  
 e-LIBRARY.RU [www.elibrary.ru](http://www.elibrary.ru),  
 electronic catalogue of the KSMU scientific library – the automated library system «ИРБИС» (irbis64r\_01/cgiirbis\_64.exe) was introduced in the scientific library of the KSMU. You can control your books in your electronic library card and implement advance order of literature from scientific library of KSMU via Web-IRBIS.

Manuals and handbooks on the discipline are also placed on our Department site <http://oslopov-kazan.ru> (access via the KSMU site [www.kgmu.kcn.ru](http://www.kgmu.kcn.ru)).

Other useful web-sites:

Mayo clinic <http://www.mayoclinic.com>;

#### ORDER OF AUDITORIA ADMITTANCE

An admittance to the classrooms in the hospitals is carried out according to schedules of practical classes, consultations and re-works of missed classes, that placed on the cathedral stands and the site of our Department.

The KSMU library working hours: 8.30 a.m. - 5.30 p.m., working hours of reading rooms: 8.30 a.m. - 6.30 p.m., Sunday – work off.

#### RIGHTS AND DUTIES OF STUDENTS, REQUIREMENTS CONCERNING EDUCATIONAL PROCESS AND LEARNING ACTIVITY

Legal regulatory documents determining rights and duties of students:

1. Federal law “On higher and postgraduate professional education”

of 22.08.96, № 125-F3.

2. Federal State Educational Standard of Higher Professional Education (2010) on 060101.65 General Medicine specialty.

3. Charter of the State Budget Educational Institution of the Higher Professional Education “Kazan State Medical University” of the Healthcare and Social Development Ministry of Russian Federation (2011).

4. Strategy of the Kazan State Medical University approved by Academic Council of the KSMU of 30.10.09.

5. Rules and regulations of Kazan SMU (2012).

6. Kazan State Medical University Regulations of the rating system of students’ academic progress evaluation (2010).

7. Kazan State Medical University Regulation “On the current monitoring and intermediate academic progress evaluation in students” (2003).

8. Regulations “On the order of academic debts deletion in the Kazan State Medical University” (2009).

9. Applicable sanitary and fire-prevention rules and norms.

## RIGHTS AND DUTIES OF THE STUDENTS

(quotation from Charter of the State Budget Educational Institution of the Higher Professional Education “Kazan State Medical University” of the Healthcare and Social Development Ministry of Russian Federation, 2011)

7.1. The rights and the duties of all categories of employees and students of the University are defined in accordance with Russian legislation, the present Charter, rules and regulations of Kazan SMU, the collective agreement, and other local deeds of the University.

7.2. The employees and students of the University have rights:

– to participate in making decisions in the crucial issues of the University activities,

– to unite in the trade union and other social organizations,

– to use educational and scientific resources, archives and library funds of the University free of charge,

– to take part in the congresses, conventions, conferences,

workshops, symposia.

7.3. The employees and students of the University are obliged:

- to follow regulations of the current Charter, rules and regulations of the KSMU and other local deeds of the University, to fulfill resolutions of the University administration;

- to ensure high efficacy of the educational process and scientific researches;

- to preserve the University property.

7.4. Measures of disciplinary, material and civil legal responsibility can be applied to the employees and students of the University in accordance with established order for violations of the obligations, stipulated by the current Charter, on the statutory grounds in accordance to Russian legislation, the current Charter, and rules and regulations of the KSMU.

<...>

7.32. Students of the University have rights and duties stipulated in accordance to Russian legislation.

7.33. Students of the University have right:

- to get knowledge corresponding to the modern level of science, technique and culture development;

- to attend lecture courses on all faculties of the University;

- to take part in any kinds of scientific researches including participation in scientific conferences, publication of own results, also in the University issues, to carry out a cultural educational work;

- to make use of sports and health-improving bases of the University;

- to set up social organizations for making decisions in the crucial issues of the University activities;

- to elect and to be elected to the Scientific Councils of the University and of the faculties;

- to appeal orders and warrants of the University in the stipulated order in accordance to Russian legislation;

- to actualize other rights in accordance to Russian legislation, the current Charter and other local deeds of the University.

<...>

7.38. Students of the University are obliged:

- to execute all kinds of educational loading, stipulated by the curriculum at a stated time, to acquire knowledge and skills essential for future of high quality professional;
- to attend all kinds of academics, stipulated by the curriculum;
- to comply with the current Charter, rules and regulations of the University and a guidance of a residence in the hostel.

7.39. Measures of disciplinary responsibility till the expulsion from the University can be applied to the students who did not execute educational plan at a stated time, committed disciplinary faults, did not comply with the current Charter, rules and regulations of the University.

7.40. Use of disciplinary penalty to the student of the University is preceded by the receiving of arguments in writing to the point from the guilty person.

Student refusal or avoiding of explanations is not a reason of his deliverance from disciplinary penalty. In case of refusal from arguments in writing the proper document is completed.

7.41. Disciplinary penalty is applied not later than 1 month after relieving and not later than 6 months after commitment of disciplinary fault, excluding time of his illness and (or) vacations, sabbatical or maternity leave, parental leave or other reasons of excused absence.

7.42. Expulsion for an academic failure is proceeding in accordance to the University regulations of current monitoring and intermediate academic progress evaluation in students.

<...>

7.44. A student may be expelled from the University for submission of false document related to the learning in the University, and also for violations of contract for rendering of paid educational service specifications.

The rights and the duties of students  
(quotation from Rules and regulations of Kazan State Medical  
University, 2012).

3.5. Students of the University have right:

3.5.1. on learning in accordance to current state and Federal state educational standards and requirements.

3.5.2. on learning in accordance to individual curriculum within current state and Federal state educational standards and requirements.

3.5.3. on accelerated learning in accordance to curricula of high professional education, higher professional education with awarding a *bachelor* degree.

3.5.4. on receipt of additional (including paid) educational service.

3.5.5. on participation in the KSMU administration according to the Charter of the University.

3.5.6. on respect of his (her) human dignity.

3.5.7. on liberty of conscience, information and expression of own opinions and views.

3.5.8. on choice of optional (non-obligatory for this direction of specialty) and elective (obligatory chosen) disciplines.

3.5.9. on participation in discussion and solutions of the main matters of the University activities including social organizations and administration of the KSMU.

3.5.10. on free use of the University library, information funds, services of educational, scientific and other subdivisions of KSMU in order stipulated by the Charter of KSMU, participation in all kinds of scientific research studies, conferences, symposia.

3.5.11. on submission of his (her) researches for publication including the University issues.

3.5.12. on receipt of information about circumstances in the employment sphere.

3.5.13. on social insurance security in accordance to Russian legislation.

3.5.14. on personal data protection from their illegal exploitation by the employer or the third party.

3.5.15. on guarantees of free transfer to another higher educational institution in order stipulated by Federal executive authority making policy and legal regulation in educational sphere. Right on the transfer from one higher educational institution to another may be limited in cases stipulated by

Russian legislation and (or) conformed treaty. In transfer from one higher educational institution to another all the student rights as for the first time learning on the current level of higher professional education are preserved.

3.5.16. on restoration in the KSMU during 5 years after expulsion from the University because of his (her) free will or excused reasons with preservation of the same form of education (free or paid) student learned before expulsion (in availability of vacant places).

Order and conditions of student restoration expelled due to unreasonable excuse are determined by proper Regulations.

3.5.17. to appeal against orders and arrangements of the University stipulated by the Russian legislation.

3.5.18. to realize any other rights in accordance to Russian legislation, Charter of KSMU, the current Regulations and another local regulatory acts.

3.5.19. involvement of KSMU students without their approval not provided by curriculum is forbidden.

3.5.20. enforcement of KSMU students to entry the social, religious, socio-political organizations (unions) and also forced involvement of them to its activities, canvassing campaigns, and politic actions is not allowed.

3.6. Student of the University must:

3.6.1. acquire knowledge, practical skills and modern methods for successful work in the chosen specialty, stipulated by state and Federal state educational standards.

3.6.2 attend and be on time at the beginning of all kinds of academics stipulated by Curriculum. in obligatory order.

3.6.3. fulfill all kinds of assignments stipulated by proper syllabus and curricula of higher professional education.

3.6.4. comply with schedule graphs of educational experience, take exams and credits at a stated time and in compliance with the main educational program.

3.6.5. improve his (her) cultural and morals level, strengthen physical fitness.

3.6.6. neatly and with care handle classrooms, equipment,

learning aids, literature, devices and another property of the University.

3.6.7. carry out financial liability for breakage of the University property in accordance to current Russian legislation.

3.6.8. comply with requirements of KSMU Charter, present Regulations, orders and directions of administration, and Regulations of a hostel dwelling.

3.6.9. regularly, according to schedule approved by administration of KSMU be checked in preventive medical examination including illicit drugs (narcotics, psychoactive substance) users detection.

3.6.10. be responsible for violation of KSMU Charter, current Regulations, Regulations of hostel dwelling and another local normative act.

3.7. It is strictly prohibited to employees and students in the buildings and territory of KSMU:

3.7.1. illegal storage, production, processing, consumption, selling, and propaganda of narcotics, psychoactive substances and their analogs, and also herbs, containing narcotics or psychoactive substances, or their parts, containing narcotics psychoactive substances.

3.7.2. alcohol consumption, being drunk, being in narcotic or toxic drunkenness condition, insulting honour and dignity of surrounding people and causing negative social consequences.

3.7.3. tobacco smoking (including hookah).

3.7.4. carrying, use, keeping of explosive, chemically hazard substances and pneumatic, traumatic or firearms.

3.7.5. violation of the fire security rules.

3.7.6. act of force and commitment of other faults, entailing dangerous consequences for surrounding people.

3.7.7. being in the classrooms or service rooms in outerwear and caps.

3.7.8. violation of trespassing regimen rules.

3.7.9. gambling.

3.7.10. unauthorized carrying out of different equipment and things from auditoria, library reading rooms and another rooms of the University.

3.7.11. use of mobile phones and another communications,

and various technical devices during classes time and during intermediate and final academic progress evaluation otherwise it is stipulated by educational program.

3.7.12. use of obscene words, another antisocial behavior.

3.7.13. to chatter.

3.7.14. bright catchy make-up, facial piercing.

3.7.15. to wear miniskirts and low cut dresses, tops with open stomach, low set trousers, shorts, transparent clothes, beach sandals.

3.7.16. Every student must have a white gown in the classes. In some laboratory buildings of the University, by the order of general issues pro-rector, the changeable footwear is stipulated to be obligatory.

### Class attendance

For successful learning of the discipline student must attend all academics that are regulated by schedule approved by teaching department of the University. So, student must attend all the lectures and practical classes. Student attendance is registered by lecturer, teachers and heads of the student groups.

Only respected excuse confirmed by official document (doctor's certificate, dean's office certificate) may be the reason of absence.

In case of illness or other reasons according to which student could not attend the classes he (she) must inform the dean's office and department, he (she) must submit doctor's certificate or another document (for ex. certificate from dean's office, Department of tutorial work etc.), explaining his (her) absence at classes. But it does not release student from re-work of the missed class. If student missed more than 2 classes with no respected excuse (without documents submission), he (she) will be called on the meeting with the head of department and classes attendance will be allowed only with dean's permission.

## Deletion of academic debts

Missed classes and classes with obtained failing grade must be re-worked in compulsory order. Deletion of academic debts is performing on the ground of Regulations “On the order of academic debts deletion in the Kazan State Medical University”, 2009.

*Schedule of academic debts deletion*, of the missed classes re-work is establishing by decision of the Department and is posted up on the Department stand. In case of questions appearance student may apply to lab technician, class conducting teacher, head of the curriculum subdivision of the department, lecturer, head of the department.

Forms of class re-work are established on the ground of normative documents of KSMU, decisions of academic Council of KSMU, decisions of faculties academic Councils, rector orders, instructions of educational methodological administration, department decisions.

It is possible to rework missed lectures and (or) practical classes with obtained failing grade orally and (or) in writing in various forms approved by Introduction to Internal Diseases department. For example, to submit content of missed lecture, to write essay on the missed lecture theme, to answer lecturer questions orally, to rework missed class with another academic group, to fulfill written control test, to solve situational task, to examine patient with case report completing (on re-worked theme).

In missing more than 30% of total academic hours volume according to discipline curriculum a student does not get a credit for the course and follow the course again *in corpore* (with another group).

According to the Regulations of the rating system of students' academic progress evaluation of KSMU (2010) lectures re-work is estimated with reducing coefficient 0,5. In practical class re-work in the auditoria forms (with another group, during the night shifts, by extra work at the patient bedside with completing of extra case report) the reducing coefficient 0,75 is used. In practical class re-work in essay form, or oral answers form the reducing coefficient 0,5 is used.

## Indispensable equipment for lectures and practical classes

On the lectures student must have lectures copybook, on practical classes – workbook, phonendoscope.

### General appearance (dress-code)

On the lectures and practical classes student must wear medical gown, medical cap and changeable footwear (on practical classes shoe covers are not allowed). Bright make-up, piercing, long fingernails, untidy hairstyle (hair must be completely disposed under the cap), strong perfume.

As far back as in ancient India a physician said to his followers: “You should now give up your passions, anger, mercenariness, insanity, vanity, pride, envy, rudeness, buffoonery, fake, laziness and any vicious behavior. Now you will bear your hair and nails close-cropped, will wear a red clothes, lead a clean life”.

### Lecture books, workbooks, synopsis, documents keeping

At the lectures on Introduction to Internal Diseases student should take notes (i.e. jot down) of the lecture content. In the beginning of each synopsis of the lecture there must be note of the lecture number, date of the lecture, theme of the lecture. Student must bring his (her) lecture book on to exam on Introduction to Internal Diseases, Radiology.

Design of practical classes in the workbook on Introduction to Internal Diseases includes number of class, date of class, theme of class, fragment of examined patient case report (or results of standardized patient examination in the Practical Skills Centre of KSMU, or results of healthy person examination, or ECG analysis reports, solutions of situational tasks), results of self-dependent work.

### Self-dependent work of students

Self-dependent work of students is the obligatory element of learning process, according to curriculum of Introduction to Internal

Diseases, Radiology discipline it makes 60 hours.

Self-dependent (extra auditorium) work of students is emerged of few categories:

1) theoretical self-preparation of students on some educational themes, mainly on modern laboratory and instrumental diagnostics of internal diseases, clinical diagnostics of main pathologic syndromes etc.;

2) acquaintance with supplementary educational literature and other educational methodological materials, consolidating students practical skills (educational audio and video films, учебными аудио- и видеофильмами, laboratory analyses set, ECGs etc.);

3) writing of exam case report.

The main kinds of self-dependent work of students for better preparation to the lectures and practical classes of the definite theme: to read and to learn material in the recommended main and supplementary literature; to answer given questions, to fulfill specified tasks and manipulations, to master and to demonstrate manual skills, to prepare or to learn schemes, tables, plaster casts, case reports; to write synopsis, to prepare oral and/or computer presentation, to make schemes, tables, tests, practical situations etc.

All kinds and results of self-dependent work of student should be drawn up in the workbook, and/or printed out, and/or e-mailed to the teacher, and/or sent with the aid of distance teaching techniques of Kazan SMU.

Self-dependent work of students at the patient bedside or in the clinic laboratory, or in the functional diagnostics department, or in the medical treatment room etc. is the major stage of practical class. Depending on concrete theme of class students independently inquire a patient, perform his (her) inspection, palpation, percussion, auscultation etc. The class ends with clinical discussion of subject patients by the teacher and the whole group of students. During the discussion quality of fulfilled self-dependent work of students and developed skills and abilities is controlled. The teacher evaluates implementation of class objectives individually by every student.

In the process of semiotics course it is reasonable to complete few fragments of case report according to the "Scheme of medical case report" as a result of independent patients with respiratory, cardio-

vascular, and gastrointestinal diseases examination. At the end of the clinical pathology bases course students submit the final (exam) case report, which contains thorough description of a patient's identification data, medical history, physical examination data, results of laboratory and instrumental examination of a patient, clinical diagnosis with its substantiation, and also plan of a patient's further clinic-laboratory and instrumental examination. The final (exam) case is estimated according to 100 point system, and it is brought to the course exam on Introduction to Internal Diseases, Radiology discipline.

Timing of student independent work at the patient bedside  
Total duration of student independent work – 65 min.

№	Duration	Student action at patient bedside
1	10 min.	Collecting of interviewing data
2	5 min.	General inspection (examination)
3	10 min.	Inspection, palpation of the chest, comparative percussion of the lungs
4	5 min.	Topographic percussion of the lungs: upper borders, lower lung borders determination (1 or 2 lines may be used). Lungs auscultation
5	10 min.	Palpation of the precordium, percussion determination of the relative and superficial cardiac dullness borders
6	5 min.	The heart auscultation
7	5 min.	Taking pulse (arterial and vein). Measurements of BP (on the arms and legs), venous pressure
8	15 min.	Superficial abdominal palpation. Palpation of sigmoid colon, caecum palpation, ascending and descending colon palpation, transverse colon palpation. Examination of the lower stomach border. Percussion of the liver span after Kurlov. Liver palpation. Spleen percussion and palpation. Kidneys palpation

## Regulations of current monitoring and intermediate academic progress evaluation (credit, exam)

Rules of current monitoring and intermediate academic progress evaluation in students are determined in the Regulation “On the current monitoring and intermediate academic progress evaluation in students of Kazan State Medical University” (2003).

Student’s use of microearphones, smartphones and other technical communicative devices is prohibited.

### STUDENTS SCIENTIFIC RESEARCHES

Scientific research is one of the kinds of student self-dependent work, and it is directed to the complex forming of the general cultural and professional competencies in accordance to Federal state educational standard.

KSMU students have an opportunity

- to study special literature and other scientific medical information, achievements of domestic and foreign science and technologies in the appropriate knowledge domain;
- to participate in conducting of scientific researches;
- to collect, process, analyze and categorize scientific information on the given theme (task);
- to write scientific reports (or their parts), to prepare abstracts on the theme or its part;
- to make a presentation on the conferences.

In order to involve students in the scientific researches the students’ scientific circle traditionally (SSC) functions on the Introduction to Internal Diseases department. Annually in the beginning of the learning year plan of the SSC work is composed on the department meeting. While planning SSC activities a specialization of clinical bases is taken into account for a better acquaintance with scientific researches conducting in every hospital (city hospitals № 2, 7, 9, 11). Themes of students’ researches are devoted to actual problems of internal diseases: cardiology, instrumental diagnostics, gastroenterology, pulmonology.

Many researches are devoted to studying of cellular membranes condition in cardiology and adjacent areas of medicine.

The SSC head – head of the Introduction to Internal Diseases department, Professor Oslopov Vladimir Nicolayevich, MD, PhD, Doctor of Medical Science. Professor in charge of SSC – Professor Boulashova Olga Vasilyevna, Doctor of Medical Science, MD, PhD.

The first in the learning year SSC meeting is devoted to students acquaintance with scientific directions of the department; students are allowed to choose a direction of scientific work and a guidance. Announcement of SSC meetings are hanged out in the University main buildings in advance.

The most active students – SSC members – are drawn to articles writing under the guidance of a teacher. SSC members actively participate in All-Russian students scientific conferences.

### CURRICULUM OF THE DISCIPLINE

№	Name of divisions and themes	Total (h)	Audotiria classes		Self-dependent work (h)
			lect.	pract.cl.	
	MODULE 1. <i>ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION</i>	100	26	44	30
1.	Theme 1.1. Introductory class. Acquaintance with department Scheme of case report. Medical history. Completing of case report fragment.	10	4	4	2
2.	Theme 1.2. Self-dependent work of students: taking patient's interview. Discussion of medical history with a teacher. Completing of a case	10	2	4	4

	report.				
3.	Theme 1.3. General inspection (examination) of a patient.	14	6	4	4
4.	Theme 1.4. Examination of patients with respiratory system diseases.	8	2	4	2
5.	Theme 1.5. Lungs percussion and auscultation in healthy human beings.	8	2	4	2
6.	Theme 1.6. Lungs percussion and auscultation abnormalities.	8	2	4	2
7.	Theme 1.7. Examination of patients with cardiovascular system diseases.	10	2	4	4
8.	Theme 1.8. Heart percussion and auscultation in healthy human beings.	9	3	4	2
9.	Theme 1.9. Heart percussion and auscultation abnormalities.	11	3	4	4
10.	Theme 1.10. Mastering of practical skills of inspection, palpation, percussion, and auscultation of respiratory and cardiovascular system.	8	–	4	4
11.	Module control check-up of themes 1.1.–1.10.	4	–	4	–
<i>MODULE 2.</i> <i>METHODS OF PATIENTS WITH GASTROINTESTINAL AND URINARY DISEASES CLINICAL EXAMINATION</i>		34	4	20	10
12.	Theme 2.1. Examination of patients with gastrointestinal diseases.	7	1	4	2

13.	Theme 2.2. Examination of patients with diseases of hepatobiliary system and spleen.	7	1	4	2
14.	Theme 2.3. Examination of patients with urinary system diseases.	8	2	4	2
15.	Theme 2.4. Mastering of practical skills of stomach and kidneys examination.	8	–	4	4
16.	Module control check-up of themes 2.1. – 2.4.	4	–	4	-
<i>MODULE 3.</i> <i>CLINICAL LABORATORY DIAGNOSTICS</i>		18	–	10	8
17.	Theme 3.1. Blood investigation.	8	–	4	4
18.	Theme 3.2. Urinalysis, sputum and pleural fluid investigation.	8	–	4	4
	Module control check-up of themes 3.1. – 3.2.	2	–	2	–
<i>MODULE 4.</i> <i>BASES OF ELECTROCARDIOGRAPHY</i>		42	10	16	16
19.	Theme 4.1. ECG heart examination. Normal ECG. The heart chambers hypertrophy.	12	4	4	4
20.	Theme 4.2. ECG heart examination. Sinoauricular and atrioventricular heart blocks. Intaventricular conduction abnormalities.	10	2	4	4
21.	Theme 4.3. ECG heart examination. Arrhythmias. Extrasystole. Paroxysmal tachycardia. Atrial fibrillation, atrial flutter. Ventricular flut-	10	2	4	4

	ter and fibrillation.				
22.	Theme 4.4. ECG in ischemic heart disease.	8	2	2	4
	Module control check-up of themes 4.1.–4.4.	2	–	2	–
<i>MODULE 5</i> <i>SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM DISEASES.</i>		52	12	24	16
23.	Theme 5.1. The main clinical syndromes of respiratory system diseases.	12	4	4	4
24.	Theme 5.2. Rheumatic fever. Semiotics of endocarditis, myocarditis, pericarditis. Symptomatology of mitral valvular heart disease.	8	2	4	2
25.	Theme 5.3. Rheumatic fever. Symptomatology of aortic valvular heart disease. Tricuspid incompetence.	8	2	4	2
26.	Theme 5.4. Arterial hypertension. Essential hypertension. Symptomatic hypertension.	10	2	4	4
27.	Theme 5.5. Atherosclerosis. Ischemic heart disease: angina pectoris, myocardial infarction. Heart failure.	10	2	4	4
28.	Module control check-up of themes 5.1.–5.5.	4	–	4	–
<i>MODULE 6.</i> <i>SEMIOTICS OF GASTROINTESTINAL AND URINARY SYSTEM DISEASES</i>		14	2	8	4
29.	Theme 6.1. Semiotics of gastritis, peptic ulcer disease. The main clinical syndromes in hepatobiliary system disea-	7	1	4	2

	ses.				
30.	Theme 6.2. The main clinical syndromes in urinary system diseases.	5	1	2	2
	Module control check-up of themes 6.1. – 6.2.	2	–	2	–
<i>MODULE 7. FINAL EXAM CASE REPORT.</i>		12	–	8	4
31.	Theme 7.1. A patient examination. Writing of a case report.	8	–	4	4
32.	Theme 7.2. Discussion of students' case reports. The final exam MCQ.	4	–	4	–
<i>MODULE 8. THE FINAL EXAM CHECK-UP OF PRACTICAL SKILLS IN ALL METHODS OF PHYSICAL EXAMINATION</i>		4	–	4	–
33.	Check-up of practical skills. Analysis of the most common mistakes in the final MCQ.	4	–	4	–
<i>MODULE 9. THE BASES OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES</i>		88	14	42	32
34.	Theme 9.1. Principles and methods of diagnostic radiology.	8	1	4	3
35.	Theme 9.2. Roentgen computer tomography. Principles of radio- Ultrasound examination, magnetic resonance imaging nuclide diagnosis.	8	1	4	3
36.	Theme 9.3. Radiologic diagnostics of pulmonary diseases.	10	2	4	4
37.	Theme 9.4. Chest X-ray.	10	2	4	4

38.	Theme 9.5. Radiologic diagnostics of cardiovascular diseases.	9	2	4	3
39.	Theme 9.6. Proceedings of the X-ray examination of the patients with cardiovascular diseases.	9	2	4	3
40.	Theme 9.7. Radiologic diagnostics of gastrointestinal diseases.	12	2	6	4
41.	Theme 9.8. Radiologic diagnostics in nephrology and urology.	10	2	4	4
42.	Theme 9.9. Radiologic diagnostics in diseases of pancreas and hepatobiliary system.	8	–	4	4
43.	Module control summing-up of themes 9.1. – 9.9.	4	–	4	–
	Total	360	68	172	120
	Form of resultant control – examination (1 credit unit of workload - CUW).	36			
	TOTAL – 6 CUW	396			

KINDS OF THE CURRENT MONITORING AND INTERMEDIATE ACADEMIC  
PROGRESS EVALUATION (EXAMINATION)

IV term

*1. Modules evaluation*

Module 1. General inspection. Methods of patients with pulmonary and cardiovascular diseases clinical examination.

*2. Current grade.*

*3. Attestation.*

V term

*1. Modules evaluation*

Module 2. Methods of patients with gastrointestinal and urinary diseases clinical examination.

Module 3. Clinical laboratory diagnostics.

Module 4. Bases of electrocardiography.

2. *Current grade.*

3. *Attestation.*

#### VI term

1. *Modules evaluation*

Module 5. Semiotics of respiratory and cardiovascular system diseases.

Module 6. Semiotics of gastrointestinal and urinary system diseases.

Module 7. Final exam case report.

Module 8. The final exam check-up of practical skills in all methods of physical examination.

Module 9. The bases of diagnostic radiology in internal diseases.

2. *Current grade.*

3. *The final exam MCQ.*

4. *Examination.*

### PLAN OF THE LECTURES

#### IV term

№	Module	Theme name	Brief content
1	1	Introductory	Fundamental significance of Introduction to Internal Diseases in medical educational system. <i>Computer presentation. Video-film "Introduction to Internal Diseases"</i>
2	1	Notion of disease	Notion of disease. Basic principles of diagnosis methodology. Medical ethics. Some issues of history of medicine. <i>Computer presentation.</i>

3	1	The patient interview	The patient interview, its portions and meaning for diagnostics. Patient complaints, their classification. Symptom analysis (detailing). Anamnesis morbi. Anamnesis vitae. <i>Computer presentation.</i>
4	1	General inspection	Objective examination of a patient. General inspection. General division of the objective examination methods. Rules and sequence of general inspection. Assessment of patient's general condition. Temperature curves. Patient's consciousness condition (qualitative and quantitative changes). Patient's gait and bearing. <i>Computer presentation.</i>
5	1	General inspection (continuation)	Face expression and features. Odor of patient's body and exhaled air. Examination of the neck, thyroid gland. Anthropometry (height, weight, waist circumference). Body mass index (BMI). Body built. Constitution. <i>Computer presentation.</i>
6	1	General inspection (continuation)	Integument. Hair and nails. Subcutaneous fat tissue: development, distribution. Oedemas. Lymph nodes. Bones. Muscles. Joints. Examination of separate parts of the body. <i>Computer presentation.</i>
7	1	General approach to patients with pulmonary diseases	The main interviewing data, main complaints: chest pain, cough, dyspnoea, asthma, blood-

			mixed sputum, pulmonary hemorrhage. Objective data: inspection and palpation of the chest. <i>Computer presentation.</i>
8	1	Lungs percussion data in norm and pathology	Percussion as diagnostic method. Comparative percussion. Changes of percussion note above lungs. Topographic percussion. <i>Computer presentation.</i>
9	1	Lungs auscultation data in norm and pathology	Auscultation as diagnostic method. Physiological and pathological breath sounds. <i>Computer presentation. Audio recordings.</i>
10	1	General approach to patients with cardiovascular diseases	Medical history of cardiologic patients, main complaints: dyspnoea, asthma, palpitation, heart pain. Physical examination of patients with cardiovascular diseases. Pulse and its properties. Blood pressure, its measurement (on arms and legs). Inspection and palpation of precordium. <i>Computer presentation.</i>
11	2	The heart percussion	The heart percussion. Rules and technique of the heart percussion. Relative and superficial cardiac dullness. Mitral and aortic heart configuration. Trapezium-shaped heart configuration. Normal heart borders and their changes in pathology. <i>Computer presentation.</i>
12	9	Radiophysics. Types of most important radiological examination.	Types of radiations and different groups of imaging methods. Interactions of x-rays and gamma rays with matter. Interactions

			in magnetic fields, interactions of ultrasound. Radioisotopes and radiopharmaceuticals, quantities and units of radiation dose. History. Traditional projection images: radiography, fluoroscopy and fluorography, contrast media for x-Rays. Computed tomography (CT), Radionuclide imaging, Diagnostic ultrasound (US), Magnetic resonance imaging (MRI), and contrast media in diagnostic radiology. Contrast media for roentgen rays. <i>Computer presentation.</i>
13	9	The lungs and mediastinum radiology	Most important radiological examinations of the lungs and mediastinum, how to use them in reaching diagnosis of most frequently performed diseases. Chest radiographs with supplementary methods of examination. Bronchography, Computed tomography (CT), Magnetic resonance imaging (MRI,) Isotope scanning. Pathological radiological syndromes. <i>Computer presentation.</i>
14	9	The lungs and mediastinum radiology	Roentgen diagnostics of the major pulmonary diseases. Radiologic signs and syndromes of the chest and lung diseases. <i>Computer presentation.</i>

## V term

№	Module	Theme name	Brief content
15	1	The heart auscultation: normal heart sounds pathology	The heart auscultation: valvular projection points, points and areas of auscultation. Heart sounds: mechanism of their formation, their characteristics. <i>Computer presentation. Audio recordings.</i>
16	1	The heart auscultation: heart sounds abnormalities.	Changes of the heart sounds intensity, doubling and splitting. Trinomial heart rhythms (gallop rhythms). <i>Computer presentation. Audio recordings.</i>
17	1	The heart auscultation: heart murmurs	Definition of heart murmurs, classification, mechanism of their appearance. Murmurs characteristics. Differentiation of two valvular murmurs. Organic and functional murmurs. Extra-cardiac murmurs. <i>Computer presentation. Audio recordings.</i>
18	4	Normal electrocardiogram (ECG) (ECG 1)	Brief historical data. Biopotential origin in solitary muscular fiber. Vectorial principle in the ECG. Dipole. ECG waves and intervals genesis, their characteristics. ECG leads. <i>Computer presentation.</i>
19	4	Changes of heart axis position. ECG in heart chambers hypertrophy (ECG 2)	Some ECG indices. The heart electrical axis deviations. Heart chambers hypertrophy. <i>Computer presentation.</i>
20	4	ECG in automatism and conduction disorders (ECG 3)	Disorders of automatism: sinus brady-, tachycardia, arrhythmia. Conduction disorders: sinoauri-

			cular, intraatrial, atrioventricular, interventricular blocks. WPW syndrome. Ectopic heart beats (extrasystole): causes and mechanism of their appearance, classification, variants. Paroxysmal tachycardia: causes and mechanism of their appearance, classification. Atrial fibrillation and flutter. Ventricular fibrillation and flutter. <i>Computer presentation.</i>
21	4	ECG changes in Coronary Heart Disease (ECG 5)	ECG changes in angina. Functional tests. Myocardial infarction: forms, stages and phases, location <i>Computer presentation.</i>
22	2	General approach to patients with gastrointestinal diseases	Medical history and complaints of patients with esophageal diseases: dysphagia, pain, eructation. Complaints of patients with gastric diseases. Peculiarities of physical findings in patients with gastrointestinal disorders. Laboratory and instrumental methods of esophagus and stomach investigation. Medical history and complaints of patients with liver diseases. Major hepatic syndromes. <i>Computer presentation.</i>
23	9	The heart and vessels radiology	Most important radiological examinations of the heart and mediastinum, how to use them in making diagnosis of the most frequently performed diseases. <i>Computer presentation.</i>

24	9	The heart and vessels radiology	Ultrasound examination of the heart and vessels. The main techniques. Chest radiographs with supplementary methods of examination, angiocardigraphy, coronary angiography. CT, MRI, isotope scanning Pathological radiological syndromes. <i>Computer presentation.</i>
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## VI term

№	Module	Theme name	Brief content
25	2	General approach to patients with renal diseases	Medical history and physical examination of patients with renal diseases. Main renal syndromes. Zimnitsky and Reberg tests. Stages and characteristics of chronic renal failure. Instrumental investigations of kidneys. <i>Computer presentation.</i>
26	5	Community-acquired pneumonia: crupous pneumonia, bronchopneumonia (focal pneumonia). Lung abscess. Pleuritis. Pulmonary carcinoma	Definition. Prevalence. Etiology, pathogenesis, classification. Morphological stages and clinical picture. Outcomes and prognosis. <i>Computer presentation.</i>
27	5	COPD. Symptomatology of acute and chronic bronchitis. Asthma. Emphysema. Bronchiectasis	Bronchitis. Definition. Classification? Clinical signs. Asthma classification, etiology, pathogenesis of asthma. Diagnostics of asthma attack. Laboratory and roentgenologic data in asthma. Emphysema – pathogenesis and morphology, clinical and instrumental diagnostics. Bronchi-

			ectasis: classification, etiology, pathogenesis, pathologic anatomy; clinical, instrumental, and laboratory diagnostics. Diagnostics of respiratory insufficiency. Spirometry. Diagnostics of obstructive and restrictive respiratory insufficiency. <i>Computer presentation.</i>
28	5	Rheumatic fever: endocarditis, myocarditis, pericarditis	Brief historical data. Definition. Etiology and pathogenesis. Brief pathological anatomical data. Classification and clinical picture of rheumatic fever. Endocarditis. Myocarditis. Pericarditis. Laboratory diagnostics. Outcomes. <i>Computer presentation.</i>
29	5	Symptomatology of acquired valvular heart disease (mitral, aortic, tricuspid valvular heart disease)	Occurrence of mitral valve disease. Mechanism of formation. Mitral incompetence. Mitral stenosis. Aortic incompetence. Aortic stenosis Tricuspid valve incompetence (organic and functional). Mechanisms of compensation. <i>Computer presentation.</i>
30	5	Arterial hypertension	Brief historical data. Classification of arterial hypertension. Modern conception of etiology and pathogenesis of essential hypertension. Clinical course, stages of disease. Symptomatic hypertension. <i>Computer presentation.</i>
31	5	Atherosclerosis. Ischemic heart disease	Atherosclerosis and its clinical manifestations. Periods and stages. Ischemic heart disease.

			Angina pectoris and myocardial infarction. Medical history, clinical, laboratory and instrumental data. <i>Computer presentation.</i>
32	6	Symptomatology of gastritis, peptic ulcer disease. Renal diseases	Definition, prevalence, etiology, pathogenesis. Diagnostics. Importance of objective data. Laboratory and instrumental diagnostic methods. Principles of therapy and prevention. Acute glomerulonephritis: etiology, pathogenesis, clinical syndromes. Chronic glomerulonephritis: classification, clinical course. Nephrotic syndrome. Uremia. <i>Computer presentation.</i>
33	9	The gastrointestinal tract radiology	Most important radiological examinations of the gastrointestinal tract, how to use them in reaching diagnosis of most frequently performed diseases. Plain film radiography with supplementary methods of examination, contrast studies ultrasonography, nuclear medicine scintigraphy, CT, endoscopes examinations. The routine contrast examination for gastroduodenal disease, the double-contrast barium meal (DCBM). Gastric ulceration, the diagnosis of gastric carcinoma, submucosal tumours.
34	9	The genitourinary system radiology	Most important radiological examinations of the kidneys, ureter-bladder, urethra, how to use

			them in reaching diagnosis of most frequently performed diseases
	68	Total	

## PROGRAM OF THE LECTURE COURSE

### *MODULE I. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

#### **Lecture 1 Introductory**

Internal illnesses (diseases) [therapy] is the largest section of medicine. Therefore it is studied in all courses, beginning with the third one. Therapy studies not only the greatest quantity of illnesses, but also methods of the approach to the patient and brings up medical thinking. Propaedeutics of internal diseases - is the introduction into area of therapy (Greek "pro" – before, "paideuo" – to teach). "Propaedeutics of internal diseases" or "Introduction to internal medicine" or "Physical examination and history taking". It is divided into I) - diagnostics and II) - a spicial pathology. The section of diagnostics is divided, in turn, into methodology of research and semiotics, or symptomatology.

The outstanding Russian therapist Botkin S.P. wrote: "Medicine as a science gives the certain sum of knowledge but the knowledge itself doesn't give skill to apply it in the practical life". This skill is acquired with the experience (or as Mudrov M. Ya. spoke) "by own exercise at the bed-sides of the patients". The main task of the course of the propaedeutics of internal diseases is to teach the students to use methods of examination, the rules of diagnosis and put the bases of the doctoring "skill".

*MODULE I. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 2**

**Notion of disease. Basic principles of diagnosis methodology.  
Medical ethics. Some issues of history of medicine**

The healthy organism presents the balance of the exchanged processes both in the organism and in the environment. The compensate mechanisms establish the balance on the new level due to the change of the processes, connected with the physiological loading. But if the influence of external factors is too strong or too prolonged, the physiological mechanism is not enough and the damage of organs and tissues takes place and reciprocal reaction of the organism on this damage appears, that is a disease.

S.P.Botkin wrote “The disease is the life in the condition of the disturbed balance of the exchanged processes and the reaction of organism on these changes”.

The clinical diagnosis can be presented, as a top of so-called Lopez Cardozo`s pyramid. The correct estimation results in the correct clinical diagnosis – a top of a pyramid as major factors, which can make the basis of a pyramid (the anamnesis, the general criteria), and the factors making lateral sides, - opportunities for revealing the major data (morphology-cytology, histology; physics - the Electrocardiogram, X-ray, the basic exchange, chemistry - laboratory researchers, biology - bacteriology, immunology, allergology).

The doctor is a person of special profession. Quelly with common ethical norms doctor should seize special ethics - ethics of a doctor. Ethics - latin "ethica"- custom, character. Ethics is a section of philosophy, studying of a category of "kind" and "evil", it studies behavior of a person in the society, the doctrine about morals, morals as one of forms of public consciousness. For all people there are general ethical standards, but there are no special for example ethics of mechanics, but there is ethics for a doctor. Medical ethics is named also as medical deontology.

“The father of medicine” is the ancient greek doctor Hippocrates (V-IV centuries AD, BC – before Christ, 460-377).

The outstanding follower of Hippocratic doctrine was the doctor Klavdy Galen, (II century, 129-201), who was a friend of the ancient Rome emperor Mark Avrelija. Klavdy Galen has become famous for his anatomic and his especial experimental researchers, in particular he has proved, that artery contains blood, instead of pneuma as Erasistrat had considered. He first created idea about the blood moving, according to which the center of blood circulation is liver.

It's worth to mark such foreign scientists, as Auenbrugger (XVIII age), Laehneck (XIX age), Korvisar (XIX age), Roentgen (XIX age), Einthhoven (XX age).

It's Matvey Yakovlevich Mudrov (1776-1831), who is regarded to be the "farther" of Russian therapy. Zybelin's student, he was the leader of Medical faculty of Moscow University, the founder of original Russian clinical medicine.

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 3**

**The patient interview, its portions and meaning for diagnostics.  
Patient complaints, their classification. Symptom analysis  
(detailing). Anamnesis morbi. Anamnesis vitae**

The methods of the patient's examination are divided into the methods of subjective and objective examination. At the same time the volume and reliability of the information, received with the help of objective methods of examination, depends largely on the condition of our sense organs — vision, hearing, etc.

For example, it is known that after holiday a doctor « hears » heart diseases «worse». Apropos of this S.P.Botkin wrote: « If our objective ways of examination represented mathematical accuracy, then, certainly, they would not submit in such degree to the examiner's personality as it happens under the present condition of the applied medicine ».

Now, in the time of rapid development of technics, we witness of the increasing introduction of technical equipment, used not only with respect to therapy , but also diagnosis.

However the importance of the patient interviewing during the

modern period of doctoring is belittled to no small degree, as well as during the period, when medicine had basically empirical character.

The anamnestic method is a characteristic feature of medical diagnosis, it is singular and referable only to the applied medicine, since speech is used here as a tool of diagnosis.

Patient interviewing is also the unique method of studying the patient's personality, the character of nervous processes, definition of the type of the human higher nervous activity, constitutional features, that is of importance for understanding the development of the disease in a concrete patient.

The plan of the anamnesis taking

1. Complaints of the patient — the chief (CC) (main) and secondary (additional) ones.
2. History of the present illness (HPI) (anamnesis morbi).
3. Past medical history (PMH).
4. Allergies (Allergologic anamnesis).
5. The family history (FH) and heredity.
6. Psychosocial history (PSH) (life history of the patient — anamnesis vitae).

*MODULE I. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 4**

**Objective examination of a patient. General inspection**

Methods of objective examination of a patient are divided into physical and laboratory-instrumental methods. Physical methods of examination are subdivided, in turn, into inspection, feeling (palpation), percussion and auscultation. The general examination (check-up) is carried out according to the certain rules: a patient should be examined consistently, a patient should be examined completely.

Plan of general examination of a patient:

- I. General patient's status.
- II. Taking temperature.
- III. Patient's consciousness (quantitative and qualitative changes).
- IV. Patient's position.

- V. Defining of face expression peculiarities.
- VI. Face - “masks”, specific for certain diseases.
- VII. Neck and thyroid gland examination.
- VIII. Growth, weight, body mass index (BMI). The body build.
- IX. Patient's constitution.
- X. Skin. Mucous membranes. Nails, hair.
- XI. Subcutaneous fat. State of nourishment. Oedema examination (exposition).
- XII. Lymphatic nodes.
- XIII. Bones.
- XIV. Muscles.
- XV. Joints.
- XVI. Examination of patient's body parts (if they have some peculiarities).

The general condition of a patient is estimated as satisfactory, medium gravity or grave (heavy).

Fevers are divided by a level of the temperature rising and by character of fluctuations of a body temperature within a day or during more long time period.

Disorders of consciousness arise from cerebral lesion (trauma, insult), metabolic disorders (hypoxia, hypoglycemia, renal or hepatic insufficiency), intoxications, and also mental diseases. Disorders, or disturbances of consciousnesses are classified to: quantitative and qualitative. To clear consciousness (as it is known) there corresponds the adequate, differentiated reaction to complex stimuli, and to coma - full loss of reactivity. Between them there is the continuous spectrum of quantitative disorders (oppression) of consciousness in which torpor, sopor, coma are distinguished.

Position of a patient may be active, passive and forced.

Active position is a possibility to move actively within the limits of hospital ward, although the patient may experience various painful sensations at that time.

Passive position is the condition when the patient can't change given position by himself. Passive position is met in unconsciousness or great weakness.

Forced position is the position which to some extent releases pa-

tient's sufferings (pain, dyspnoea, etc.). Sometimes forced patient's position is so characteristic for one or another disease or syndrome. It helps to make the correct diagnosis even at a distance (Lat. “par distans”).

*MODULE I. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 5**

**General inspection (continuation)**

The expression of the face reflects emotional state (manifestation of the higher nervous activity) of a person, in general, and of a patient, specifically. The features of the face (masks) in illness are other manifestations of an illness (different from changes of the face expression). Changes of the features of the face (masks) can be pathognomonic for certain diseases. An experienced doctor easily notices these changes and in a number of cases can already diagnose glancing at a patient.

Hippocratic face — the face of the patient in the heaviest condition, with expressed dehydration of an organism, more often with severe abdominal cavity disease, for example, with diffuse peritonitis, ulcer perforation. Korvizar face is the face of a patient with the expressed cardiac insufficiency. Facies mitralis («mitral butterfly») appears in heart disease — mitral stenosis (narrowing of the left atrioventricular aperture). Nephritic face (facies nephritica) is met in renal diseases: acute and chronic glomerulonephritis, nephrotic syndrome, renal amyloidosis, chronic renal insufficiency. Myxedematous face is observed in patients with hypothyreosis (myxedema) – thyroid insufficiency.

The neck should be examined all around, using the direct and sidelight. The attention should be focused on its form, outlines, changes in the skin, swelling, venous distention, pulsation of the carotid arteries, and also the position of larynx and trachea.

Normal thyroid gland is not visible during the examination, but is accessible for palpation. There are several methods of the palpation of the thyroid gland: the doctor stands in front or behind the patient.

Anthropometry (Greek “anthropos” – a man, a human; “metreo” – to measure) – an evaluation of the man’s (human’s) body by measuring several parameters, the most important from which are the height, body weight and the circumference of the chest on the level of 4th rib (for registration of chest respiratory excursion).

Today in clinical practice is widespread the calculation of the so-called body mass index (BMI), or Quetelet’s index, which in a particular sense can be considered as the mass (weight)-height index.

BMI is calculated using the following formula:

$$\text{BMI} = \frac{\text{the mass (weight) of the body (kg)}}{[\text{height (m)} \times \text{height (m)}]}$$
 (kg/m<sup>2</sup>).

The body building is determined by growth, structure of the skeleton, a degree of development of muscles, a condition of a nourishment status, weight. The totality of the morphological and functional special features of a man emergent on the basis of the hereditary and acquired properties and determining the reactivity of the organism is called constitution (Latin “constitution” – an organization).

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 6**

**General inspection (continuation)**

During skin investigation attention is paid to its color, humidity, elasticity, state of the hair, presence of exanthema, hemorrhages, vascular changes, scars, etc. A practicing physician more often faces several variants of skin and visible mucous membranes color changes: paleness, hyperemia, cyanosis, jaundice and brownish (bronze) skin color. Paleness may be caused by two main reasons: anemias of any origin with a decrease of erythrocytes number and hemoglobin content per unit of blood volume or peripheral circulation pathology. Red skin color (hyperemia) may be caused by two main reasons: peripheral vessels dilation and hemoglobin and erythrocytes increase per unit of blood volume (erythrocytosis, polycytemia). In these cases hyperemia has a specific purple tint, associating with cyanosis. Cyanosis is bluish color of the skin and seen mucous membranes caused by increase of

reduced hemoglobin amount in the peripheral blood (in a limited body area or diffuse). Jaundice in the majority of cases is caused by skin and mucous membranes impregnation with bilirubin in case of its increased content in blood. In accordance with main reasons of hyperbilirubinemia three kinds of jaundice are distinguished: parenchymal (in hepatic parenchyma lesion); mechanical (in obturation of common bile duct with a concrement or its compression with a tumor); hemolytic (in enhanced hemolysis of erythrocytes).

Skin exanthemata sufficiently differ each other by their morphologic properties, presence and character of inflammatory reaction and other features.

Finger nails are observed for color and deformities. Vascular integrity is assessed by gently compressing the nail and releasing, then noting the rapidity of capillary filling.

During investigation of subcutaneous fat attention is paid to the degree of its development, places of biggest fat deposition and presence of edema.

Edemas are a very important symptom of various visceral organs diseases. The extent of edematic syndrome may vary from slight subcutaneous fat puffiness to anasarca with pronounced edemas and accumulation of liquid in serous cavities (ascites, hydrothorax, etc.).

Investigation of peripheral lymph nodes located in subcutaneous fat has a great meaning for diagnostics of certain visceral organs diseases (blood system diseases, malignant neoplasms, tuberculosis, infectious and inflammatory diseases).

Lymph nodes carry on barrier-filtration and immune functions. Normally peripheral lymph nodes present round or oval formations from 5 to 20 mm in size. They are not elevated above the skin level and that is why not disclosed during examination.

During muscles investigation the degree of skeletal musculature, muscular tonus, as well as painfulness during palpation are estimated.

Shape of bones, presence of deformations, painfulness during palpation and percussion and other symptoms are defined.

During objective investigation of joints their configuration, swelling, painfulness during palpation and motions, range of active and passive motions in the joints and changes of skin and subcutaneous fat

in the region of joints are defined.

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 7**

**General approach to patients with pulmonary diseases**

Patients having respiratory system diseases may present the following problems: chest pain, cough, dyspnea, asphyxiation.

Pains caused by respiratory apparatus lesion depend on pulmonary pleura involvement. If the process is confined to lungs only, no pain can be registered since the lung tissue has no pain receptors. Thus, pain can accompany any lung process provided it spread as far as pleura. Pleural pains are characterized by the following features: they are of shooting character, not of radiating nature, and are usually aggravated or detected only at the maximum of inhale or while coughing and sneezing, that is, when pleural leaves overlap.

It is important to specially note some specific character of pains arising due to diaphragmatic pleurisy. They are peculiar in having ability to spread to jugular region via phrenic nerve. On the other hand, these pains radiate to abdominal cavity and can be mistaken for abdominal diseases.

Pleural pains should be distinguished from other kinds that can arise in the thorax region: caused by thorax diseases: intercostal muscles myosites, intercostal nerves pleurisy and nerve root compression (osteocondrosis), rib injuries (fractures, fissures, etc.); pleural pains, cardiac and vascular pains (angina pectoris, myocardial infarction, aortitis, etc.); reflex pains (cholecystitis, diaphragmatic hernia, ulcer, appendicitis).

The second characteristic complaint is cough which categorizes according to pathogenesis: pulmonary, reflex, central; according to duration: permanent, occasional; according to timbre: barking, hoarse, noiseless, etc.; according to character: dry, productive (nature, smell, amount, period of expectoration).

The third characteristic patient complaint is dyspnea. It categorizes: depending on breathing stages: inspiratory, expiratory, mixed; according

to pathogenesis: pulmonary, cardiac, anemic, etc.

Asthma is an attack-like abrupt dyspnea. It occurs not only with lung diseases (bronchial asthma), but also with a number of other diseased states: bronchial, cardiac, mixed, cerebral, and hysteric types.

On static examination, thorax shape characteristics are described. There exist three normal types of thorax: alar chest, normosthenic (athletic) type, and hypersthenic chest. Its pathologic shapes are paralytic chest, emphysematous (barrel) chest, rickets breast, funnel breast, kyphoscoliotic chest. It is necessary to explain here the notions of scoliosis, lordosis, and kyphosis. On static examination of thorax, there can also be detected distortion in terms of restriction or enlargement of one side. Examples can be given of the restriction of one side of the chest when having pulmonary fibrosis, and enlargement with exudative pleurisy.

Dynamic inspection allows to evaluate the extent of thorax share in the breathing process, lagging of one side, etc. It also allows to characterize breathing process.

Palpation of chest determines: chest elasticity or resistance, tenderness areas, vocal or tactile fremitus (fremitus pectoralis).

*MODULE I. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 8**

**Lungs percussion data in norm and pathology**

Percussion in its modern modification was proposed by Viennese physician Leopold Auenbrugger in 1761. They distinguish the following peculiarities of percussion note: loudness, i.e. amplitude of oscillation, duration, pitch, and tympanic component. Loudness and duration of percussion note is relating to density of underlying tissues. On comparative percussion the percussion note over the lung may change towards either tympanic and flat note.

Lung comparative percussion abnormalities:

Into dull or flat:

Infiltration of the lung  
parenchyma;  
Exudative pleuritis and  
hydrothorax;  
Pleura thickening (adhesions);  
Obturator atelectasis

Into tympanic:

Emphysema;  
Empty pulmonary cavity (lung  
abscess)  
Large bronchiectasis;  
Pneumothorax

Lungs topographic percussion abnormalities (lower lung borders):

Elevation:

Shrinking of the lung  
Thickening of pleura  
Exudative pleuritis and  
hydrothorax  
High diaphragm  
Flatulence (meteorism)

Depression:

Emphysema  
Asthma  
Chronic pulmonary congestion  
Pneumothorax (false depression)

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH  
PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 9**

**Lungs auscultation data in norm and pathology**

Auscultation is objective diagnostic method included listening to sound phenomena arising in organs. This method was proposed by Laennec in 1819.

The sound of breathing originates somewhere between the pharynx and smaller bronchi, although its exact source remains under study. Respiratory sounds are transmitted through the lungs and chest wall. The tissues through which they pass, however, filter out their higher-pitched components. What you hear over most of the lungs are soft, relatively low-pitched sounds that last through inspiration and fade out of your range of hearing relatively early in expiration. Such sounds have been termed vesicular breath sounds. According Laennec, a soft blowing

murmur resembling the sound "f-f" is caused by vibration of extending elastic alveolar walls, heard during the whole inhalation. In the first third of exhalation the vibrations of collapsing alveoli walls are still significant and may be heard, and during the last two thirds of exhalation collapse of the alveoli is silent.

When you listen near the trachea – over the manubrium or between the scapulae on the level of T2-4, for example—your stethoscope is close enough to the source of the breath sounds so that little filtration occurs. Here the breath sounds are louder and higher in pitch. This difference is most noticeable during expiration, and you can hear relatively high-pitched breath sounds throughout expiration. – laryngotracheal breath sounds. Harsh and loud respiratory murmur of laryngotracheal respiration, resembling the sound "H-H" is caused by turbulent air flow and associated vibrations of adjacent dense tissues.

Quantitative changes of vesicular breath sound:

enhancement:

Thin chest wall  
Puerile breathing in children  
Vicarious hyperventilation

diminishing:

Thick chest wall  
Shallow breathing in weak patients  
Narrowing of airways  
Thickening of pleura  
Emphysema  
Presence of small consolidation foci  
Fluid or air in pleural cavity

Qualitative changes of vesicular breath sound: harsh breath sound occurs in bronchitis due to airflow via unevenly narrow and thickened bronchi. It is more rough and raspy; saccadic (interrupted) breath sound occurs in nervous and shivering patients.

They distinguish the following variants of pathological bronchial breath sound: infiltrative (inflammation, tumour, infarction etc.), compressive (in exudative pleuritis above the fluid border), cavitory (in presence of large pulmonary cavities) – amphoric.

Mixed (bronchovesicular) breath sound appears in focal inflammatory pulmonary consolidation (focal pneumonia). Weak

bronchial respiration is transmitted to the lung surface in the projection area of a small focus of consolidated pulmonary tissue. The unchanged alveoli surrounding this focus induce vesicular respiratory murmur.

They distinguish adventitious breath sounds: continuous: wheezes and rhonchi; and discontinuous: fine crackles, coarse crackles and pleural rub.

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 10**

**General approach to patients with cardiovascular diseases**

Cardinal symptoms of cardiac diseases are chest pain or discomfort, symptoms of heart failure: dyspnea, edema, fatigue, cough and hemoptysis, nocturia; palpitation, syncope.

Chest pain is a common presenting symptom of cardiovascular disease and must be characterized carefully. Chest pain may be cardiac (myocardial or pericardial) or noncardiac in etiology.

Dyspnea is a subjective sensation of shortness of breath and often is a symptom of cardiac disease, especially in patients with congestive heart failure.

Edema. This is helpful in elucidating the etiology of edema. Thus a history of edema of the legs that is most pronounced in the evening is characteristic of heart failure.

Fatigue. This is among the most common symptoms in patients with impaired cardiovascular function.

Cough and hemoptysis may be associated with cardiac disease, but it may be difficult to differentiate cardiac from pulmonary disease on the basis of these two symptoms alone. A cough, often orthostatic in nature, may be the primary complaint in some patients with pulmonary congestion.

Nocturia, secondary to resorption of edema at night, is common in patients with congestive heart failure.

Palpitation refers to an awareness of heart beat

Syncope, which may be defined as a loss of consciousness, results most commonly from reduced perfusion of the brain.

During general examination attention should be first of all paid to certain objective signs associated with blood congestion in the lesser or the greater circulation circle. In left ventricular heart failure the above described orthopnea position is characteristic. Chronic right ventricular heart failure manifests itself with a number of objective signs caused by venous blood congestion in the greater circulation circle: cyanosis, cavities hydrops (ascites, hydrothorax, hydropericardium), liver enlargement, scrotum and penis edema, etc.

Swelling of neck veins is an important sign of venous blood congestion in the greater circulation circle and increase of central venous pressure.

The face in patients with right ventricular and total heart failure is puffy, the skin is yellowish-pale with marked cyanosis of the lips, tip of the nose and ears, the mouth is half-opened, eyes are glassy (facies Corvisari).

Before palpation and auscultation, the precordium should be inspected. With good lighting, the point of maximal cardiac impulse may be visible. Cardiac impulses are not normally observed in any other area. The normal apical impulse occurs in early systole and is located within an area of approximately 1 cm<sup>2</sup> in the fourth to fifth left intercostal space near the midclavicular line. Inspection of the precordium should reveal any abnormalities of the bony structures (e.g., pectus excavatum) that may displace the heart to produce unusual findings on physical examination.

The main goals of heart palpation are

1. disclosure of ventricular myocardial hypertrophy;
2. disclosure of ventricular dilatation;
3. disclosure of main vessels dilatations (indirectly);
4. disclosure of aortic and left ventricular aneurysms.

Arterial pulses can be palpated over the carotid, axillary, brachial, radial, femoral, popliteal, dorsalis pedis, and posterior tibial arteries.

Blood pressure may be measured satisfactorily with a sphygmomanometer of either the aneroid or the mercury type.

Examination of the jugular veins and their pulsations allows quite accurate estimation of the central venous pressure, and therefore gives important information about cardiac compensation.

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 11**  
**The heart percussion**

Main goals of heart percussion are:

1. Disclosure of ventricular and auricular dilation;
2. Disclosure of vascular bundle dilation.

Defining of relative cardiac dullness borders At first right, left and upper borders of relative cardiac dullness are defined. It is necessary to obtain beforehand an indirect impression about the level of diaphragm standing which influences the results of percussion defining of relative cardiac dullness size. For this purpose the lower border of the right lung is defined along the midclavicular line which is normally located at the level of rib VI.

The right border of relative cardiac dullness, formed by the right atrium (RA), is found by percussing one rib above the found lower lung border (usually in the IV intercostal space), moving vertically placed pleximeter finger strictly along the intercostal space. Normally it situated at the right sternum edge or 1 cm laterally.

The left border of relative cardiac dullness formed by the left ventricle (LV) is defined after preliminary palpation of the apical impulse, usually in the V intercostal space, moving from anterior axillary line towards the heart. Normally it situated at or just medial to the midclavicular line (1-2 cm).

The upper border of relative cardiac dullness, formed by auricle of left atrium and pulmonary artery trunk is defined by percussing from top to bottom, 1 cm lateral from left sternal line (but not along left parasternal line!). Normally it situated at the III rib level.

Measurement of heart diameter. For measurement of heart diameter the distances from right and left borders of relative cardiac dullness to midsternal line are defined. Normally these distances make respectively 3-4 cm and 8-9 cm, and heart diameter makes 11-13 cm.

Defining of vascular bundle borders. The vascular bundle including aorta, vena cava superior and pulmonary artery is not simple to percuss. Soft percussion is applied, moving vertically placed

pleximeter finger along the II intercostal space on the right and on the left towards the sternum. Normally vascular bundle borders coincide with right and left edges of the sternum, its width doesn't exceed 5-6 cm.

Defining of heart configuration. For defining of heart configuration the borders of right and left contours of relative cardiac dullness are additionally defined by percussing in the right III intercostal space and in the left III and IV intercostal spaces. Having connected all the points corresponding the borders of relative cardiac dullness, one can obtain the idea about heart configuration. Normally an obtuse angle is clearly defined along the left heart contour between the vascular bundle and the left ventricle - the so-called waist of the heart.

Defining of superficial cardiac dullness borders During defining the borders of superficial cardiac dullness that gives flat percussion note softest percussion is applied. Percussion is performed from relative cardiac dullness borders found before towards superficial dullness region. Right, left and upper borders are marked at the edge of pleximeter finger facing more loud sound with loss of resonance (but not flat!). Normally right border is situated at the left sternum edge, left border – at 1-2 cm medially from left border of relative cardiac dullness, and upper border - at the IV rib level.

Changes of heart dullness borders may be caused by extra cardiac reasons. So, while high diaphragm level heart takes a horizontal position that leads to increasing of the transverse heart size. At low diaphragm level heart takes a vertical position, and, accordingly, its transverse size becomes less. Pleural fluid or free pleural air in one of the pleural cavities brings to displacing of the cardiac dullness borders to the healthy side, atelectasis or lung shrinking, fibro thorax – to the sore side. Area of superficial cardiac dullness sharply decreases or disappears at the emphysema and increases at the lung shrinking. Increase of superficial cardiac dullness area also occurs in heart ante displacement by mediastinal tumour, pericardium effusion, right ventricle dilation.

Relative cardiac dullness borders are displaced because of the heart chambers dilation. Relative dullness borders displacement to the right is caused by right atrium and right ventricle dilation. Relative dullness is displaced upwards because of left atrium and pulmonary artery trunk dilation. Relative dullness borders displacement to the left is the result

of left ventricle dilation. It is necessary to remember, that sharply dilated and hypertrophied right ventricle shoving back the left ventricle also can displace relative dullness border to the left. Aortic dilation leads to dullness diameter increase in the 2nd intercostal space.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 12**

**Radiophys. Types of most important radiological examination**

Types of radiations and different groups of imaging methods. Interactions of x-rays and gamma rays with matter. Interactions in magnetic fields, interactions of ultrasound. Radioisotopes and radiopharmaceuticals, quantities and units of radiation dose. History. Activity. The number of decaying radioisotope nuclei per unit time is described as activity- A. Its unit is one decay event/s = one Becquerel, Bq. The older unit is the curie, Ci, =  $3,7 \times 10^{10}$  decay events/s. Thus, a typical in vivo patient dose of Tc- 99m is 370 MBq = 10 mCi. Activity - a measure describing a number of disintegrations in the unit of time.

Exposure implies that ions are generated in air as a consequence of the passage of radiation. Ions can be measured with an ionization chamber, which is an air space between two conducting plates coupled to the positive and negative poles of a voltage source. The exposure = the number of ions with negative (or positive) charges divided by the mass of air in the ionization chamber. The Si-unit is C/kg (C=coulomb). The older unit is R =  $2,08 \times 10^8$  pairs of ions.

Traditional projection images: radiography, fluoroscopy and fluorography, contrast media for x-Rays.

Computed tomography (CT), With CT only thin tissue slices are exposed to X-rays. There is no disturbing superimposition or blurring of structures located outside the selected tissue planes. The result is a contrast resolution far superior to projection X-ray techniques. CT detectors are approximately 100 times more sensitive than radiographic film in detecting differences in radiation intensity, and are therefore equally more sensitive in detecting differences in attenuation. CT scanning allows measurement of tissue attenuation in a simple manner,

and these measurements may have some diagnostic value. For example, fatty infiltration of the liver may be diagnosed by measuring abnormally low attenuation in the liver parenchyma.

Radionuclide imaging, Radioactive tracers are named radiopharmaceuticals. They all contain radionuclides. This radioactive part of the radiopharmaceutical is often coupled with a carrier molecule which determines the distribution in the body. The ideal radiopharmaceutical is distributed only to the organs or structures to be imaged.

The distribution may be determined by e.g. metabolic processes (the carrier molecule may be part of the metabolic process), or by local perfusion or blood flow. Recording of radioactivity may then give important functional information.

The ability to show physiological function, is the major advantage of radionuclide imaging as compared to alternative radiological modalities. A relative disadvantage is the low spatial resolution of the technique.

Diagnostic ultrasound (US). In radiology, ultrasound is used for two major purposes: to make sectional images and to measure blood flow velocities. The ultrasound imaging technique is named ultrasonography (US). The most commonly used ultrasonic flow measurement technique is called Doppler ultrasound, Doppler sonography, or Doppler flow measurement. Ultrasonography (US) is by far the most widespread ultrasound modality in radiology. The use of Doppler ultrasound is steadily increasing, however. The basic principles of ultrasonography are first reviewed.

Magnetic resonance imaging (MRI), and contrast media in diagnostic radiology. Contrast media for roentgen rays The most basic components of a MR unit are: a very strong magnet, a radio transmitter, a radio frequency receiver coil, a computer. The interior of the magnet is often tunnel-shaped and big enough to contain a human adult. Most magnets have a magnetic field orientated parallel to the long axis of the patient.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 13**

**The lungs and mediastinum radiology**

Most important radiological examinations of the lungs and mediastinum, how to use them in reaching diagnosis of most frequently performed diseases. Chest radiographs with supplementary methods of examination. Normal anatomy. Frontal and lateral view in normal chest x-ray.

Bronchography. For this procedure, local anesthesia is given by inhalator, after which a soft catheter is passed into the main bronchus on the side to be examined.

Fluoroscopy control is used The bronchial tree is made visible by administering an iodized contrast medium in aqueous suspension, which lines the walls of the bronchial branches. The main indications are the demonstration of bronchiectasis, bronchial anomalies, and occasionally a fistula communicating with the pleural cavity.

Computed tomography (CT), The advantage of CT is that sectional imaging of high quality in the transverse plane is made possible. The good contrast resolution increases the possibility of demonstrating small round shadows in the lungs, for example in patients with presumed solitary metastases where thoracotomy is being considered. CT has to a large extent replaced conventional tomography, for example in staging lung cancer. By using a special computer program (high resolution CT), a detailed representation of pulmonary infiltrates and diffuse conditions of the parenchyma can be obtained. CT is also valuable for demonstrating localized fluid or air-filled cavities, and for defining diseases of the thoracic wall. CT sections are also of great value for assessing the depth of lesions prior to needle biopsy and for adjustment of external radiotherapy.

Magnetic resonance imaging (MRI). This technique is used in selected cases where conventional chest radiograph combined with CT has not been sufficient to make a diagnosis.

The advantage of MRI is the possibility of making sections in the coronal and sagittal planes in addition to the transverse plane. MRI

provides excellent definition of the mediastinal structures, as the high signal of mediastinal fat on T<sub>1</sub>-weighted images provides good contrast.

Isotope scanning. Radioactive isotope scanning is frequently used for the evaluation of suspected pulmonary embolism. An intravenous injection of radioactive particles is administered for perfusion scintigraphy. The size of these particles is such that they are "trapped" by the pulmonary capillaries. A scan is acquired of the isotope-containing lungs using a gamma camera. The areas of perfused lungs emit radiation. Areas that emit relatively less or no radiation are considered to be underperfused or non-perfused.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 14**

**The lungs and mediastinum radiology**

**Pathological radiological syndromes. Atelectasis. Pleural effusion. Pneumonia. Cirrhosis. Fibrosis. Pulmonectomy and others**

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 15**

**The heart auscultation: normal heart sounds**

During systole the aortic valve is open, allowing ejection of blood from the left ventricle into the aorta. The mitral valve is closed, preventing blood from regurgitating back into the left atrium. In contrast, during diastole the aortic valve is closed, preventing regurgitation of blood from the aorta back into the left ventricle. The mitral valve is open, allowing blood to flow from the left atrium into the relaxed left ventricle.

As the ventricle starts to contract, pressure within it rapidly exceeds left atrial pressure, thus shutting the mitral valve. Closure of the mitral valve produces the first heart sound (S<sub>1</sub>). As the ventricle ejects most of its blood, its pressure begins to fall. When left ventricular pressure drops below the aortic pressure, the aortic valve shuts. Aortic valve closure

causes the second heart sound. Next occurs a period of rapid ventricular filling as blood flows early in diastole from left atrium to left ventricle. In children and young adults this period may be marked by a third heart sound (S<sub>3</sub>). Finally, although not often heard in normal adults, a fourth heart sound (or S<sub>4</sub>) marks atrial contraction. It immediately precedes S<sub>1</sub> of the next beat. While these events are occurring on the left side of the heart, similar changes are occurring on the right, involving the right atrium, right ventricle, tricuspid valve, pulmonic valve, and pulmonary artery. Right ventricular and pulmonary arterial pressures are significantly lower than corresponding levels on the left side. Furthermore, right-sided events usually occur slightly later than those on the left.

They distinguish six so-called auscultation points (areas): aortic area – right 2nd interspace close to the sternum; pulmonic area – left 2nd interspace close to the sternum, these two areas together are sometimes called the “base” of the heart; tricuspid area – at the base of xiphoid process, as well as to the left and right from it; mitral (or apical) area – left 5th interspace just medial to the midclavicular line; Botkin – Erb's point – 3rd left interspace close to the sternum where aortic and pulmonic origin may often be heard; mitral valve projection area – left 4th interspace close to the sternum.

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 16**

**The heart auscultation: heart sounds abnormalities**

In clinical practice the following changes of heart sounds may be met:

1. Volume change of the main sounds (S<sub>1</sub> and S<sub>2</sub>);
2. Splitting (doubling) of the main sounds;
3. Appearing of additional sounds: S<sub>3</sub> and S<sub>4</sub>, mitral valve opening snap (OS), additional systolic sound (click) and the so-called pericardium tone.

Diminished first heart sound. The first heart sound may be diminished by the following reasons:

1. incomplete closure of atrioventricular valves (for example, in mitral or tricuspid incompetence),.

2. sharp slowing down of ventricle contraction and increase of intraventricular pressure due to myocardial contractile capacity decrease in patients with cardiac insufficiency and acute myocardial lesion.

3. Significant slowing down of hypertrophic ventricle contraction, for example, in aortic stenosis;

4. Unusual position of atrioventricular valves cusps just before the beginning of isovolumetric ventricular contraction.

Accentuating of  $S_1$ . There exist two main reasons of accentuating of  $S_1$ :

1. increase of isovolumetric ventricular contraction rate for example, in tachycardia or thyrotoxicosis, when the rate of all the metabolic processes in the organism, including myocardium, is increased;

2. consolidation of cardiac structures taking part in vibrations and formation of the first sound, for example, in mitral stenosis.

Diminished  $S_2$ . The main reasons of the second heart sound diminishing are:

1. non-hermetic closure of aortic and pulmonary artery semilunar valves;

2. decreased rate of semilunar valves closure in:

a. heart failure accompanied by decreased rate of ventricles relaxation;

b. arterial pressure decrease;

3. adhesion and decrease of motility of semilunar valves cusps, for example, in valvular aortic stenosis.

Accentuating  $S_2$  Enhancing (accent) of the second heart sound on aorta may be caused by:

1. arterial pressure increase of various genesis (due to increase of aortic valve cusps shutting rate);

2. consolidation of aortic valve cusps and aortic walls (atherosclerosis, syphilitic aortitis, etc).

Main reason of  $S_1$  splitting is asynchronous closure and vibrations of mitral (M) and tricuspid (T) valves. Such situation may appear, for example, in case of the right bundle branch block

Doubling and splitting of  $S_2$  are, as a rule, associated with increase

of blood ejection time of the right ventricle and/or decrease of blood ejection time of the left ventricle that leads, respectively, to later appearance of pulmonary component and/or earlier appearance of aortic component of  $S_2$ .

Any change of diastolic ventricular myocardial tonus, rate of its relaxation or increase of atrium volume may lead to appearance of pathologic third heart sound, or protodiastolic gallop rhythm.

In healthy people physiologic fourth sound is very soft, low frequent and is found rather rarely, predominantly in children and teenagers. Pathologic accentuation of  $S_4$  in adults is named as pre-systolic gallop rhythm.

Summation gallop is a three-part ventricular rhythm when, in result of sharp shortening of slow filling phase in presence of tachycardia pathologic  $S_3$  and  $S_4$  merge into one additional sound.

Mitral valve opening snap (OS) appears exclusively in case of mitral stenosis at the moment of mitral valve cusps opening.

Systolic gallop is a three-part rhythm appearing in case of additional short sound, or systolic flap, rise in the period of ventricles systole (between  $S_1$  and  $S_2$ ).

*MODULE 1. ANAMNESIS. GENERAL INSPECTION. METHODS OF PATIENTS WITH PULMONARY AND CARDIOVASCULAR DISEASES CLINICAL EXAMINATION*

**Lecture 17**

**The heart auscultation: heart murmurs**

Cardiac murmurs are relatively long lasting sounds appearing during turbulent blood motion. The turbulence appears in case of disturbance of three hemodynamic parameters normal proportion:

1. Diameter of valve ostium or vessel lumen;
2. Blood flow velocity (linear or volume);
3. Blood viscosity.

Murmurs heard above the region of the heart and large vessels are divided into intra- and extracardiac.

Intracardiac murmurs Intracardiac murmurs are divided into:

1. organic, appearing due to rough organic lesion of valves and other cardiac anatomic structures (interventricular or interatrial septum);

2. functional murmurs based not on rough anatomic structures lesions, but on lesion of valvular functions, blood flow acceleration through anatomically unchanged ostiae or blood viscosity decrease.

Organic murmurs All the organic intracardiac murmurs appear in presence of narrowing, dilation or other obstacles, for example, parietal thrombus or atherosclerotic patch on aortic wall in cardiac cavities or initial parts of main vessels.

One should give its detailed characteristic, namely, define:

1. murmur relation to cardiac activity phases (systolic, diastolic, etc.);
2. region of maximal murmur intensity;
3. murmur transmission;
4. timbre, volume of the murmur;
5. shape of murmur.

Examples of most characteristic murmurs in five acquired cardiac defects: mitral incompetence, mitral stenosis, aortic stenosis, aortic incompetence, tricuspid incompetence.

Functional murmurs All the functional murmurs are conditionally divided into three groups:

1. dynamic murmurs, based on significant blood flow velocity increase in absence of any organic cardiac diseases (for example, dynamic murmurs in thyrotoxicosis, cardiac neurosis, febrile conditions).

2. anemic murmurs, caused by decrease of blood viscosity and certain blood flow acceleration in patients with anemias of different genesis;

3. murmurs of relative valvular incompetence or relative narrowing of valvular openings caused by various valvular function lesions, including patients with organic cardiac diseases.

#### *MODULE 4. BASES OF ELECTROCARDIOGRAPHY*

### **Lecture 18**

### **Normal electrocardiogram (ECG) (ECG 1)**

Electrocardiography is a method to study bioelectric potentials generated by the myocardium; a graphic recording of electric potentials

generated by the heart. Electrocardiogram - a record of the electrical changes in the heart muscles. Registration of electrocardiogram is performed with the help of different leads. The line, connecting two points of electrodes application is named a lead axis.

The signals are detected by means of metal electrodes attached to the extremities and chest wall and are then amplified and recorded by the electrocardiograph.

The depolarization stimulus for the normal heartbeat originates in the sinoatrial (SA) node or sinus node, a collection of pacemaker cells. These cells fire spontaneously; that is, they exhibit automaticity. The first phase of cardiac electrical activation is the spread of the depolarization wave through the right and left atria, followed by atrial contraction. Next, the impulse stimulates pacemaker and specialized conduction tissues in the atrioventricular nodal and His-bundle areas. Together, these two regions constitute the AV junction.

The bundle of His bifurcates into two main branches, the right (7) and left (8) bundles, which rapidly transmit depolarization wave fronts to the right and left ventricular myocardium by way of Purkinje fibres.

The main left bundle bifurcates into two primary subdivisions, a left anterior fascicle and a left posterior fascicle.

The depolarization wave fronts then spread through the ventricular wall, from the endocardium to the epicardium, triggering ventricular contraction.

Genesis of the normal ECG:

P wave – the normal atrial depolarization vector is oriented downward and toward the subject's left, reflecting the spread of depolarization from the sinus node to the right and then the left atrial myocardium.

PQ-interval: passage of the impulse through the atrio-ventricular node (slow) and

A-V (His) bundle (rapid) Normal ventricular depolarization proceeds as a rapid, continuous spread of activation wavefronts. This complex process can be divided into two major, sequential phases, and each phase can be represented by a mean vector. The first phase is depolarization of the interventricular septum from the left to the right.

The second phase results from the simultaneous depolarization of the main mass of the right and left ventricles; it is normally dominated

by the more massive left ventricle, so that vector 2 points leftward and posteriorly.

S wave deflects when excitation of remote portion of RV wall occurs, fractionally later than main ventricular excitation

Spread of electrical recovery wave through ventricular walls is slower than excitation. Normally, the mean T-wave vector is oriented roughly concordant with the mean QRS vector In usual ECG examination the recording is carried out in 12 leads:

- 6 from the extremities (limbs): 3 standard leads (I, II, III) and 3 augmented leads (aVR, aVL, aVF);
- 6 chest (precordial) leads

#### *MODULE 4. BASES OF ELECTROCARDIOGRAPHY*

### **Lecture 19**

## **Changes of heart axis position. ECG in heart chambers hypertrophy (ECG 2)**

The projection of cardiac electrical forces on to the chest wall may be described as a VECTOR - a force with both MAGNITUDE and DIRECTION.

Though the instantaneous vector changes throughout the cardiac cycle, one can calculate the NET or AVERAGE VECTOR of the P-wave, the QRS and the T-wave. This average vector is termed the ELECTRICAL AXIS.

Clinically, most information is derived from the QRS axis in the frontal plane (that is the plane running head-to-toe down the surface of the chest), which describes the pattern of left ventricular depolarization.

Electrical axis is a summary vector (i.e. mean, average direction of the cardiac electrical forces within the time of depolarization.

Electrical axis direction is judged by the  $\alpha$ -angle. It is an angle, formed by the summary vector of the cardiac electrical forces with an axis of the I standard lead, expressed in degrees.

To detect the electrical axis they use:

- vector method,
- approximate estimation of Electrical axis for clinical purposes (hexaxial system, or six-axial system – a combination of axes of standard and augmented limb leads),

- special tables for electrical axis estimation.

Positions of Electrical Axis:

- 1) normal electrical axis position:  $\alpha$  angle =  $+30^\circ \dots +69^\circ$ ;
- 2) horizontal electrical axis position:  $\alpha$  angle =  $0^\circ \dots +29^\circ$ ;
- 3) vertical electrical axis position:  $\alpha$  angle =  $+70^\circ \dots +90^\circ$ ;
- 4) left electrical axis deviation:  $\alpha$  angle =  $-1^\circ \dots -90^\circ$ ;
- 5) right electrical axis deviation:  $\alpha$  angle =  $+91^\circ \dots +180^\circ$ .

The basic general definition of hypertrophy defines hypertrophy as increase in size of an organ or tissue without increase in number of its component units. Hypertrophy of the heart may result in several-fold increase of size and functional activity without change in number of the muscle fibers. Correspondingly to the increase of muscle fibers, electric cardiac force increases.

Common signs of cardiac hypertrophy

1. Amplitude increase of corresponding ECG-waves of hypertrophied part of the heart
2. Change of the waves' form
3. Increase of the time of the internal deflection
4. Electrical axis deviation
5. Change of the repolarization processes in ventricular hypertrophy (negative T-wave)

“Direct” (i.e. main) signs of cardiac hypertrophy are registered in the corresponding leads:

In right atrial and ventricular hypertrophy there is a predominance of the amplitude of the corresponding waves in the so-called “right” leads – III, aVF,  $V_1 - V_2$

In left atrial and ventricular hypertrophy there is a predominance of the amplitude of the corresponding waves in the so-called “left” leads – I, aVL,  $V_5 - V_6$ .

#### *MODULE 4. BASES OF ELECTROCARDIOGRAPHY*

### **Lecture 20**

### **ECG in automatism and conduction disorders (ECG 3)**

Heart rhythm disturbances include sinus rhythm disturbances, sinoatrial block, atrioventricular block, pre-excitation syndrome, supra-

ventricular arrhythmias (premature contractions, tachycardia, atrial fibrillation, atrial flutter), and ventricular arrhythmias (premature beats, tachycardia, ventricular fibrillation & flutter).

Rhythm disturbances include sinus tachycardia, sinus bradycardia, sinus arrhythmia, inferior atrial rhythm, supraventricular pacemaker migration, replacing rhythms, and springing out rhythms.

Intraatrial conductivity disorder: P-wave duration  $\geq 0,12$  sec, two-humped (bifid) P-wave.

Blockade degrees: I degree: impulse conduction is delayed; II degree: not all the impulses are conducted; III degree: not impulses are conducted.

Sinoatrial block - failure of the sinus node to function for one or more beats: I degree: impulse conduction is delayed (is not detectable on the ECG); II degree: not all the impulses are conducted; III degree: not impulses are conducted (is not detectable on the ECG).

First degree heart (AV) block (impulse conduction is delayed) - PQ (PR) interval  $> 0.20$  (0,21) seconds.

Second degree AV block (not all the impulses are conducted):

- AV block Mobitz type I (with Samoilov-Wenckebach periodics), or Wenckebach type: the Samoilov-Wenckebach phenomenon – progressive lengthening of PQ(PR) interval with shortening of the RR interval for several cycles until the P wave is blocked completely

- AV block Mobitz type II: PQ(PR) interval of the conducted beat before a blocked P wave is usually normal. The block may be intermitted or may occur in a fixed 2:1 or 3:1, etc. ratio.

Complete Heart Block (third degree AV block: not impulses are conducted):

- P-waves are present and occur at a rate faster than the ventricular rate;

- QRS-complexes are present and occur at a regular rate, usually  $< 60$  beats per minute (usually  $\square 40$  beats per minute);

- P-waves bear no relationship to the QRS complexes;

- ventricles are depolarized by a ventricular escape rhythm.

Bundle branch block denotes a conduction defect in either of the bundle-branches or in either fascicle of the left bundle-branch (anterior & posterior). The consequence of left or right bundle branch block is

that activation of the ventricle must await initiation by the opposite ventricle. After this, activation proceeds entirely on a cell-to-cell basis (muscle-to-muscle conduction).

Common signs of bundle branch block. The absence of involvement of the conduction system, which initiates early activity of many sites, results in a much slower activation process along normal pathways. The consequence is manifest in bizarre shaped QRS-complexes of abnormally long duration.

- M-shaped QRS-complex),
- QRS-complex duration  $> 0,12$  sec,
- ST-segment depression, T-wave inversion,
- reciprocal pattern of a widened, notched S-wave resembling the letter W.

Fascicular blocks (partial blocks, hemiblocks) Fascicular Blocks in the left bundle system: blockages of transmission in the anterior or posterior branches (fascicles) of the left bundle branch. The main effect of a fascicular block is to markedly change the QRS axis without changing the shape or duration of the QRS wave form.

Arrhythmias are divided on supraventricular arrhythmias: premature atrial & junctional contractions (beats), paroxysmal tachycardia, atrial fibrillation & flutter; and ventricular arrhythmias: premature contractions (beats), paroxysmal tachycardia, ventricular flutter & fibrillation.

Premature (ectopic) beats arise in some focus other than sinus node and interrupt the regular sequence of normal sinus rhythm.

Paroxysmal tachycardia is a sudden acceleration of the heart to a rate 150-250 bpm, paroxysm may last from a few minutes to several days. Rapid rhythm usually arises from some over-irritable area of heart muscle other than the natural pacemaker in the right atrium. They distinguish atrial, atrioventricular, and ventricular tachycardia.

Atrial flutter – akin to paroxysmal tachycardia with partial heart-block. The abnormal rhythm of the atrium is so rapid that even with an intact conducting mechanism the ventricle cannot keep pace; consequently only every second or third impulse is effective.

Atrial fibrillation is a state of continuous and uncoordinated activity of the heart muscle: instead of beating, it quivers, and ceases to act as a

pump. The effective impulses reaching the ventricles are haphazard, and the response is irregular both in time and intensity.

Ventricular flutter is a broad, rather high monophasic curves (sinusoid curve); frequency of ventricular separate fibres contraction – 150-300 bpm.

Ventricular fibrillation appears as bizarre, irregular, random waveform with no clearly identifiable QRS complexes or P waves and wandering baseline with rate 150-500 bpm.

#### *MODULE 4. BASES OF ELECTROCARDIOGRAPHY*

### **Lecture 21**

## **ECG changes in Coronary Heart Disease (ECG 5)**

Myocardial ischemia is a reduction of blood flow to a region of a heart; Ischemic heart disease (IHD) is a result of failure by the coronary arteries to meet the demand.

IHD develops in a few clinical and corresponding ECG forms: angina pectoris – response of the muscle forced to work with insufficient oxygen; myocardial infarction – loss of a segment of muscle lacking enough oxygen to keep it alive.

Hallmark of ischemia is coronary T-wave, injury is reflected by ST-segment elevation, necrosis – by pathologic Q wave appearance. In myocardial infarction ischemia, injury and necrosis exist simultaneously

They distinguish Q-wave and non-Q-wave myocardial infarction. In non-Q-wave myocardial infarction ECG-sign of acute stage is negative, symmetrical, “coronary” T-wave. In Q-wave myocardial infarction ECG signs are pathological Q-wave (QR или QS), ST-segment elevation, (-) T-wave. In subacute stage necrosis zone is surrounded with ischemic zone, that seen on the ECG as pathological Q-wave (QR или QS), (-) symmetrical T-wave. In the scarry stage on the ECG: pathological Q-wave (QR, QS), ST-segment – on the isoline, T-wave positive, lowered, flattered or negative.

*MODULE 2. METHODS OF PATIENTS WITH GASTROINTESTINAL AND URINARY  
SYSTEM DISEASES CLINICAL EXAMINATION*

**Lecture 22**

**General approach to patients with gastrointestinal diseases**

Evaluation of symptoms: patients complain on pain, pyrosis (heartburn), vomiting, constipation, diarrhea. Pain location depends on the type of pathologic process (esophagus, subcardial part of stomach, stomach body, pylorus, duodenum, small intestine, colon, rectum). They distinguish 4 types of pain depending on leading mechanism of pain: spastic, distension, peritoneal, and vascular.

Pyrosis - sensation of burning behind the sternum and in epigastric region, appearing as a result of gastric contents reflux to esophagus and irritation of mucous membrane of esophagus with acid gastric contents.

Reasons of pyrosis: insufficiency of cardiac sphincter (gastric or duodenic ulcer, diafragmatic hernia); hypermotility of the stomach (ulcer, excessive meal); increase of gastric juice acidity (duodenic, gastric ulcer).

Vomiting is a sophisticated reflex act which results in ejection of gastric contents on the outside. Direct reason of vomiting is irritation of vomiting center (8), which is located in the bottom of ventriculus IV.

Vomiting may be caused by enhanced afferent impulsation, coming along sensitive fibers of n. vagus from different reflexogenic areas: stomach, gallbladder, hepatic and bile ducts, pancreas, appendix, ureter, as well as throat, peritoneum, coronary vessels, uterus, etc.; pathologic processes in the brain: ischemic or hemorrhagic stroke, brain edema, increased intracranial pressure, for example, in hypertensive crisis, brain injuries, etc.; toxic influences directly on vomiting center (in uremia, hepatic insufficiency, diabetic coma, pregnancy, etc.).

Constipation is long-lasting delay of feces in the intestines caused by retardation of peristalsis, mechanical obstacles in the intestines and alimentary factor.

They distinguish 3 types of constipation: 1). spastic constipation appear as a result of smooth intestinal musculature spasm; 2). atonic constipation are associated with decrease of intestine musculature tonus; 3). organic constipation is caused by mechanical obstacle to feces

moving along the intestine (intestinal tumors, scars, commissurae, megacolon, dolichosigmoid, etc.).

Diarrhea is liquid stool, in the majority of cases combined with frequent defecations. Diarrhea appears due to:

1. enhancing of intestine peristalsis and acceleration of its contents movement;
2. disturbance of liquid absorption in the intestine;
3. increase of pathologic production of liquid in the intestine in its inflammation.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 23**

**The heart and vessels radiology**

Most important radiological examinations of the heart and mediastinum, how to use them in making diagnosis of the most frequently performed diseases. Chest radiographs with supplementary methods of examination, The cardiac radiographic study consists of one frontal and two oblique projections. The lateral view is often taken with contrast medium in the esophagus to facilitate assessment of the position of the posterior outline (left atrium) In the frontal view, the heart appears as a white shadow, where it is only possible to assess changes in shape and size. Cardiac shape and size depends of constitution. Studying of a skeleton of a chest revealing of anomalies of a skeleton, «uzuration» (fuzziness) of ribs means aortic coarctation. Studying of the lung markings, there are pronounced when the vessels are distended in the case of failure of the left side of the heart with pulmonary congestion. Revealing of secondary emphysema.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 24**

**The heart and vessels radiology**

Ultrasound scanning of the heart can either be performed as: M-

mode, Two-dimensional (2-D) echocardiography, Doppler echocardiography In two-dimensional echocardiography, the sonic waves travel in one plane through the heart, and the echoes received by the transducer are shown on a monitor in real time. This provides a tomographic image of the plane under examination. Most of the heart can be visualized in this way. The major limiting factors for attaining an acoustic window for recording are interposition of bony structures of the chest wall or lung.

Using Doppler echocardiography the direction and velocity of blood flow can be determined. The Doppler technique is very well suited for detecting pathological changes in the flow of blood, which may occur with atrial septal defect, ventricular septal defect, and pathological changes in the heart valves (pulmonary, mitral and aortic orifices).

Computed tomography is not used routinely in the radiological evaluation of the heart, but CT programs have been constructed that can follow a contrast bolus through the heart from the right side through the pulmonary circulation to the left side.

Magnetic resonance imaging (MRI) is used for the diagnosis of a few specific types of cardiac disease

MRI can be considered for the evaluation of the following clinical situations: thoracic aortic disease, including dissections and aneurysms Some forms of pericardial disease, especially for the definitive diagnosis of constrictive pericarditis; loculated pericardial effusions and pericardial hematoma. Intracardiac and paracardiac masses. Complications of acute myocardial infarction such as true and false ventricular aneurysms and mural thrombus.

Isotope scanning of the heart is a noninvasive examination which provides not only pure visual information, but also details of physiological conditions. This examination can provide information on function of the left ventricle; myocardial perfusion; presence of myocardial infarcts and presence and volume of intracardiac shunts. Several radioactive isotopes are used in cardiac scintigraphic diagnosis. The most frequently used are technetium  $^{99m}\text{Tc}$  and thallium  $^{201}\text{Tl}$

Angiocardiology Practically all interventional procedures are based on Seldinger's historic invention of the percutaneous technique for inserting catheters into blood vessels in 1953. Using this principle per-

cutaneous access to many organ systems was developed in the mid 1950s to the 1960s. Stenosis and occlusion of the coronary arteries results in reduced pressure peripheral to the lesion, and reduced myocardial blood flow with poor oxygenation of the jeopardized region of the myocardium. As a consequence of this, angina pectoris develops. Treatment may be either surgical, by aorto-coronary bypass (usually autologous veins from the ascending aorta to the affected coronary artery peripheral to the stenosis or occlusion), or by dilatation of the arterial stenosis or occlusion.

Radiological symptoms and syndromes of heart and vessels lesions. Change of position (pleural effusion, atelectasis). Change of the form - mitral, aortic and trapezoid. Change of size – the enlarged heart congenital and acquired valvular diseases (mitral valve disease, aortic valvular disease, pericardial diseases).

*MODULE 2. METHODS OF PATIENTS WITH GASTROINTESTINAL AND URINARY SYSTEM DISEASES CLINICAL EXAMINATION*

**Lecture 25**

**General approach to patients with renal diseases**

Nephron – is the main structural and functional unit of the kidney. It consists of renal (Malpighian) corpuscle (glomerulus and capsule Shumlynsky Bowman), and tubule which is divided into proximal convoluted tubule of the 1st order, Henle's loop, distal convoluted tubule of the 2nd order. In its turn Henle's loop consists of thick descendent segment, thin (descendent, ascendent) segment, and thick ascendent segment.

When collecting anamnesis of renal patients it is important to pay attention to the following: among infections, which a patient is getting over, angina and scarlet fever are of most significance while other streptococci infections are of less significance as well as syphilis, tuberculosis, malaria. Attention should be paid to the past rhino-pharyngeal infections. Mercuric and lead intoxications are of most importance. It is necessary to find out a patient's outside living conditions including meteorological (dampness, supercooling, clothing condition).

Main complaints: pain, edema, syndrome of disturbed urine

secretion, hypertension, and uric syndrome.

Initial symptoms may include the following: unintentional weight loss, nausea, vomiting, general ill feeling, fatigue, headache.

Later symptoms may include the following: increased or decreased urine output, need to urinate at night, easy bleeding (may have blood in the vomit or in stools), confusion, delirium, coma, muscle twitching or cramps, uremic frost - deposits of white crystals in and on the skin, decreased sensation in the hands, feet, or other areas.

Additional symptoms that may be associated with this disease: excessive nighttime urination, abnormally dark or light skin, paleness, nails abnormalities, breath odor, loss of appetite.

Edemas develop due to decrease of oncotic plasma pressure, increase of capillaries permeability, activation of renin-angiotension-aldosterone system, decrease of glomerular filtration. They constitute base of nephrotic syndrome characterized by pronounced and diffuse edemas, pronounced proteinuria (over 3,0 g/l), hypoproteinemia (total protein less than 60 g/l), and hyperlipoproteinemia.

Syndrome of disturbed urine includes:

Polyuria - stable increase of urine output (more than 2000 ml/day). The reason of polyuria is slowdown of kidney concentration function. For example, compensatory polyuria in case of chronic nephritis. Sometimes polyuria is the only sign of chronic renal insufficiency. It should be noted that polyuria sometimes can accompany nonrenal diseases, diabetes, chronic adrenal insufficiency etc.

Oliguria – stable decrease of urea output (less than 500 ml/day)

Anuria – sudden reduction of diuresis (down to 200 ml/day) or complete cessation of urine excretion

Hematuria – blood in the urine (dark, rust-colored, or brown urine) or elimination of blood with urine. Hematuria can be caused by change in blood content (hemorrhagic diathesis), infectious and toxic lesion, embolism and infarct of kidneys, tumor, nephritis, tuberculosis, renal calculus (nephrolithiasis)

One can distinguish between macrohematuria and microhematuria. In case of microhematuria urine contains blood which can be found by microscopy only. In case of macrohematuria urine contains blood which

can be seen by the eye (blood does not make urine brightly red, but greyish-brown or dimly pink in color).

*MODULE 5. SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM  
DISEASES*

**Lecture 26**

**Community-acquired pneumonia: crupous pneumonia,  
bronchopneumonia (focal pneumonia). Lung abscess. Pleuritis.  
Pulmonary carcinoma**

Pneumonia is an acute disease, an infection of the lungs which may occur in a person of different age, usually have special pathological genesis, special symptoms. Focal pneumonia is inflammation of lung tissue bordered by lobule or few lobules (lobular pneumonia).

Most pneumonias are caused by bacterial infections, and the most common cause in the United States is the bacteria *Streptococcus pneumoniae*.

Other bacteria, such as *Mycoplasma* and *Legionella*, as well as certain viruses, also can cause pneumonia. However, because these less common infections do not always cause all of the classic pneumonia symptoms, they often are called atypical pneumonias. Atypical pneumonias most commonly occur in people under age of 40.

Predisposing factors: hypostasis, emboli, pulmonary infarctions, foreign bodies aspiration, chest traumas, inhalation of war gases. Pathogenesis is related to infection, pathological immune reaction of the body to the antigen influence with formation of circulating immunocomplexes, its interconnection with distal parts of lungs in form of inflammation.

Pneumonia is characterized by cough and fast, difficult breathing. Fever and muscle aches may occur. Physical changes are various, sometimes very scanty. They depend on two reasons: size of focus, and depth of focus location. On physical examination: dull percussion note, localized fine-medium moist consonant bubbling rales (coarse crackles), harsh or bronchovesicular breath sound. Laboratory findings include leukocytosis, neutrophilic left shift of leukogram, ESR acceleration, infiltrates in the lung tissue on X-ray films.

Lung abscess is purulent melting of lung tissue with one or few cavities formation, surrounded by inflammatory infiltration of pulmonary tissue. Hemolytic Staphylococcus is the most frequent pathogen (it is detected in 75% as monoculture and in 25% in combination with other microbes).

According to their pathogenesis lung abscesses are divided on bronchogenic and hematogenous.

In the course of lung abscess 2 periods are distinguished in the abscess formation – before the burst and after abscess burst into bronchus. Symptoms of the 1<sup>st</sup> period –chills, hectic fever, dyspnea, dry cough; of the 2<sup>nd</sup> period – productive cough with expectorated purulent malodorous sputum. Physical findings are also different, the most important is amphoric breath sound with consonant large moist bubbling rales over dull-tympanic zone on the chest. X-ray is very informative in the 2<sup>nd</sup> period – cavity with air - fluid horizontal level.

Pleuritis (pleurisy) – inflammation of pleura, covering lungs and intrathoracic cavity from inner side. Pleuritis are divided on dry and effusive. Pleuritis accompanies the main disorder, such as tuberculosis, rheumatic fever, lung tumours, systemic connective tissue diseases, chest traumas, pneumonias etc. Thoracocentesis in exudative pleurisy has diagnostic meaning. X-ray shows presence of effusion – intensive homogenous shadow with oblique upper boundary and mediastinal organs shift to the contralateral (healthy) side.

Signs of effusive pleurisy include remittent fever, forced position on the sick side, chest asymmetry, decrease of tactile fremitus on affected hemithorax, flat percussion note above effusion area, diminished vesicular breath sounds down to their absence, on X-ray: intensive opacity with oblique upper boundary.

Lung carcinoma is the leading cause of cancer-related death worldwide. About 85% of cases are related to cigarette smoking. Symptoms can include cough, chest discomfort or pain, weight loss, and, less commonly, hemoptysis; however, many patients present with metastatic disease without any clinical symptoms. The diagnosis is typically made by chest x-ray or CT scan and confirmed by biopsy. Depending on the stage of the disease, treatment includes surgery, chemotherapy, radiation therapy, or a combination. Despite advances in

treatment, the prognosis remains poor, with only 15% of patients surviving > 5 yr from time of diagnosis. For patients with stage IV (metastatic) disease, the 5-yr overall survival rate is < 1%. Improving survival requires focusing attention on smoking cessation, early detection, and research into the genetic profile of lung tumors and developing novel forms of therapy.

*MODULE 5. SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM  
DISEASES*

**Lecture 27**

**COPD. Symptomatology of acute and chronic bronchitis. Asthma.  
Emphysema. Bronchiectasis**

Chronic obstructive pulmonary disease (COPD) is comprised primarily of three related conditions, 1) chronic bronchitis, 2) chronic asthma, and 3) emphysema. In each condition there is chronic obstruction of the air flow through the airways and out of the lungs, and the obstruction generally is permanent and may progress over time.

While asthma features obstruction to the flow of air out of the lungs, usually, the obstruction is reversible. Between "attacks" of asthma the flow of air through the airways typically is normal. These patients do not have COPD. However, if asthma is left untreated, the chronic inflammation associated with this disease can cause the airway obstruction to become fixed. That is, between attacks, the asthmatic patient may then have abnormal air flow. This process is referred to as lung remodeling. These asthma patients with a fixed component of airway obstruction are also considered to have COPD.

Breathing involves inspiration followed by exhalation. During inspiration, muscles of the diaphragm and the rib cage contract and expand the size of the chest (as well as the airways and alveoli) causing negative pressure within the airways and alveoli. As a result, air is sucked through the airways and into the alveoli and the chest wall is enlarged. During exhalation, the same muscles relax and the chest wall springs back to its resting positions, shrinking the chest and creating positive pressure within the airways and alveoli. As a result, air is expelled from the lungs.

The walls of the bronchioles are weak and have a tendency to collapse, especially while exhaling. Normally, the bronchioles are kept open by the elasticity of the lung. Elasticity of the lung is supplied by elastic fibers which surround the airways and line the walls of the alveoli. When lung tissue is destroyed, as it is in patients with COPD who have emphysema, there is loss of elasticity and the bronchioles can collapse and obstruct the flow of air. Normal lung tissues look a lot like a normal sponge. Emphysema often looks like an old sponge with large irregular holes and loss of the spring and elasticity.

Bronchitis is inflammation of bronchi. Acute and chronic bronchitis are distinguished. Acute bronchitis may be caused by different factors:

- 1) physical (dry, cold or hot air);
- 2) chemical (war gases; gases or air, containing chemical substances - sulfurous gas, nitric oxide etc.);
- 3) infectious (viruses and bacteria). Infectious factors, particularly viruses (influenza virus, adenovirus, parainfluenza virus), and also viruses and bacteria, causing specific infectious disease (measles, pertussis, rubella, diphtheria etc.) have significant meaning in etiology of acute bronchitis. It is reputed that influenza virus causes bronchitis in 100% of patients because it produces mucinase – mucus splitting enzyme. Bronchotropic action of virus is connected with epithelium alteration and bronchial trophism damage due to nervous conductors and ganglia damage.

It is necessary to emphasize role of smoking as etiologic factor of bronchitis. Tobacco smoke contains a big amount of harmful for bronchial mucous substances such as pyrimidine alkali, ammonia, nicotine etc.

Chronic bronchitis is diffuse progressive lesion of bronchi owing to long-term harmful irritation. Illness is characterized by structural changes of mucous secretory apparatus, sclerotic changes in deep layers of bronchial wall, it is accompanied by mucus hypersecretion and bronchial drainage function alterations. There is established connection between chronic bronchitis and tobacco smoking. Infection significance as the beginning of disease is controversial. Chronic bronchitis is more often observed in men, more often in 40–60 y, frequently in industrial countries. Signs include hyperresonant percussion note, diaphragmatic

excursions are restricted, harsh breath sounds, wheezes, rhonchi and inconsonant moist bubbling rales, leukocytosis, ESR acceleration; on X-ray - increase of lung pattern.

Asthma, like chronic bronchitis, is a disease of the airways. Obstruction to the flow of air is due to inflammation of the airways as well as spasm of muscles surrounding the airways in asthma. The narrowing that results from spasm of the muscles is called bronchospasm. Generally, bronchospasm in asthma is reversible and subsides spontaneously or with the use of bronchodilators (medications that relax the muscles surrounding the airways). We now know that a major component of asthma is inflammation of the airways, and this inflammation causes thickening of the walls of the airways. This inflammation involves different inflammatory cells and mediators than those seen in chronic bronchitis. This may play a role in the choice of antiinflammatory medications for these similar yet different entities. In many asthmatics, antiinflammatory medications such as inhaled steroids are required to reduce this inflammation. In long standing asthma, this chronic inflammation can lead to scarring and fixed airway obstruction.

Bronchiectasis is another abnormality that can be found in patients with COPD. In bronchiectasis, serious and repeated infections of the lung as well as abnormal development of the lung results in permanent damage to the airways. The damaged airways become enlarged tubes or, in more severe cases, large sacs. These segments of lung can impair clearance of secretions. The damaged, mucus-filled airways often become infected, resulting in further inflammation and damage to the airways. Patients with bronchiectasis often have a vigorous cough producing large amounts of infected mucus.

In patients affected predominantly by emphysema, shortness of breath may be the major symptom. Dyspnea usually is most noticeable during increased physical activity, but as emphysema progresses, dyspnea occurs at rest.

**Respiratory Insufficiency:** A condition where the lungs are unable to function properly and maintain the normal processes of oxygen uptake and carbon dioxide removal.

Symptoms include fatigue, shortness of breath, heavy and rapid breathing, exercise intolerance. They distinguish restrictive (in

pneumonia, pneumothorax, hydrphtorax etc.) and obstructive (COPD) types of RI.

Spirometry is a common office test used to diagnose asthma, chronic obstructive pulmonary disease (COPD) and certain other conditions that affect breathing. Spirometry may also be used periodically to check how well lungs are working once patient is being treated for a chronic lung condition. Spirometry measures how much air patient can inhale and exhale. Spirometry also measures how fast he (she) can exhale. Spirometry values below average indicate their lungs aren't working as well as they should.

*MODULE 5. SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM*

*DISEASES*

**Lecture 28**

**Rheumatic fever: endocarditis, myocarditis, pericarditis**

Hippocrates had given its first description. Baillou (1538–1616) first distinguished acute arthritis from gout. Sydenham (1624–1668) described chorea but did not associate it with acute rheumatic fever (ARF). In 1944, the Jones criteria were formulated to assist disease identification. These criteria, with some modification, remain in use today.

Rheumatic fever is systemic allergic infectious inflammatory disease of connective tissue with predominant location of pathologic process in cardiovascular system, joints and serous membranes, that is a sequel to infection with Group A beta- hemolytic streptococci. RF, as a rule, occurs in presence of streptococcal chronic inflammatory focus, frequently tonsillitis; exacerbation of focal infection precedes RF; carriage of Streptococci in nasopharynx in acute RF is 90 - 100 per cent, in contrast with healthy — only 0 - 20%.

They distinguish 4 path anatomy stages of mucoid degeneration, fibrinoid necrosis, granulomatous inflammation, and sclerosis.

RF is classified on active and inactive, according to the heart damage – on to primary carditis, recurrent carditis without valve damage, and recurrent carditis with valve damage. Damage of other organs include polyarthritis, chorea, erythema marginatum, rheumatic nodules,

according to course – acute, subacute, lingering, recurrent, and latent.

The most frequent form of RF is carditis, and the most frequent form of carditis is myocarditis. The most frequent symptom of it is dyspnea as element of heart failure. Precordial pains are seldom met, but heaviness and discomfort sensations in the precordial area are common. These sensations increase on walking, resembling anginous pain. On examination: sometimes acrocyanosis, cardiac dullness enlargement (not always); soft blowing systolic murmur at the apex, diminished heart sounds, sometimes gallop rhythm, tachycardia or bradycardia are detected. ECG helps to reveal conduction disturbances: interatrial block, 1st degree atrio-ventricular block.

Hyaline degeneration of the affected valve leads to the formation of verrucas at its edge, preventing total approximation of the leaflets. Most frequently mitral valve is affected, more rarely - aortic valve, and tricuspid – extremely rare. Diagnostics of rheumatic endocarditis during the 1st attack is difficult, as all signs may be referred to myocarditis. Increase of systolic murmur allows to suspect endocarditis. PhonoCG shows that murmur becomes high-pitched.

Rheumatic pericarditis takes 2<sup>nd</sup> place on prevalence after myocarditis. It may be dry and effusive. In the course of dry pericarditis diagnostics it is necessary to pay attention on the constricting heart pains, sometimes intermitent pericardial rub on the level of 3d -4th ribs close to the sternum may be listened in dry pericarditis. X-ray shows formation of pleuro-pericardial adhesions. ECG shows ST elevation, concave upwards, with upright T waves in most leads. Classically it is more obvious in lead II than in I or III. There are no pathological Q waves, and the widespread distribution of ST–T changes without reciprocal depression, distinguishes acute pericarditis from early myocardial infarction.

Diffuse effusive pericarditis is presented by leaning forward patient sitting forced position, forced knee-elbow [Bozeman's] position, swelling neck veins, sharply diminished heart sounds (pericardial fluid may muffle heart sounds), typical triangular heart dullness shape, enlargement of cardiac dullness in all directions, paradoxical pulse. Large quantities of pericardial fluid produce an ECG of generally low voltage, with generalized T wave flattening or inversion. Echocardio-

graphy, which is safe, quick, and noninvasive, has a high degree of sensitivity and specificity for recognizing pericardial fluid.

RF affects especially young people and leads to acquired valvular heart disease development.

*MODULE 5. SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM  
DISEASES*

**Lecture 29**

**Symptomatology of acquired valvular heart disease (mitral, aortic, tricuspid valvular heart disease)**

The most common forms of heart valve disease affect the mitral and aortic valves, causing left heart failure and pulmonary congestion. The valves may fail to open fully (stenosis) or to close (regurgitation or incompetence). Both stenosis and regurgitation can coexist.

Mitral Stenosis is a heart valve disorder characterized by narrowing or obstruction of the mitral valve, which prevents the valve from opening properly. Also known as Mitral valve obstruction, it affects about 2 out of 10,000 people. Symptoms usually develop between the ages of 20 and 50. Mitral Stenosis most commonly occurs in people who have had rheumatic fever but can be caused by any disorder that causes narrowing of the mitral valve. Congenital mitral stenosis alone is rare. It more commonly occurs with complex groups of cardiac abnormalities. Narrowing of the mitral valve obstructs blood flow from the left atrium to the left ventricle. This can reduce the amount of blood that flows forward to the body. The atrium enlarges as pressure builds up in it, and blood may backflow into the lungs resulting in fluid in the lung tissue. Symptoms may begin with an episode of atrial fibrillation, or may be triggered by pregnancy or other stress on the body such as respiratory infection, stroke, endocarditis and other cardiac disorders. There are often no symptoms, or symptoms may appear or worsen with exercise or increase in heart rate. Symptoms include: difficulty breathing after exercise or when lying flat, also awakening at night with difficulty breathing, cough (may have blood in the sputum), fatigue, tired easily frequent respiratory infections such as bronchitis, chest discomfort, tight, crushing, pressure, squeezing, constricting pain radiates to the

arm, neck, jaw, or other areas, increases with activity, decreases with rest, sensation of feeling the heart beat, swelling of feet or ankles.

A stethoscope examination reveals a distinctive murmur, snap, or other abnormal sounds. This means a rumbling sound is heard over the point of the heart during the resting phase of the heartbeat, and it gets more pronounced just before the heart contraction begins. Examination may also reveal irregular heartbeat or lung congestion. Blood pressure is usually normal. There may be vibration or a tapping on palpation over the heart making it difficult to distinguish from a heart tumor.

Narrowing or obstruction of the valve, or enlargement of the atrium may show on an echocardiogram, Doppler ultrasound, chest X-ray, ECG or coronary angiography.

**Mitral incompetence.** The backflow of blood between the two left heart chambers because a problem with the mitral valve prevents it from closing properly. Blood flows back from the left ventricle into the left atrium of the heart. Mitral regurgitation can be caused by conditions such as rheumatic fever, myocarditis and congenital valve abnormalities. There may be asymptomatic course, or breathlessness as manifestation of the left heart failure, palpitation as manifestation of atrial fibrillation. On physical examination left ventricular heave, enlargement of the left and upper cardiac dullness borders with the mitral heart configuration, diminished S1 and systolic murmur at the apex are detected. ECG, X-ray exam, echocardiography confirm diagnosis.

**Aortic incompetence** is valvular disease in which the semilunar cusps close incompletely the aortic orifice and during diastole blood regurgitates from aorta into left ventricle. Sharp fluctuation of blood pressure within aorta during systole and diastole is characteristic of aortic incompetence. Angina-like pains in the precordium are typical. They are caused by coronary insufficiency due to severe myocardial hypertrophy and worsening of coronary arteries blood supply upon low diastolic pressure within aorta. Dizziness is observed owing to worsened cerebral blood supply. On physical examination peripheral arteries pulsation, left ventricular heave, left borders outward displacement, diminished heart sounds and diastolic murmur in the aortic area are detected. ECG, X-ray exam, echocardiography confirm diagnosis.

Stenosis of aortic ostium (aortic stenosis, *stenosis ostii aortae*)

creates difficulty for blood ejection into aorta on the left ventricle contraction. The classic triad of symptoms is syncope, angina, and dyspnea on exertion. If syncope occurs on exertion, it is considered to be due to fixed cardiac output [CO] (inability to increase CO on exertion) and represents severe AS. On physical examination systolic thrill at the aortic area, diminished heart sounds and systolic murmur over all precordium transmitted to the carotids are disclosed. ECG, X-ray exam, echocardiography confirm diagnosis.

**Tricuspid incompetence** The backflow of blood between the two right heart chambers because a problem with the tricuspid valve prevents it from closing properly. Blood flows back from the right ventricle into the right atrium of the heart. Symptoms include edemas, dull aching pain in the right hypochondrium, stomach enlargement, fatigue, general weakness. Signs of the right heart failure: swelling of the neck veins, enlarged liver, epigastric pulsation, positive vein pulse, ascites, peripheral edema, fatigue; diminished heart sounds and pansystolic murmur at the base of xyphoid process are detected on physical examination. ECG, X-ray exam, echocardiography confirm diagnosis.

## *MODULE 5. SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM*

### *DISEASES*

### **Lecture 30**

### **Arterial hypertension**

Arterial Hypertension, or High Blood Pressure, Blood Pressure, High Systemic hypertension, Essential hypertension, Hypertensive disease, «the silent killer» is chronically proceeding disease which basic display is the syndrome of the arterial hypertension, which is not connected with presence of pathological processes at which increase of BP is caused by the known reasons.

Hypertension is the condition of having high blood pressure. It is very common and affects around 50 million Americans of which about 30% are not yet diagnosed. Hypertension is an under-diagnosed condition because it causes damage to the body with no symptoms or only mild symptoms. It has been called a "silent killer" for this reason.

Prevalance of Hypertension: 50 million Americans, 217 per 1000.  
 Prevalance Rate of Hypertension: 1 in 5 or 18.38% in USA. Undiagnosed prevalence of Hypertension: more than 15 million. World wide prevalence: estimated 600 million people affected worldwide.

Risk Factors of Hypertension include obesity (overweight), men and menopause women, diabetes mellitus, cholesterol  $>5,2$  mmol/l, age, race, family hystory of high blood pressure, high-normal blood pressure, high-salt diet, high-saturated fat diet, lack of exersise (poor physical fitness), smoking, alcohol, stress.

Types of Hypertension (Classification of Blood Pressure Levels):

1. Primary Hypertension
2. Secondary Hypertension
3. Hypertension subtypes based on ranges:

Optimal Blood Pressure

Normal Blood Pressure

High-Normal Blood Pressure

Hypertension Grade 1

Hypertension Grade 2

Hypertension Grade 3

4. Isolated systolic hypertension (ISH)

5. Malignant hypertension

Classification of AH by WHO (1962)

I stage – BP  $>160/95$  mmHg, no organic changes

II stage – BP  $>160/95$  mmHg in combination with changes of target organs

II stage – AH combined with target organs damage

The diagnostic procedures comprise:

- repeated blood pressure measurements
- medical history
- physical examination

- laboratory and instrumental investigations, some of which should be considered part of the routine approach in all subjects with high blood pressure, some, which are recommended and may be used extensively.

Twenty-four-hour ambulatory blood pressure monitoring (N. Holter, 1957) is used now to confirm AH.

High blood pressure can cause symptoms such as headaches, dizziness, fatigue and ringing in the ears. However, it often causes no symptoms.

Signs suggesting secondary hypertension and organ damage:

- skin stigmata of neurofibromatosis (pheochromocytoma),
- palpation of enlarged kidneys (polycystic kidney),
- auscultation of abdominal murmurs (renovascular hypertension),
- auscultation of precordial or chest murmurs (aortic coarctation or aortic disease),
- diminished and delayed femoral and reduced femoral blood pressure (aortic coarctation, aortic disease).

Signs of organ damage:

- brain: murmurs over neck arteries, motor or sensory defects,
- retina: fundoscopic abnormalities,
- heart: location and characteristics of apical impulse, abnormal cardiac rhythms, ventricular gallop, pulmonary rales, dependent oedema,
- peripheral arteries: absence, reduction, or asymmetry of pulses, cool extremities, ischaemic skin.

Laboratory and instrumental investigations:

- plasma glucose (preferably fasting),
- serum total cholesterol,
- serum high-density lipoprotein (HDL)-cholesterol,
- fasting serum triglycerides,
- serum uric acid,
- serum creatinine,
- serum potassium,
- haemoglobin and haematocrit,
- electrocardiogram.

Recommended tests:

- echocardiogram,
- carotid (and femoral) ultrasound,
- C-reactive protein,
- microalbuminuria (essential test in diabetics),
- funduscopy (in severe hypertension),
- complicated hypertension: tests of cerebral, cardiac and renal function,

- search for secondary hypertension: measurement of renin, aldosterone, corticosteroids, catecholamines; arteriography; renal and adrenal ultrasound; computer-assisted tomography (CAT); brain magnetic resonance imaging.

*MODULE 5. SEMIOTICS OF RESPIRATORY AND CARDIOVASCULAR SYSTEM DISEASES*

**Lecture 31**

**Atherosclerosis. Ischemic heart disease**

Atherosclerosis is a form of arteriosclerosis characterized by patchy subintimal thickening (atheromas) of medium and large arteries, which can reduce or obstruct blood flow. Atherosclerotic plaque consists of accumulated intracellular and extracellular lipids, smooth muscle cells, connective tissue, and glycosaminoglycans. Circulating low-density lipoprotein (LDL) migrate through the endothelial barrier of the arterial wall and penetrate into the intima. Some plaques, covered by a thin fibrous cap, may undergo spontaneous fissure or rupture. These plaques are unstable or vulnerable and are more closely associated to the onset of an acute ischemic event.

Ischemic heart disease (IHD; also known as coronary heart disease (CHD) is usually caused by structural disorder of the coronary arteries (coronary artery disease – CAD).

Ischemic heart disease produces six clinical syndromes:

- angina pectoris – stable or unstable, and variant;
- myocardial infarction (MI);
- postMI cardiosclerosis or old MI;
- heart failure;
- arrhythmias;
- sudden cardiac death.

Ischemic heart disease has uncontrollable (advanced age, male sex, genetic predisposition) and modifiable [smoking (risk is almost double), hypertension (risk is double if systolic blood pressure is >180 mm Hg), hyperlipidemia, glucose intolerance or diabetes mellitus, obesity (weight >30% over ideal), hypothyroidism, left ventricular hypertrophy (LVH), sedentary life-style, oral contraceptive use, cocaine use, low serum

folates level) risk factors.

Angina pectoris is characterized by discomfort that occurs when myocardial oxygen demand exceeds the supply. Myocardial ischemia can be asymptomatic (silent ischemia), particularly in diabetics.

Pain is located behind the sternum. The usual distribution is referral to all or part of the sternal region, the left side of the chest, and the neck and down the ulnar side of the left forearm and hand.

The most important diagnostic factor is the history.

The physical examination is of little diagnostic help and may be totally normal in many patients.

An ECG taken during the acute episode may show transient T-wave inversion or ST-segment depression or elevation (may be either convex and concave), but some patients may have a normal tracing.

Ambulatory (Holter) electrocardiographic monitoring can detect silent ischemia (ischemic ECG changes without accompanying symptoms), which occur in >50% of patients with unstable angina.

Coronary angiography is performed to define the location and extent of coronary disease; this is indicated in selected patients who are candidates for CABG (coronary artery bypass grafting) surgery or angioplasty.

Myocardial infarction (MI) is characterized by necrosis resulting from an insufficient supply of oxygenated blood to an area of the heart.

One distinguishes:

- non-Q wave MI: Area of ischemic necrosis is limited to the inner one third to half of myocardial wall;

- Q wave MI: Area of ischemic necrosis penetrates the entire thickness of the ventricular wall. MI may be caused by

- Coronary atherosclerosis
- Coronary artery spasm
- Coronary embolism (caused by infective endocarditis, rheumatic heart disease, intracavitary thrombus)
- Periarteritis and other coronary artery inflammatory diseases
- Dissection into coronary arteries (aneurysmal or iatrogenic)
- Congenital abnormalities of coronary circulation
- MI with normal coronaries (MINC syndrome): more frequent in younger patients and cocaine addicts.

### Clinical presentation of MI:

- Crushing substernal or retrosternal chest pain usually lasts longer than 30 min.
- Pain is unrelieved by rest or sublingual nitroglycerin or is rapidly recurring.
- Pain radiates to the left or right arm, neck, jaw, back, shoulders, or abdomen and is not pleuritic in character.
- Pain may be associated with dyspnea, diaphoresis, nausea, or vomiting.
- There is no pain in approximately 20% of infarctions (usually in diabetic or elderly patients).

### Physical findings:

Skin may be diaphoretic, with pallor (because of decreased oxygen).

- Rales may be present at the bases of lungs (indicative of CHF).
- Cardiac auscultation may reveal an apical systolic murmur caused by mitral regurgitation secondary to papillary muscle dysfunction; S3 or S4 may also be present.
- Physical examination may be completely normal.
- Serum cardiac enzyme studies: damaged necrotic heart muscle releases cardiac isoenzymes (CK, LDH) into the blood stream in amounts that correlate with the size of the infarct. Electrophoretic fractionation of the enzymes can pinpoint certain isoenzymes (CK-MB and LDH-1) that are more sensitive indicators of MI than total CK or LDH.
- Cardiac troponin levels: cardiac-specific troponin T (cTnT) and cardiac-specific troponin I (cTnI) are new markers for acute MI.

On the ECG in Q wave infarction, there is development of:

- a. Inverted T waves, indicating an area of ischemia
- b. Elevated ST segment, indicating an area of injury
- c. Q waves, indicating an area of infarction (usually develop over 12 to 36 hr).

ECG in non-Q wave MI: Q waves are absent, but:

- a. History and myocardial enzyme elevations are compatible with MI.
- b. ECG shows ST segment elevation, depression, or no change followed by T wave inversion.

Echocardiography can evaluate wall motion abnormalities and identify mural thrombus or mitral regurgitation, which can occur acutely after MI.

*MODULE 6. SEMIOTICS OF GASTROINTESTINAL AND URINARY SYSTEM*

*DISEASES*

**Lecture 32**

**Symptomatology of gastritis, peptic ulcer disease. Renal diseases**

Gastric disorders are classified as functional and organic. Functional disorders are linked to derangements of gastric functions (motor, secretory) in absence of morphological changes in organ itself. Functional disorders usually precede organic (gastritis, peptic ulcer disease, etc.), which are accompanied by both functional and morphological changes.

Gastritis is inflammation of the gastric mucosa caused by any of several conditions, including infection (*Helicobacter pylori*), drugs (NSAIDs, alcohol), stress, duodenal reflux, and autoimmune phenomena (atrophic gastritis).

Sidney classification (so-called Sidney System) was proposed in 1990 on International Congress of gastroenterologists. This system has 2 sections: histological (includes description and classification of histological signs of gastric mucous biopsy) and endoscopical (includes description and classification of disclosed signs on gastroscopy). Histological section consists of 3 parts: etiological, topographic, and morphological.

Chronic *H. pylori*-associated gastritis or gastritis B is characteristic of young people, manifests with ulcer-like symptoms: periodic pain, frequently on an empty stomach; heartburn, nausea, sometimes sore belching, constipations with normal weight, clean tongue, local tenderness in the Choffar zone, rough relief of antral mucous, spasm of pylorus, segmented peristalsis, improper evacuation of barium meal on X-ray examination; on the background of patchy hyperemia and mucous edema of antrum submucous hemorrhages and erosions (flat, prominent) are seen, rugal hyperplasia, exudation, antral spasm, stasis on the endoscopy.

Chronic autoimmune gastritis or gastritis A. This form of gastritis is characterized by atrophy of gastric mucous and secretory insufficiency. It is met in 1% of population. Situation of inflammation in the gastric body with unchanged antral part is authentic sign of autoimmune gastritis. It leads to sharp decrease of acid, pepsinogen, and intrinsic factor production, sequela of which is deterioration of vitamin B<sub>12</sub> absorption and vitamin B<sub>12</sub>-deficient anemia development.

Peptic ulcer disease (PUD) is an ulceration in the stomach or duodenum resulting from an imbalance between mucosal protecting factors and various mucosal damaging mechanisms. In industrially developed countries 6-10% of adults suffer from this disease, duodenal ulcer / gastric ulcer ratio is 4:1; 4-fold frequently in men.

Etiology is often multifactorial, including mucosal damaging and predisposing factors.

An imbalance between mucosal protecting factors and various mucosal damaging mechanisms leads to development of peptic ulcer.

Duodenal reflux is reflux of bile into stomach, which exerts aggressive influence on gastric mucosa. Mixture of bile with pancreatic secretion leads to formation of lysolecithine, the latter damages gastric mucous. Under the influence of duodenal content defensive mucosal barrier is destroyed, back diffusion of H<sup>+</sup> increases, ulcer forms.

Classification includes

#### I. Location

1. gastric ulcer: cardial and subcardial parts of stomach; mediogastral; antral; pyloric or prepyloric, or greater or lesser curvature
2. duodenal ulcer: bulbar; postbulbar.

II. Phase of disease: exacerbation, recurrence, remission.

III. Course of disease: recent, latent; mild, moderate, severe.

IV. Ulcer size: small (to 0.5 cm in diameter); large (>1 cm in diameter); giant (>2–3 cm in diameter).

Pain and dyspeptic syndrome are major manifestations of disease.

On physical examination patients are usually asthenics or normo-s-thenics with tendency to bradycardia and hypotension. Tongue is usually clean. On abdominal examination moderate and sometimes pronounced localized tenderness in epigastrium is disclosed. Tenderness to percussion with finger (Mendel's sign) in epigastrium is typical of peptic

ulcer.

Endoscopy is golden standard in peptic ulcer disease diagnostics.

Kidney disease is classified as any disease or disorder that affects the function of the kidneys. This may include: acute kidney failure, acute nephritic syndrome, chronic kidney failure, chronic nephritis, glomerulonephritis, interstitial nephritis, kidney infection (pyelonephritis), kidney stones (nephrolithiasis) etc.

Acute glomerulonephritis (glomerulonephritis acuta) is an acute immune and inflammatory disease of kidneys that affects glomerules and to a lesser extent tubules of the kidney and interstitial tissue.

Epidemiology: suffer primarily persons of young age, children older than 2 and teenagers, frequently of male sex.

As a rule, acute glomerulo-nephritis develops in 7-21 day after endured infection. Among the infections, the most frequently encountered are tonsillitis, pyodermitis, scarlet fever, pneumonia, otitis etc. Main mechanism is related with pathological immune reaction of the body to the antigen influence with formation of circulating immunocomplexes, its interconnection with basement membrane of glomerules, accompanied by menbrane injury in form of inflammation.

Classification includes:

- acute glomerulonephritis with rapid course that finishes by recovery as a rule;
- acute glomerulonephritis with chronic nephritis syndrom that is frequently accompanied by formation of chronic kidney insufficiency;
- acute glomerulonephrities with latent course.

Clinical manifestations include haematuria, edemas, arterial hypertension. In renal hypertension examination shows tense pulse, increasing of both systolic and diastolic arterial pressure, when arterial hypertension is going on for a long period of time, hypertrophy of left ventricle of the heart starts to develop; change of relative cardiac dullness borders, shift and intensity of apex beat, rounded outline of apex cordis, electrocardiogram – signs of left ventricle hypertrophy, echocardiographic signs of hypertrophy. Heart auscultation shows aorta second sound accent (the second sound accent on aorta).

Chronic glomerulonephritis is a chronic immune and inflammation affection of kidneys. It is developed by 10-20% of patients as a result

of chronic glomerulonephritis suffered. By 80-90% of patients the disease develops imperceptibly- hidden, latent course. More frequently men than women are ill. The beginning of the disease occurs at the age of 40 as a rule.

Chronic glomerulonephritis is classified as follows:

Clinical classification:

1. Latent
2. Hematuria
3. Nephrotic
4. Hypertensive
5. Mixed (nephritic+hypertensive)

Morphological classification:

- Mesangium
- Membranous
- Minimal change of glomeruli
- Fibroplastic

Symptoms - hematuria (dark, rust-colored, or brown urine), foamy urine, chronic renal failure symptoms that gradually develop; decreased urine output.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 33**

**The gastrointestinal tract radiology**

Most important radiological examinations of the gastrointestinal tract, how to use them in reaching diagnosis of most frequently performed diseases. Plain film radiography with supplementary methods of examination, contrast studies. Contrast studies: double-contrast erect views to show mucosal detail; single-contrast distended views to best show strictures, rings and hiatus hernias; to assess motility; occasionally mucosal relief views for varices and oesophagitis, evidence of gastro-oesophageal reflux.

Endoscopy. Endoscopy and radiology are complementary investigations but a contrast swallow is the investigation of first choice since it allows dynamic study of neuromuscular function, as well as the detection of structural abnormalities in the pharyngo-oesophageal segment such as webs, that may be missed endoscopically, and diverticula that may present a hazard to endoscopy. Radiology is often able to define the

length of an endoscopically impassable stenosing lesion and to provide information about extrinsic compressions. Endoscopy will usually be required for biopsy of radiologically demonstrated pathological

CT is useful in gastroduodenal disease for staging of neoplasms and assessment of extramural disease. The patient should be fasted so that solid food in the lumen does not cause confusion with pathological filling defects. Distension of the gut with oral contrast medium is essential. Dilute (3%) Gastrografin or dilute barium sulphate suspension is used. As well as positive contrast, a gas-forming agent can be given to distend the stomach and duodenum. A hypotonic agent may also be administered if gas is used. This distension allows recognition of wall thickening and intraluminal filling defects

Ultrasonography. Wall thickening due to gastric carcinoma and inflammatory disease in the antrum can often be seen. Real-time US can also be used to study antropyloric emptying and motility non-invasively. Endoscopic ultrasound (EUS) is accurate in the T and N staging of gastric adenocarcinoma. It may also be used to detect and stage gastric lymphoma, and image submucosal tumours such as smooth muscle lesions and distinguish them from extrinsic impressions seen at endoscopy or barium studies.

Gastric ulceration, the diagnosis of gastric carcinoma, submucosal tumours.

*MODULE 9. FUNDAMENTALS OF DIAGNOSTIC RADIOLOGY IN INTERNAL DISEASES*

**Lecture 34**

**The genitourinary system radiology**

Most important radiological examinations of the kidneys, ureter-bladder, urethra, how to use them in reaching diagnosis of most frequently performed diseases. A plain film of the kidneys and bladder is useful for the diagnosis of calculi, soft-tissue calcifications and gas. It is an integral part of all conventional X-ray examinations of the urinary tract; It should always be performed prior to contrast medium injection.

Intravenous urography (IVU or IVP) Contrast medium (e.g. 1 ml per kg body weight of a 300 mg I/ml solution independent of the kidney

function) is injected into a vein. Within the first 60 seconds up to three exposures over the kidney are done in order to visualize the renal parenchyma during the nephrographic phase of the contrast passage. Another film over the kidney region is taken 5 min. post contrast. Urography includes standard exposures, but should principally be individualized.

Direct pyelography means direct injection of contrast medium (75-100 mg I/ml) into the upper urinary tract. may be performed either through a catheter placed in the ureter during cystoscopy (retrograde) or through a needle or a nephrostomy tube (antegrade). At this examination the visualization of the calyces, pelvis and ureter is independent of the kidney function in contrast to intravenous urography.

Angiography of the genitourinary system does not differ from the same examination of other organ systems. A catheter is introduced into the venous or arterial system using Seldinger technique. The tip of the catheter is placed during fluoroscopic guidance in a vessel leading to or coming from the region of interest.

Ultrasonography has gained a central position in genito-urinary imaging. It has a diagnostic potential in almost every part of the genitourinary tract and is furthermore easy, cheap and non-invasive. The major disadvantage is that it is very operator dependent. Traditional ultrasonography gives information about morphology (e.g. solid vs. cystic), but not about function. Perfusional data require Doppler or color Doppler. By flow characteristics and frequency shifts color Doppler can detect arterial stenosis and demonstrate the vascular nature of various lesions. Ultrasonography is superb for guidance in relation to interventional procedures like nephrostomy, biopsy, and drainage.

Nuclear medical examinations give functional information about the genitourinary system, especially about the kidneys and the adrenals. It provides information about renal function/perfusion and particularly about renal outflow obstruction (diuresis renography), renal artery stenosis (captopril renography), split functions, scar detection, and renal transplant monitoring.

CT is excellent in detecting and differentiating renal masses and in staging renal malignancies. It is very sensitive in identifying calcifications, even non opaque stones. It surpasses the efficiency of ultra-

sonography in identifying perinephric, periureteral and pelvic processes secondarily affecting the urinary tract. CT is the method of choice for evaluating renal injuries thought to be clinically severe (or if the initial urogram is abnormal). It is the best modality to demonstrate the normal adrenal glands in detail and it has become the mainstay in diagnosing and differentiating adrenal pathology

#### FORMS OF THE CONTROL OF “INTRODUCTION TO INTERNAL DISEASES, RADIOLOGY” DISCIPLINE MASTERING

Check-up of discipline mastering is performed in accordance with requirements of Federal State Educational Standard of the Higher Professional Education on the ground of the KSMU Regulation “On the current monitoring and intermediate academic progress evaluation in students” (2003).

##### Forms of self-dependent work control

Forms of self-dependent work control are determined by the teacher in dependence on particular theme of class and include the following:

- oral quiz;
- analysis of report;
- check-up of the summary in the notebook;
- check-up of abstracting (review) of the journal article;
- evaluation of manual skills demonstrated by a student;
- analysis of synopsis written by a student;
- check-up of schemes, tables, computer presentation made by a student;
- check-up of a situational task solution;
- check-up of a case report fragment written by a student.

##### Forms of current discipline monitoring

A current monitoring of discipline adoption is performed by a teacher during every practical class by test (usually multiple choice questions – MCQ), oral quiz, check-up of of a case report fragment writing and evaluation of manual skills demonstrated by a student.

## Forms of module control

## IV term

Module 1. Anamnesis. General inspection. Methods of patients with pulmonary and cardiovascular diseases clinical examination.

## V term

Module 2. Methods of patients with gastrointestinal and urinary diseases clinical examination.

Module 3. Clinical laboratory diagnostics.

Module 4. Bases of electrocardiography.

## VI term

Module 5. Semiotics of respiratory and cardiovascular system diseases.

Module 6. Semiotics of gastrointestinal and urinary system diseases

Module 7. Final exam case report.

Module 8. The final exam check-up of practical skills in all methods of physical examination.

Module 9. The bases of diagnostic radiology in internal diseases.

The description of educational tasks to every module is given in statement of corresponding practical class (see Volume 2 of "Introduction to Internal Diseases, Radiology" Methods Handbook).

## Forms of intermediate control (examination)

## EXAM QUESTIONS

1. Notion about the comprehensive patient interview and its parts.
2. Order and strategy of collecting interviewing data.
3. What are chief (main) and additional (secondary) patient's complaints?.
4. List 7 parameters of symptom observed in CC.
5. What parts compose the "History of present illness"?
6. What should clinician inquiry in the "Past medical history"?
7. The importance of the "Allergy" set.

8. What questions are necessary to realize in the "Family history (FH)"?
9. What should clinician inquiry in the " Psychosocial history"?
10. Rules, conditions and sequence of patient general inspection.
11. Condition of consciousness and grades of its disturbances.
12. Patient's behavior, his position in bed, bearing, gait.
13. Physique, types of constitution, anthropometric data.
14. Fever, its types; techniques of taking temperature and putting it in chart.
15. Data revealed by the general examination of head; particularities of face, neck (thyroid gland).
16. Data revealed by the general examination and palpation of skin.
17. Data revealed by the general examination of hypodermic adipose cellular tissue, determination of edemas.
18. Data of lymph nodes examination.
19. Data of muscles, bones, joints examination.
20. What are the complaints of patients with respiratory tract diseases and their pathogeneses?
21. Data of general inspection in patients with respiratory tract diseases.
22. Dyspnea: pathogeneses, types.
23. Differentiation of pulmonary and cardiac dyspnea.
24. Shape of the chest, its kinds.
25. What chest abnormalities are observed in patients with pleural and pulmonary diseases?
26. Respiratory patterns and their abnormalities.
27. Respiratory rate, reasons of its changes.
28. Abnormalities of respiratory rhythm.
29. What uses has chest palpation?
30. The vocal (tactile) fremitus changes in abnormalities of bronchi, pleura and lungs.
31. Percussion notes (sounds) over human body.
32. Rules of percussion.
33. Techniques of percussion.
34. Peculiarities of lungs percussion note.
35. Techniques of comparative percussion.

36. Techniques of topographic percussion.
37. Techniques of defining of diaphragmatic excursion.
38. Traube's semi lunar space: its location and diagnostic meaning.
39. Rules and techniques of lungs auscultation.
40. Breath sounds: generation, normal location.
41. Techniques of defining of bronchophony
42. When do vesicular breath sounds increase?
43. When do harsh breath sounds occur and what are their peculiarities?
44. What are terms of vesicular breath sounds decrease and absence?.
45. Terms of pathologic bronchial breath sounds generation, its kinds.
46. Rhonchi, terms of its origin.
47. Rhonchi, classification.
48. Crepitation (fine crackles), terms of its origin, diseases in which it is observed.
49. Pleural rub, its peculiarities and the most frequent location.
50. Distinction between rhonchi and pleural rub, rhonchi and crepitation.
51. Bronchophony modifications.
52. Conditions of pathologic percussion notes origin.
53. Diagnostic meanings of lungs borders and diaphragmatic excursion changing.
54. Complaints of patients with cardiovascular diseases, their pathogeneses.
55. Characteristic cardiovascular signs defining during general inspection.
56. Data defining in precordial inspection.
57. Apical impulse, its characteristics/
58. Apical impulse peculiarities in different cardiovascular diseases.
59. Cardiac impulse.
60. Pulsations in main vessels areas.
61. Epigastric pulsation, its origin.
62. Arterial pulse, its characteristics.
63. Defining of pulse deficiency.
64. Arterial blood pressure, technique of measuring, normal range, pathologic changes.

65. Jugular venous pressure, technique of measuring,, diagnostic meaning.
66. The heart location in the thorax, its chambers projection on the anterior chest wall.
67. Heart percussion peculiarities.
68. Relative cardiac dullness, its borders in healthy human beings.
69. Technique of relative cardiac dullness borders defining.
70. Superficial cardiac dullness, its borders in healthy human beings.
71. Technique of superficial cardiac dullness borders defining.
72. Technique of vascular bundle borders defining.
73. General rules of heart auscultation.
74. Heart sounds, their amount in healthy adults.
75. S1 characteristics and origin.
76. S2 characteristics and origin.
77. S1 and S2 differentiation.
78. List the auscultation points.
79. Heart valves projection on the anterior chest wall.
80. Compulsory points of heart auscultation.
81. Reasons and pathogeneses of the cardiac dullness borders changes to the left, to the right, upward, to all directions.
82. The cardiac dullness borders in pericardium effusion.
83. Reasons of cardiac dullness area decreasing (even to absence).
84. Reasons of simultaneous diminishing and accentuating of both heart sounds.
85. Reasons and mechanism of 1st and 2nd heart sounds accentuating.
86. Gallop rhythm and mechanism of its appearance.
87. Reasons of heart sounds splitting and doubling.
88. “Mitral melody” and mechanism of its appearance.
89. Cardiac murmurs, mechanism of their appearance.
90. How to differentiate systolic and diastolic murmurs?
91. How to establish the murmur appearance location?
92. Murmurs transmission, their affiliation with thereto or another valve.
93. Electrocardiography. The main founders of the method. Physiological basis of the electrocardiogram. Genesis of the normal ECG.

94. The characteristic features of the ECG-leads (standard limb leads, augmented limb leads, unipolar chest leads). Einthovens triangle from the point of the genesis of the standard leads.
95. The ECG-wave morphology. The main elements of the ECG in the norm. Duration and amplitude of the waves, characteristic features of PQ- and QT- intervals, measurement of heart rate.
96. The notion “electrical axis” and “ $\alpha$ -angle”. Definition, electrical axis positions, methods of electrical axis determination.
97. Approach to ECG analysis: consequence of the main steps, ECG-protocol filling in.
98. General ECG-signs of cardiac (atrial and ventricular) hypertrophy.
99. ECG-signs of the atrial hypertrophy (left atrial hypertrophy, right atrial hypertrophy).
100. ECG-signs of the left ventricular hypertrophy.
101. ECG-signs of the right ventricular hypertrophy.
102. General ECG-signs of the bundle branch block. ECG-signs of the right bundle branch block.
103. ECG-signs of the left bundle branch block and fascicular blocks in the left bundle system.
104. ECG-signs of the normal sinus rhythm. Sinus rhythm disturbances (sinus tachycardia, sinus bradycardia, sick sinus syndrome).
105. ECG-signs of the sinoatrial block (3 degrees of SA-block).
106. ECG-signs of the atrioventricular heart block (3 degrees of AV-block).
107. Pre-excitation syndromes (WPW- and LGL-syndromes). Mechanism of genesis, ECG-signs, clinical significance.
108. ECG-signs of supraventricular premature (ectopic) beats.
109. ECG-signs of ventricular premature (ectopic) beats.
110. ECG-signs of paroxysmal supraventricular tachycardia.
111. ECG-signs of paroxysmal ventricular tachycardia.
112. ECG-signs of atrial fibrillation and atrial flutter.
113. ECG-signs of ventricular fibrillation and ventricular flutter.
114. ECG-signs of ischemia, myocardial injury and necrosis. Q-wave and non-Q-wave myocardial infarction.
115. ECG-signs of the anterior myocardial infarction.
116. ECG-signs of the inferior myocardial infarction.

117. ECG-signs of the lateral myocardial infarction.
118. What are the complaints of patients with gastrointestinal diseases and their pathogeneses?
119. Inspection of the oral cavity (gums, teeth, tongue, mucous).
120. Outward appearance in some gastrointestinal diseases.
121. Anterior abdominal wall topography, distinguished areas, abdominal viscera projection areas.
122. Findings of abdominal inspection.
123. Uses and technique of superficial palpation of the abdomen.
124. What do the terms: methodic, sliding, deep palpation mean?.
125. Technique of sigmoid colon palpation.
126. Technique of caecum palpation.
127. Technique of ascending and descending colon palpation
128. Technique of transverse colon palpation.
129. Technique of gastric large curvature palpation.
130. Technique of pylorus palpation.
131. Technique of defining gastric lower border.
132. Technique of pancreas palpation.
133. What are the complaints of patients with diseases of hepatobiliary system and their pathogeneses?
134. Ascites signs and techniques of its defining (inspection, percussion and fluctuation methods).
135. Complementary signs in diseases of hepatobiliary system.
136. Technique of liver percussion, its normal dimensions.
137. Technique of liver and gallbladder palpation.
138. Technique of spleen percussion, its normal dimensions.
139. Technique of spleen palpation.
140. What are the complaints of patients with renal diseases and their pathogeneses?
141. Technique of the kidneys palpation, bimanual palpation.
142. The Pasternatsky's sign.
143. Techniques of bladder percussion and palpation.
144. Brief path-anatomic characteristics of crupous pneumonia according to its stages.
145. Major symptoms of crupous pneumonia initial stage and their

pathogenesis.

146. Physical findings at the initial stage of crupous pneumonia, their pathogenesis.
147. Physical findings at the second stage of crupous pneumonia, their pathogenesis.
148. Physical findings at the third stage of crupous pneumonia, their pathogenesis.
149. Symptomatology (symptoms and signs) of focal pneumonia.
150. Complications of pneumonia.
151. Symptoms and physical findings in lung abscess according to its periods (diagnostics of pulmonary cavity syndrome).
152. Significance of additional diagnostic methods in pulmonary disease diagnostics (type of temperature curve, blood picture, radiographic data).
153. Diagnostics of acute bronchitis.
154. Diagnostics of chronic non-obstructive bronchitis.
155. Diagnostics of bronchiectasis.
156. Diagnostics of exudative pleurisy.
157. Diagnostics of pneumothorax.
158. Diagnostics of emphysema
159. Diagnostics of asthma
160. Diagnostics of chronic obstructive bronchitis.
161. Mechanism of asthma attack development.
162. Diagnostics of respiratory insufficiency.
163. Changes of intracardiac hemodynamics in mitral stenosis. Mechanisms of valve disease compensation.
164. Symptoms and patient' appearance in mitral stenosis.
165. Findings of precordial inspection and palpation, percussion data in patients with mitral stenosis.
166. Auscultatory signs of mitral stenosis.
167. Pulse and blood pressure in mitral stenosis.
168. Electrocardiographic changes in mitral stenosis.
169. Phonocardiography data in mitral stenosis.
170. Echocardiography data in mitral stenosis.
171. X-ray examination findings in mitral stenosis.
172. Changes of intracardiac hemodynamics in mitral incompetence.

- Mechanisms of valve disease compensation.
173. Symptoms and patient' appearance in mitral incompetence.
  174. Findings of precordial inspection and palpation, percussion data in patients with mitral incompetence.
  175. Auscultatory signs of mitral incompetence.
  176. Pulse and blood pressure in mitral incompetence
  177. Electrocardiographic changes in mitral incompetence.
  178. Phonocardiography data in mitral incompetence.
  179. Echocardiography data in mitral incompetence.
  180. X-ray examination findings in mitral incompetence
  181. Changes of intracardiac hemodynamics in aortic stenosis.  
Mechanisms of valve disease compensation.
  182. Symptoms and patient' appearance in aortic stenosis.
  183. Findings of precordial inspection and palpation, percussion data in patients with aortic stenosis.
  184. Auscultatory signs of aortic stenosis.
  185. Pulse and blood pressure in aortic stenosis
  186. Electrocardiographic changes in aortic stenosis.
  187. Phonocardiography data in aortic stenosis.
  188. Echocardiography data in aortic stenosis.
  189. X-ray examination findings in aortic stenosis.
  190. Changes of intracardiac hemodynamics in aortic incompetence.  
Mechanisms of valve disease compensation.
  191. Symptoms and patient' appearance in aortic incompetence.
  192. The peripheral signs of aortic incompetence
  193. Findings of precordial inspection and palpation, percussion data in patients with aortic incompetence.
  194. Auscultatory signs of aortic incompetence.
  195. Pulse and blood pressure in aortic incompetence
  196. Electrocardiographic changes in aortic incompetence.
  197. Phonocardiography data in aortic incompetence.
  198. Echocardiography data in aortic incompetence.
  199. X-ray examination findings in aortic incompetence
  200. Changes of intracardiac hemodynamics in tricuspid incompetence.  
Mechanisms of valve disease compensation.
  201. Symptoms and patient' appearance in tricuspid incompetence.

202. The peripheral signs of tricuspid
203. Findings of precordial inspection and palpation, percussion data in patients with tricuspid incompetence.
204. Auscultatory signs of tricuspid incompetence.
205. Pulse and blood pressure in tricuspid incompetence
206. Electrocardiographic changes in tricuspid incompetence.
207. Phonocardiography data in tricuspid incompetence.
208. Echocardiography data in tricuspid incompetence.
209. X-ray examination findings in tricuspid incompetence
210. Etiology and pathophysiology of heart failure.
211. Classification of chronic heart failure.
212. Symptoms and signs of left ventricular heart failure.
213. Symptoms and signs of right ventricular heart failure.
214. Instrumental diagnostics of heart failure.
215. Symptoms and signs of vascular failure.
216. Complaints of patients with hypertension
217. Etiology and pathogenesis of primary hypertension
218. Risk factors of hypertension
219. Estimation of absolute cardiovascular risk in hypertensive patients
220. Hemodynamics changes in essential hypertension
221. Classification of hypertension and hypertensive disease
222. Physical examination data in patients with hypertension
223. Signs of target organs damage in hypertension
224. Instrumental diagnostics of hypertension
225. Laboratory diagnostics of target organs damage
226. Instrumental diagnostics of target organs damage
227. Differential diagnostics of primary and secondary hypertension
228. Complaints of patients with coronary heart disease
229. Pathology and pathogenesis atherosclerosis
230. Reversible and irreversible risk factors for atherosclerosis
231. Hemodynamics changes in coronary artery disease
232. Classification of coronary artery disease
233. Physical examination data in patients with angina pectoris
234. Instrumental diagnostics of angina pectoris
235. Physical examination data in patients with myocardial infarction
236. Instrumental diagnostics of myocardial infarction

237. Laboratory diagnostics of myocardial infarction
238. Complications of myocardial infarction
239. Etiology, pathogenesis, classification of gastritis.
240. Clinical manifestations of acute and chronic gastritis.
241. Etiology and pathogenesis of peptic ulcer disease.
242. Symptomatology and complications of peptic ulcer disease.
243. Jaundice: types, pathogenesis, clinical and laboratory diagnostics.
244. Portal hypertension syndrome: notion, classification, clinical manifestations.
245. Hepatocellular insufficiency: notion, pathogenesis, clinical and laboratory manifestations.
246. Chronic hepatitis: notion, forms, diagnostics.
247. Cirrhosis: notion, etiology, pathogenesis, classification.
248. Symptomatology of cirrhosis.
249. Cholecystitis: notion, etiology, pathogenesis, classification.
250. Symptomatology of acute cholecystitis.
251. Complaints of patients with acute and chronic pancreatitis
252. Etiology and pathogenesis of pancreatitis
253. Physical examination data in patients with acute pancreatitis
254. Physical examination data in patients with chronic pancreatitis
255. Instrumental diagnostics of pancreatitis
256. Laboratory data in diagnostics of pancreatitis
257. Diagnostics of pancreatic exocrinous insufficiency
258. Complaints of patients with renal disease
259. Etiology and pathogenesis of glomerulonephritis
260. Renal hypertension: pathogenesis, types, diagnostics
261. Uric syndrome: notion, causes, laboratory diagnostics
262. Etiology and pathogenesis of acute renal failure
263. Etiology and pathogenesis of chronic renal failure, classification.
264. Diagnostics of renal failure
265. Diagnostics of nephrotic syndrome
266. Diagnostics of acute glomerulonephritis
267. Diagnostics of chronic glomerulonephritis
268. Diagnostics of acute and chronic pyelonephritis
269. Diagnostics of renal calculi
270. Complete blood count — investigation of peripheral blood smear:

rules of blood draw, sequence of operations in blood smear preparing. Count of WBC differential (leukogram): technique and method of WBC differential counting, notion about Meandre's line. WBC differential in norm and pathology (the left and the right shift of leukogram).

271. Complete blood count – investigation of hemoglobin: blood draw, technique of definition. Hemoglobin values (in Sali's units and in g%) in norm and pathology.
272. Complete blood count – investigation of red blood corpuscles (RBCs): technique of blood draw for RBCs count, sequence of operations on using Goryaev's chamber, order of RBCs count (formula). RBCs values in norm and pathology.
273. Complete blood count – investigation of colour index. Colour index in norm and pathology.
274. Complete blood count – investigation of erythrocytes sedimentation rate (ESR): technique of ESR determination. ESR values in norm and pathology. Diagnostic meaning of ESR changes.
275. Complete blood count – investigation of white blood cells (WBCs): technique of blood draw for WBCs count. Sequence of operations on using Goryaev's chamber, order of WBC count (formula). WBCs values in norm and pathology.
276. Complete blood count – investigation of peripheral blood smear for RBCs morphology study: rules of blood draw, sequence of operations in blood smear preparing. RBCs morphology in norm and pathology; notion about Price–Jones' curve.
277. Complete blood count – reticulocytes investigation: peculiarities of blood draw for reticulocytes count. Notion about supravital blood smear staining. Technique of reticulocytes count in blood smear. Reticulocytes value in norm and pathology, clinical meaning of reticulocytes count.
278. Complete blood count – platelets investigation: technique of blood draw for platelet count. Design procedure of platelets count. Platelets values in norm and pathology.
279. Changes of peripheral blood in acute post hemorrhagic anemia (changes of blood picture according 3 phases of compensation).
280. Changes of peripheral blood in iron-deficient anemia.

281. Changes of peripheral blood in anemia, bound with DNA and RNA synthesis disorders (vitamin B<sub>12</sub>-, folic acid-deficient anemia).
282. Changes of peripheral blood in leucosis. Notion about leukemic and aleukemic forms of leucosis. Acute leukemia: myeloblast and lymphoblast forms.
283. Changes of peripheral blood in chronic myelogenous leukemia.
284. Changes of peripheral blood in chronic lymphocytic leukemia.
285. Changes of peripheral blood in inflammatory diseases.
286. Urinalysis. Characteristics of diurnal diuresis in the norm and pathology. Zimnitsky test: technique of urine collection, clinical interpretation of test results.
287. Determination of urine physical properties: colour, clarity, odor, pH, specific gravity (relative density). Clinical interpretation of abnormalities.
288. Urine chemical investigation: determination of urine protein. Designate and describe 3 qualitative protein tests. Clinical sense of protein detection.
289. Quantitative determination of urine protein after Roberts–Stolnikov–Brandberg test (sequence of operations). Clinical meaning.
290. Urine chemical investigation: determination of urine glucose (qualitative tests, quantitation of glucose value). Clinical sense.
291. Urine chemical investigation: determination of urine ketones. Clinical sense.
292. Urine chemical investigation: determination of urine bilirubin and urine urobilinogen. Clinical sense.
293. Urinalysis: Microscopic exam for centrifuged urine sediment (technique of carrying out). Urine sediment characteristics in healthy human being.
294. Quantitation of urine sediment (Addice–Kakovsky and Nechiporenko tests). Procedure, numeral values in the norm and pathology.
295. Sputum investigation: determination of physical properties. Clinical meaning.
296. Sputum microscopic examination. Clinical meaning.
297. Investigation of pleural fluid. Distinction of exudates from transsudates. Rivalt's test (procedure).

298. Investigation of gastric secretory function. Technique of gastric intubation. Peroral and parenteral stimulators. Types of gastric secretory function abnormalities (hyperchlorhydria, hypochlorhydria, achlorhydria). Clinical meaning.
299. Gastric content appearance. Clinical meaning of revealed changes.
300. Chemical investigation of gastric juice. Clinical meaning of revealed changes.
301. Microscopic exam of gastric content. Diagnostic meaning of revealed changes.
302. Examination of duodenal content. Technique of duodenal intubation. 3-phased technique of duodenal intubation: description of A, B and C portions in the norm and pathology.
303. Examination of duodenal content. Technique of duodenal intubation. Multimomental fractional method. Description of 5 bile excretion phases (duration, excretory bile amount) in the norm and pathology.
304. Examination of duodenal content: microscopic exam of bile. Clinical meaning of revealed changes.
305. Chemical examination of gastric juice: determination of lactic acid (Uffelmann's test) — procedure. Clinical meaning of revealed changes lactic acid.
306. Examination of duodenal content. Examination for protozoa and helminths. Bacteriological examination of bile. Bile biochemical exam. Clinical meaning.
307. Macroscopic feces analysis, clinical meaning.
308. Microscopic feces analysis. Clinical meaning.
309. Chemical feces analysis. Gregersen's test [fecal occult blood test (FOBT)]: preparation of patient, technique, biochemical essence of test, interpretation). Clinical meaning.

### Exam requirements

Examination on “Introduction to Internal Diseases, Radiology” consists of three parts:

- 1). final exam MCQ,
- 2). examination of practical skills,

3). recitation according to exam card.

Exam card includes 7 theoretical questions (1 question on the electrocardiography, 1 question on the clinical laboratory diagnostics), an electrocardiogram and a result of a laboratory test.

A student must bring his (her) lectures book, workbook and exam case report to the examination.

#### CRITERIA OF AN EXAM STUDENT EVALUATION

**Excellent** (90–100 points) – a student knows the discipline *in corpore* of the curriculum; comprehends the discipline deeply enough; independently, in the logical sequence and almost exhaustively answers all the exam card questions, emphasizing the most essential; formulates answers clearly; freely reads results of laboratory test and another investigations, and solves an advanced situational tasks; is well acquainted with the main references and the patient examination methods in the proper extent for physician's practice; coordinates theoretical aspects of the discipline with the tasks of public health practice; knows contribution of domestic and foreign scientist to the development of this area of medical science; knows the major principles of medical ethics.

**Good** (80–89 points) – student knows the discipline in almost complete volume of curriculum (has gaps of knowledge in a few, the most complex divisions); independently and with the aid of leading questions gives a full-fledged answers on exam questions; he is not always marking out the most essential issues without serious mistakes in his answers; can solve easy and moderately severe situational tasks; handles methods of laboratory and clinical investigations in the extent exceeding compulsory minimum.

**Satisfactory** (70–79 points) – student possesses the basic knowledge volume on the discipline; has difficulties in the independent answers; operates with inaccurate formulating; in the process of an answer commits mistakes on the merits of the question. Student is able to solve only the most easy tasks, handles only the compulsory minimum of examination methods, insufficiently knows methodology questions, has poor knowledge of the main principles of medical ethics.

**Bad** (48 points) – student does not know the obligatory minimum of the discipline, is not able to answer exam card questions even with the aid of an examiner leading questions.

#### RATING SYSTEM OF STUDENT'S EVALUATION

Rating system of student's evaluation is defined by the Kazan State Medical University Regulations on the rating system of students' academic progress evaluation (2010). Rating system of student's progress evaluation is a system of an integral assessment of all kinds of educational student's activities (mastering of knowledge and skills in the disciplines, a passing of all types of intermediate evaluations, practices, a passing of final exam of a state attestation, accomplishment and defence of a graduation project) expressed in the points.

Rating system of students' academic progress evaluation is based on the module principle of the educational process organization. Module principle of the educational process organization provides an obligatory conduct of control testing after every module of discipline passing with the result assessment according to 100 points scale.

Rating of the discipline is calculated on the ground of student's passing all kinds of auditoria work, current control and intermediate attestation, self-dependent work.

#### Inspection of auditoria classes attendance

Points for auditoria work are calculated as real volume of fulfilled practical classes and lectures hours in per cent of maximal (according to curriculum).

#### Rework of the missed auditoria classes

The reducing coefficient 0,5 is used for re-work of the missed practical classes in the essay writing form, recitation (no more than 10% from the total volume of hours); if re-work is performed in a form of auditoria work (with another group, during the night shifts, writing of an additional case report, work at the patient bedside) the reducing

coefficient 0,75 is used; in lectures re-work only 0,5 coefficient is used.

### Check-up of knowledge

#### IV term

##### 1. Modules evaluation

Module 1. Anamnesis. General inspection. Methods of patients with pulmonary and cardiovascular diseases clinical examination.

2. Current grade.

3. Attestation.

#### V term

##### 1. Modules evaluation.

Module 2. Methods of patients with gastrointestinal and urinary diseases clinical examination.

Module 3. Clinical laboratory diagnostics.

Module 4. Bases of electrocardiography.

2. Current grade.

3. Attestation.

#### VI term

##### 1. Modules evaluation

Module 5. Semiotics of respiratory and cardiovascular system diseases.

Module 6. Semiotics of gastrointestinal and urinary system diseases

Module 7. Final exam case report.

Module 8. The final exam check-up of practical skills in all methods of physical examination.

Module 9. The bases of diagnostic radiology in internal diseases.

2. Current grade.

3. The final exam MCQ

4. Examination.

### Scale of rating system evaluation

1. Modules, the final exam MCQ, discipline rating:

90 – 100 points – “excellent”,

80 – 89 points – “good”,

70 – 79 points – “satisfactory”,  
 Less than 70 points – “unsatisfactory”.

2. Current evaluation:

6 points - “unsatisfactory”,  
 7 points - “satisfactory”,  
 8 points - “good”,  
 9 points - “excellent”,  
 10 points – “perfect”.

3. Examination:

90 – 100 points – “excellent”,  
 80 – 89 points – “good”,  
 70 – 79 points – “satisfactory”,  
 48 points – “unsatisfactory”,  
 0 points – is absent.

The discipline rating and a grade in accordance with scale of points conversion to the traditional 5-points system is put into the credit book. A student who has achieved a discipline rating less than 70 points has right to delete the debt.

## SUPPLEMENTS

### SUPPLEMENT 1. EDUCATIONAL AND METHODOLOGICAL MATERIALS ON INTRODUCTION TO INTERNAL DISEASES DISCIPLINE TUITION

#### *References*

##### **Basic manuals:**

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2. Ослопов В.Н., Садыкова А.Р., Карамышева И.В.. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть I. Introduction to internal diseases. Manual. Part I. – Казань: КГМУ,

2005. – 65 с.

3. Ослопов В.Н., Садыкова А.Р., Карамышева И.В. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть II. Introduction to internal diseases. Manual. Part II. – Казань: КГМУ, 2005. – 86 с.

4. Ослопов В.Н., Садыкова А.Р., Ануфриева Л.А. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть III. Introduction to internal diseases. Manual. Part III. – Казань: КГМУ, 2005. – 80 с.

5. Ослопов В.Н., Садыкова А.Р., Ануфриева Л.А. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть IV. Introduction to internal diseases. Manual. Part IV. – Казань: – КГМУ: 2005, 103 с.

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9. Ослопов В.Н., Садыкова А.Р., Карамышева И.В. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть VII. Introduction to internal diseases. Manual. Part VII. – Казань: ГОУ ВПО «Казанский ГМУ Росздрава», 2006. – 76 с.

10. Ослопов В.Н., Садыкова А.Р., Карамышева И.В. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть VIII. Introduction to internal diseases. Manual. Part VIII. – Казань: ГОУ ВПО «Казанский ГМУ Росздрава», 2006. – 112 с.

11. Ослопов В.Н., Садыкова А.Р., Карамышева И.В. Пропедевтика внутренних болезней. Учебно-методическое пособие. Часть

IX. Introduction to internal diseases. Manual. Part IX. – Казань: ГОУ ВПО «Казанский ГМУ Росздрава», 2010. – 62 с.

12. Ослопов В.Н., Богоявленская О.В., Ослопова Ю.В., Ануфриева Л.А.. Введение в электрокардиографию. Учебно-методическое пособие. Introduction to Electrocardiography. Manual. – Казань: ГОУ ВПО «Казанский ГМУ Росздрава», 2005. – 102 с.

13. Садыкова А.Р., Шамкина А.Р. Схема истории болезни. Учебно-методическое пособие. Scheme of medical case report. Manual. – Казань: КГМУ, 2010. – 18 с.

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8. Clinical gastroenterology. Fourth edition./Howard .M. Spiro, coauthors Colin E. Atterbury, et al. – McGraw-Hill Inc., New York, 1993. – 1297 p.

9. Textbook of pulmonary diseases. Fifth edition / Edited by

Gerald L. Baum, Emanuel Wolinsky. – Little, Brown and Company, Boston/New York/Toronto/London, 1994. – 1917 p.

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13. Струтынский А.В., Баранов А.П., Ройтберг Г.Е., Гапоненков Ю.П. Основы семиотики заболеваний внутренних органов. Атлас. – М.: РГМУ, 1997.

14. Струтынский А.В. Электрокардиограмма: анализ и интерпретация. – М.: «Медпресс», 1999.

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## SUPPLEMENT 2. EDUCATIONAL AND METHODOLOGICAL MATERIALS ON RADIOLOGY TUITION

### *Literature Sources Recommended*

#### **Basic manuals :**

1. Fundamentals of radiology. Manual, Part 1 / Юсупова А.Ф. – Казань: КГМУ, 2005. – 71 с.

2. Fundamentals of radiology. Manual, Part 2 / Юсупова А.Ф. – Казань: КГМУ, 2006. – 101 с.

3. Fundamentals of radiotherapy. Manual / Юсупова А.Ф. – Казань: КГМУ, 2010. – 47 с.

#### **Supplementary literature :**

1. A Global TextBook of Radiology / Edited by Holger Petterson,

MD, Series on Diagnostic Imaging from NICER Institute, 1995, 1 and 2 book.

2. Radiografic anatomy / Frank Slaby, Eugene R. Jacobs / The National Medical Series for Independent Study / A. Williams and Wilkins medical publication / 1999, 1 and 2 book.

3. Radiology and Imaging for medical students, David Sutton // Published by Elsevier, a division of Reed Elsevier, India PVT, LTD, Seventh edition in India, 2004 (SBN: 81-8147-081-8), ISBN 0-443-05917-9

4. Fundamentals of Radiology, Harvard University Press 5/e due 91/96 cloth 0-674-32927-9

5. Fundamentals of Diagnostic Radiology, University of California, Davis Williams & Wilkins, 1/e 1994 cloth, 0-683-01011-5, 158.95

6. Textbook of radiotherapy/ Walter and Millers, sixth edition/ Churchill Livingstone/ An imprint of Elsevier Limited, 2008, - ISBN 13^ 978 0 443 06201 8.

The list of Departmental Equipment Used for Tutorial Purposes:

1. Tables
2. Slides
3. Devices for multimedia projection
4. Pockets of radiological images (X-rays, CT, MRI, US and radio-nuclide images)