Odessa National Medical University
Faculty of Medicine №2
Department of Radiation Diagnostics, Therapy, Radiation Medicine and Oncology

Syllabus course
Radiation medicine

Amount	**20 hours.**
Semester, year of study	**IX – X semester V year of study**
Days, time, place	On schedule
Teacher (s)	Dorofeeva Tamara Kuzminivna, assoc., c.m.s. Arbatska Olga Serhiivna as., b\ s Korsun Alexander Anatolyevich as., b\ s
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Workplace	Department of Radiology 6 building. City clinical hospital №11
Consultations	*Eye consultations:* Every thursday *Online Consultations:* Every saturday at Windows Teams 1) Radiology testing 5th year (practice) 2) Radiology testing 5th year foreigners (practice) 3) Radiology testing 5th year (lectures) 4) Lectures (English)

COMMUNICATION

Communication with the student during the distance learning form can be in person in the classrooms and offices of the department, remotely on the platform Microsoft Teams, in some cases with prior notice - through ZOOM and in Viber-groups.

COURSE ANNOTATION

The subject of study of the discipline is modern knowledge about the peculiarities of the effects of ionizing radiation on the human body, the principles of treatment of radiation injuries and prevention of possible effects of radiation on the population.

Prerequisites and postrequisites of the course: mastering the discipline "Radiation Medicine" is based on the study of human anatomy by students; medical and biological physics; biological chemistry; bioorganic chemistry; genetics; clinical pharmacology; normal physiology; pathological physiology and morphology, therapy, surgery, hygiene, social medicine and health care organization and integrates with these disciplines, based on knowledge of pathomorphology and

pathological physiology, which allow students to understand the processes occurring in the human body under the influence of ionizing radiation.

Students acquire this knowledge in parallel with the study of the course of radiology, which involves the integration of teaching with these disciplines and the formation of skills to apply knowledge of radiation medicine in the process of further study and in professional activities.

The purpose of the discipline of radiation medicine is to form in students a set of knowledge, skills and abilities in radiation medicine.

Tasks of the discipline:

- nature and properties of ionizing radiation (alpha, beta, gamma, neutrons, X-rays);
- dosimetry of ionizing radiation;
- biological effect of ionizing radiation;
- questions of etiology, pathogenesis, pathomorphology of radiation lesions;
- diagnostic methods in radiation medicine;
- clinical course of acute and chronic radiation injuries: principles of treatment of radiation injuries;
- radiotoxicology I 131, Cs 137, Cr 90, Ри 239;
- diagnosis, clinic and principles of treatment for incorporation of radionuclides;
- the effect of ionizing radiation on various organs and systems of the body;
- long-term effects of ionizing radiation;
- the effect of small doses of ionizing radiation on the human body;
- principles of prevention of radiation damage and their consequences;
- medical, psychological and social aspects of large-scale accidents at nuclear power plants;
- principles of medical examination of persons exposed to excessive ionizing radiation, national register of Ukraine of persons affected by the Chernobyl disaster.

Expected results:

As a result of studying the discipline the student must be able to:

Know: clinic, diagnostics, that methods of treatment of radiation sickness, ways to prevent radiation overload of a person.

Be able to:

- Collect data on patient complaints, medical history, life history to determine radiation damage to various organs and systems of the body.
- Evaluate information regarding the diagnosis using a standard procedure, based on the results of laboratory and instrumental studies to determine radiation damage to various organs and systems of the body. Determine the list of necessary clinical, laboratory and instrumental studies and evaluate their results. (According to list 4.)
- To identify the leading clinical symptom or syndrome and, based on dosimetry data, laboratory tests and clinical signs, diagnose radiation injuries (severity, period of clinical course, etc.) (according to list 1). Establish a preliminary diagnosis, carry out differential diagnostics and determine the clinical diagnosis of the disease (according to list 2).
- Determine tactics and provide emergency medical assistance to victims of ionizing radiation (according to list 3).

- Plan and sort the victims according to the severity of the injury, choose the means and place of evacuation.

- Plan and carry out preventive prevention of radiation injuries.

- Determine tactics and provide emergency medical assistance to victims of exposure to ionizing radiation.

Master skills:

- Communication and clinical examination of the patient.

- Maintain medical records.

According to the requirements of the standard, the discipline Radiation Medicine ensures that students acquire the following *competencies:*

- IK - The ability to solve complex problems and problems in a particular area of professional activity or in the learning process, provides for research and / or innovation and is characterized by the complexity and uncertainty of conditions and requirements.
- ЗК1– Ability for abstract thinking, analysis and synthesis.
- ZK2 - Ability to know and understand the subject area and professional activities.
- ЗК3 - Ability to communicate in the state language.
- ZK6 - Ability to work in a team.
- ZK8 - Ability to assess and ensure the quality of work performed.
- ZK9 - Ability to act ethically, socially, responsibly and consciously.
- ZK10 - Ability to be critical and self-critical.
- CK1 - Skills of communication and clinical examination of the patient.
- CK2 – To begin with the necessary change of clinical and laboratory and instrumental data and evaluation of the results and the hour of diagnostics and diagnostics.
- CK3 - Establish an early and clinical diagnosis.
- CK5 - Ability to diagnose emergency conditions
- SK12 - Ability to determine the tactics of managing persons subject to dispensary observation.
- SK14 - Health care records.
- SK15 - Ability to conduct epidemiological and medical-statistical studies of public health; assess the impact of the environment, socio-economic and biological determinants on the health of an individual, family, population.

COURSE DESCRIPTION

Forms and methods of teaching

The course will be presented in the form of lectures (5 hours) and practical classes (15 hours), organization of independent work of students (25 hours).

Lectures are presented in the form of a presentation. During the teaching of the discipline in practical classes the author's presentations are used, prepared by the teachers of the department taking into account the peculiarities of the students of each group. Individual assignments and radiographs for homework are provided for each student, which are discussed in the next practical lesson with the assessment of the answer given in the group, the assessment is published. The student has the opportunity to ask questions during the practical lesson and get an answer.

Teaching methods: surveying students, mastering practical skills.

The content of the discipline

Lecture topics

Topic 1. Introductory lecture. History of development of radiation medicine

Topic 2. The effect of ionizing radiation on the body. Acute and chronic effects of radiation

Topic 3. Medical consequences of a large-scale accident at a nuclear power plant (Chernobyl accident).

Topics of practical classes

Topic 1. The subject of radiation medicine, its relationship with other medical disciplines. History of development of radiation medicine. Natural radiation background and its components. Artificial sources of ionizing radiation.

Topic 2. Nature, types and properties of radiation. Dosimetry of ionizing radiation. The principle of structure of dosimeters, radiometers, their types. Assessment of the degree of radionuclide contamination of the environment, soil, water, food.

Topic 3. Biological action of ionizing radiation. Radiosensitivity of various body tissues.

Topic 4. Diagnostic and prognostic value of hematological, biochemical, cytogenetic and other research methods for the assessment of pathological changes in human organs and systems after exposure to ionizing radiation. Clinical effects of ionizing radiation on human organs and systems.

Topic 5. Acute radiation sickness. Etiology, pathogenesis, clinic, diagnosis, treatment, consequences, medical and social examination. Acute local radiation damage. Features of the clinic, diagnosis and treatment of persons exposed to combined irradiation. Analysis of the most characteristic medical histories of people who have suffered from acute radiation sickness and local radiation injuries. Curation of patients who have suffered from acute radiation sickness or have internal diseases, the development of which is associated with the influence of radiation.

Topic 6. Chronic radiation sickness. Etiology, pathogenesis, diagnosis, clinic, treatment.

Topic 7. Long-term effects of ionizing radiation. Stochastic and non-stochastic effects of radiation. The effect of small doses of ionizing radiation on the human body.

Topic 8. Toxicology of basic radionuclides. Effects of human internal irradiation.

Topic 9. Medical, social, environmental and psychological aspects of large-scale accidents at nuclear power plants (according to the model of the Chernobyl accident). National Register of Ukraine of Chernobyl Victims: Purpose. Structure, purpose, tasks.

Equipment and operation of special medical institutions to provide assistance to persons exposed to ionizing radiation.

Topic 10. Final control (differential test)

List of recommended reading

Basic:

1. Kowalski OV Radiology. Radiation therapy. Radiation diagnostics: textbook. for students. higher honey. textbook lock IV level of accreditation / OV Kovalsky, DS

Mechev, VP Danilevich. - 2nd type. - Vinnytsia: New book, 2017. - 512 p. Radiology (radiation diagnostics and radiation therapy). Kyiv, Book Plus, 2017. -743 p.
2. Vasko, LM Means of protection of the body from the action of ionizing radiation: textbook. for students. higher textbook institutions of the Ministry of Health of Ukraine / LM Vasko, VF Pochernyaeva, VP Bashtan. - K.: BCB "Medicine", 2019. - 112 c.
3. Khalmuradov, BD Emergency Medicine: Textbook / BD Khalmuradov, PB Volyansky. - Kyiv: Center for Educational Literature, 2018.

Additional:

4. 30 years of the Chernobyl disaster. Looking to the future. National report of Ukraine. - K.: «Атіка», 2016. - 224 c.
5. The effect of low doses of ionizing radiation and other environmental factors on the body. under ed. MI Rudneva. - K.: Наук. opinion, 2017. - 216 p.
6. Grinevich Yu. A., Demina EA Immune and cytogenetic effects of dense and rare ionizing radiation. - K.: Здоровья, 2016. - 200 c.
7. Grodzinsky DM Radiobiology. - K.: Либідь, 2018. - 448 c.
8. Kindzelsky LP Zverkova AS, Sivkovich SA, etc. Acute radiation sickness in the Chernobyl disaster. - K .: Телеоптик, 2017. - 223 c.
9. Moskalev Yu. I. Long-term consequences of ionizing radiation. - M .: Медицина, 2019. - 464 c.
10. Radiation safety standards of Ukraine. Addendum: Radiation protection from sources of potential exposure (NRBU-2005 / D-2017). Kyiv, 2017. - 80 p.
11. Serkiz Ya. I., Pinchuk VG Pinchuk LB, etc. Radiobiological aspects of the Chernobyl accident. - K .: Наук. opinion, 2019. - 171 p.
12. Timofeev-Resovsky NV, Savich AV, Shalnov MI Introduction to molecular radiobiology: physicochemical bases. - M .: Медицина, 2016. - 231 c.
13. OSPU - 2015
14.NRBU - 2017
15. Radiology (radiation diagnostics and radiation therapy). Ed. N.M. Tkachenko. - K., Книга-Плюс, 2018. - 744 c.

Information resources.

1) https://radiopaedia.org/articles/acute-radiation-syndrome?lang=us
2) https://radiopaedia.org/articles/dosimeters?lang=us
3) https://radiopaedia.org/articles/ionising-radiation?lang=us
4) https://radiopaedia.org/articles/radiation-therapy?lang=us

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1474274

EVALUATION

1. *Methods of current control* assessment of theoretical knowledge on the topic of the lesson:

- methods: survey, solution of a situational clinical problem;
- maximum score - 5, minimum score - 3, unsatisfactory score - 2.

2. Assessment of practical skills and manipulations on the topic of the lesson:

- methods of assessing the correctness of practical skills
- maximum score - 5, minimum score - 3, unsatisfactory score - 2;

3. Assessment of work with the patient on the topic of the lesson:

- methods: assessment of: a) communication skills with the patient and his parents, b) the correctness of the appointment and evaluation of laboratory and instrumental studies, c) compliance with the algorithm of differential diagnosis d) justification of clinical diagnosis, e) preparation of treatment plan
- maximum score - 5, minimum score - 3, unsatisfactory score - 2;

Forms and methods of final control: upon completion of the discipline is differentiated credit and only those students are admitted to the final certification, who do not have academic debt and have an average score for current educational activities of at least 3.00.

Differentiated student credit is assessed on a 4-point (traditional) scale

The final control should be standardized.

The form of differentiated test in radiation medicine consists of test control of knowledge and interview according to the list of questions to diff. discipline.

Structure of final control (differentiated test)

Activity evaluation structure	Quantity
Independent description of three different cases of radiation damage (for example: acute and chronic radiation sickness).	3
Answers to two theoretical questions.	2

How will the assessment of knowledge (distribution of points) of higher education recipients be carried out? The grade for the discipline consists of 50.0% of the grade for the current performance and 50.0% of the grade for the differentiated test.

Conversion of the traditional grade for the discipline in the 200-point is carried out by the information and computer center of the university program "Contingent".

Table for conversion of traditional assessment into multi-point:

National assessment for the discipline	The sum of points for the discipline
«5»	**185 - 200**
«4»	**151 - 184**
«3»	**120 - 150**

Points in the discipline are independently converted into both the ECTS scale and the four-point scale. ECTS scores on a four-point scale are NOT converted and vice versa. Further accounts are carried out by the information and computer center of the university.

The ECTS grade is given by the educational unit of ONMedU or the dean's office after the ranking of grades in the discipline among students who study in one course and in one specialty. According to the decision of the Academic Council, it is recommended to rank students - citizens of foreign countries in one array.

The maximum number of points awarded to students when mastering each module (ECTS credit) - 200.

INDEPENDENT WORK OF STUDENTS

Independent work of students, which is provided by the topic of the lesson with classroom work, is evaluated during the current control in the appropriate lesson.

Assimilation of topics that are submitted only for independent work is checked during the exam or differential test.

COURSE POLICY

Policy on deadlines and rearrangement: For students who want to improve their performance in mastering the content modules, it is possible to conduct a re-final control of the discipline (content module) during the exam in the commission.

Academic Integrity Policy:

Violation of academic integrity is not allowed when working on writing essays, presentations, preparing reports, etc. When using *Internet* resources and other sources of information, the student must indicate the source used during the task.

If plagiarism is detected, the student receives an unsatisfactory grade for the task and must re-complete the task.

Write-off during testing and diff. offsets are prohibited (including the use of mobile devices).

Attendance and lateness policy:

Delay of a student more than 15 minutes before a lecture or a practical lesson is counted as absence from the practical lesson.

Mobile devices:

Mobile devices in practice can be used exclusively for educational purposes. Namely: consideration of the presentation, which is worked out in class, solving the teacher's problems. The use of mobile devices for other purposes during a lecture or practical lesson is prohibited, and a student who disregards these requirements will be suspended from the lecture or practical lesson.

Audience behavior:

During a lecture or practical lesson, the student should not interfere with the learning of other students and distract the teacher. A student is not allowed to eat or drink alcohol during a lecture or practical session. The student can leave the classroom, where there is a lecture or practical lesson of their choice, only for health reasons.