

**MINISTRY OF HEALTH PROTECTION OF UKRAINE
ODESSA NATIONAL MEDICAL UNIVERSITY**

Medical Faculty №2

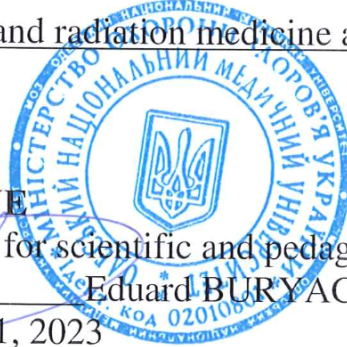
Department of radiation diagnostics, therapy and radiation medicine and oncology

I APPROVE

Vice-rector for scientific and pedagogical work

Eduard BURYACHKIVSKY

September 1, 2023



**METHODOLOGICAL DEVELOPMENT
TO PRACTICAL LESSONS
FROM EDUCATIONAL DISCIPLINE**

Faculty, MEDICAL course, 2nd year

Educational discipline RADIOLOGY

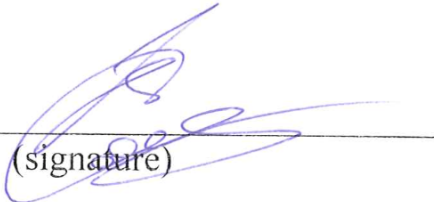
Odesa-2023

Approved:

Meeting of the Department of the Radiation Diagnostics, Therapy and Radiation
Medicine and Oncology
Odessa National Medical University

Protocol No. 1 dated 30.08. 2023

Head of the department _____


(signature)

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PRACTICAL TRAINING

Content module 8.

Radiation diagnostics in oncology. Principles and methods of radiation therapy.

Practical lesson No. 21.

Topic 21. Radiation therapy methods: X-ray therapy; contact methods; long distance gamma therapy and radiation therapy with high energy sources.

Goal: familiarize yourself with the methods of radiation therapy, learn how to choose a certain method of radiation therapy and analyze the indications and contraindications before carrying out this or that method; explain the advantages and disadvantages of each method of radiation therapy and their characteristics .

Basic concepts: about the basic principles of radiation therapy. Classification of radiation therapy methods. Radical, palliative, symptomatic treatment. Characteristics of combined, complex methods of treatment and the combined beam method. General and local radiation reactions with different methods of radiation therapy. Means of their prevention. The main methods of contact radiation therapy: application, intracavitary, intratissue. Structure and forms of radiation sources. Closed and open sources of ionizing radiation. Far away near-distance methods of external irradiation Use of high energy sources for the treatment of malignant tumors (betatron, linear and cyclic accelerators).

Equipment: laptop with presentation, multimedia projector, radiographs, tomograms

Plan:

1. Organizational measures (greetings, verification of those present, announcement of the topic, purpose of the lesson, motivation of students of higher education to study the topic).

2. Control of the reference level of knowledge:

2.1 Requirements for theoretical readiness of students to perform practical classes:

Know:

1. principles and radiobiological bases of radiation therapy;
2. characteristics of closed and open sources of ionizing radiation;
3. methods of external and internal irradiation;
4. treatment methods, their characteristics (independent, radiation, combined, complex, combined-radiation);
5. treatment programs (radical, palliative, symptomatic).

2.2. Questions to check basic knowledge on the topic of the lesson:

1. Basic principles of radiation therapy.
2. Classification of radiation therapy methods.
3. Characteristics of ionizing radiation sources used in radiation therapy (open, closed).
4. Determination of methods of external irradiation: long- and short-range irradiation.
5. Definition of methods of internal irradiation: application, intracavity, intratissue, method of tropical accumulation of radionuclides.
6. Radiation treatment programs and their tasks (radical, palliative, symptomatic).
7. Combined, complex, combined radiation methods of radiation therapy, their tasks.
8. Selection of total radiation doses in the treatment of malignant tumors, dose distribution in time and space.

9. Topometric preparation of patients for radiation. Selection of irradiation fields.

1. According to the half-life period, RFPs are divided into:

and. short-lived

b. are closed

in. organotropic

d. selective accumulation

2. Continuous irradiation can be provided using the following method of radiation therapy:

and. application

b. short distance

in. long distance

3. The purpose of preoperative irradiation is:

and. transfer of the tumor to an operable state due to the reduction of its size

b. devitalization of residual tumor cells

in. prevention of the development of implantation metastases

4. In long-distance radiation therapy, the source-surface distance is:

and. 30 cm to 2 m

b. 10-50 cm

in. 1.5 cm - 1.5 m

5. Deep x-ray therapy is indicated when the lesion is localized at a depth:

a. up to 5 cm from the surface of the skin

b. up to 1 cm from the surface of the skin

in. up to 10 cm from the surface of the skin

6. In X-ray therapy, the maximum absorbed dose is:

a. on the surface of the skin

b. at a depth of 0.5 cm

in. at a depth of 1.5 cm

7. Remote irradiation methods do not include:

and. intratissue method

b. high energy bremsstrahlung and fast electron therapy

in. static remote gamma therapy

3. Formation of professional abilities and skills (mastery of communication skills, dispensation, determination of treatment scheme, laboratory research, etc.) to be able to:

- choose the method of treatment and doses of irradiation in the treatment of oncological processes depending on their stage and localization;
- choose total and single exposure doses;
- choose methods of irradiation (static or dynamic irradiation), quantity fields (single or multi-field) depending on the location of the pathological focus
- explain to the patient the need for this type of treatment and its features.

1. What is the distance from the radiation source to the skin with the long-distance method

A) from 0 to 1.5 cm

B) from 1.5 cm to 30 cm

B) from 10 cm to 30 cm

D) from 30 cm to 50 cm

D) from 30 cm or more

2. What is the distance from the radiation source to the skin at close range? method?

- A) from 0 to 1.5 cm
- B) from 1.5 cm to 30 cm
- B) from 10 cm to 30 cm
- D) from 30 cm to 50 cm
- D) from 50 cm or more

Control materials for the final stage of the lesson (tasks, assignments, tests, etc.)

1. What treatment method is used for inoperable forms of cancer?
 - A) combined
 - B) complex
 - B) chemotherapy
 - D) palliative course of radiation therapy
 - D) surgical

2. Which program of radiation therapy is aimed at partial damage tumor focus?
 - A) radical
 - B) palliative
 - B) symptomatic
 - D) postoperative
 - D) sub-operational

3. Which radiation therapy program is aimed at complete damage to the tumor?
 - A) radical
 - B) palliative
 - B) symptomatic
 - D) postoperative
 - D) none of the above

4. The penetration ability of Bukki rays in the skin and mucous membranes is equal to:
 - A) 1.5 mm
 - B) 2.5 mm
 - B) 2 mm
 - D) 3 mm

Practical lesson No. 22.

Topic 22. Basics of radiation therapy for tumor and non-tumor diseases.

Purpose: to learn to draw up a radiation treatment plan for patients with oncological and non-cancerous diseases; choose the method of X-ray therapy and radiation doses in the treatment of non-cancerous diseases depending on the course of the process; choose the method of X-ray therapy and radiation doses during treatment

Basic concepts: Justification of radiation therapy of non-cancerous diseases. Anti-inflammatory, desensitizing, analgesic effects of ionizing radiation. Indications and contraindications for radiation therapy. The basics of radiation therapy for non-neoplastic diseases, for example: radiculitis, inflammatory diseases of the rectum, fingers and hand, skin and subcutaneous tissue, osteomyelitis. Anti-inflammatory, analgesic, antispastic effects of radiation therapy. Radiation treatment plan for oncological diseases. The basics of radiation therapy for tumors using the example of: tumors of the lungs, esophagus, stomach, colon, mammary glands, uterus

Equipment: laptop with presentation, multimedia projector, radiographs, tomograms

Plan:

1. Organizational measures (greetings, verification of those present, announcement of the topic, purpose of the lesson, motivation of students of higher education to study the topic).

2. Control of the reference level of knowledge:

2.1 Requirements for theoretical readiness of students to perform practical classes:

Know

- radiation semiotics of functional and morphological changes in pathology of various organs and systems;
- learn to determine indications and contraindications for the appointment of radiation therapy for malignant tumors and non-tumor diseases,
- to know the methods of radiation therapy of malignant tumors

2.2. Questions to check basic knowledge on the topic of the lesson:

1. In which disease are "soft" X-rays used?
 - a. dysentery, lesions of the skin only
 - b. paraproctitis
 - in. bone panaritium
2. Surface x-ray therapy is used when locating the lesion at a depth of up to:
 - a. up to 1 cm from the surface of the skin
 - b. 15 mm from the surface of the skin
 - in. 10 cm from the surface of the skin
3. The symptomatic radiation therapy program includes:
 - and. reduction of pain syndrome
 - b. complete healing of the patient
 - in. temporary cessation of malignant growth

3. Formation of professional abilities and skills (mastery of communication skills, dispensation, determination of treatment scheme, laboratory research, etc.) to be able to:

- determine possibilities and choose methods of radiation therapy for tumor and non-tumor diseases;
- to choose the optimal method of radiological research to identify functional and morphological changes in the pathology of various organs and systems.
- determine the possibilities and choose a method of radiation therapy for tumors and non-cancerous diseases.

Control materials for the final stage of the lesson (tasks, assignments, tests, etc.)

What is the source of X-ray radiation?

- A) radioactive isotopes
- B) X-ray tube
- B) neutrons
- D) protons
- D) electrons

2. Specify precancerous skin diseases:

- A) papillomas
- B) Bowen's disease

- C) psoriasis
 - D) neurodermatitis
 - D) microbial eczema
3. What filters are used in X-ray therapy devices?
- A) aluminum
 - B) copper
 - C) lead
 - D) steel
 - D) tungsten
4. In x-ray therapy, the tubes are intended for:
- A) making the radiation beam more uniform
 - B) formation of the irradiation field
 - C) increase in the penetration ability of rays into tissues
 - D) securing the casing of the X-ray tube
 - D) beam focusing
5. Principles of choosing a focal dose for the treatment of non-neoplastic processes:
- A) the more acute the process, the smaller the single and total doses
 - B) the more acute the process, the smaller the single dose, and the larger the total
 - C) the more acute the process, the larger the single dose, and the smaller the total
 - D) single and total doses do not depend on the severity of the process
 - D) the more acute the process, the greater the single and total doses

Practical lesson No. 23.

Topic 23. Radiation diagnostics in oncology.

Goal: To improve knowledge about radiation diagnostics in oncology, drawing up an algorithm for radiation diagnostics in oncology depending on the stage of cancer disease; get acquainted with the contribution of domestic scientists to the study of the problem; get acquainted with the deontological problems of using radiation diagnostics in oncology.

Basic concepts: the basic methods of radiation diagnostics used in oncology. Their Advantages and disadvantages. Cancer screening. Program requirements screening Directions of radiation diagnostics, which are implemented at various stages of provision oncology care. The value of PET in the diagnosis of neoplasms.

Equipment: laptop with presentation, multimedia projector, radiographs, tomograms

Plan:

1. Organizational measures (greetings, verification of those present, announcement of the topic, purpose of the lesson, motivation of students of higher education to study the topic).

2. Control of the reference level of knowledge:

2.1 Requirements for theoretical readiness of students to perform practical classes:

Know:

1. Principles of radiation diagnostics in oncology.
2. Algorithm of radiation diagnosis of malignant tumors.
3. X-ray anatomy of organs.
4. Symptoms and syndromes of malignant tumors.

2.2. Questions to check basic knowledge on the topic of the lesson:

1. The main method of breast cancer screening is:
 1. mammography
 2. palpation of the mammary gland
 3. Ultrasound of mammary glands
 4. thermography

2. In case of suspicion of a tumor lesion of the liver, the most informative method is:
 - a) X-ray examination of the abdominal cavity
 - b) X-ray computed tomography
 - c) contrast study of the biliary system
 - d) scintigraphy

3. The main method of studying the radiological morphology of bones in normal and pathological conditions
 - a) X-ray computed tomography
 - b) MRI
 - c) ultrasound
 - d) radiography
 - e) radionuclide studies

4. To study metabolic processes in bones and joints, use:
 - a) sonography
 - b) MRI
 - c) X-ray examination
 - d) radionuclide scintigraphy

5. The following radiopharmaceutical is used in the radionuclide study of the thyroid gland:
 - a) ^{99m}Tc - pertechnetate
 - b) ^{99m}Tc - pyrophosphate
 - c) ^{99m}Tc - colloid
 - d) ^{99m}Tc - diphosphonate

3. Formation of professional abilities and skills (mastery of communication skills, dispensation, determination of treatment scheme, laboratory research, etc.) to be able to:

1. to be able to choose the optimal method of radiation examination in oncological pathology
2. to compile an algorithm for radiation diagnostics in oncology depending on the stage of the cancer
3. recognize direct and indirect signs of pathological changes.

Control materials for the final stage of the lesson (tasks, assignments, tests, etc.)

1. The purpose of radionuclide hepatography:
 - a) study of anatomical and topographic features of the liver
 - b) study of absorptive and excretory function of the liver
2. What radiodiagnostic method is used in the screening of diseases of the mammary glands in women after 40 years of age:
 - a) thermography
 - b) ultrasound
 - c) mammography
 - d) radioisotope
3. "Hot" (hyperfixation) cells accumulate radiopharmaceuticals

- a) more than the surrounding tissues
- b) less than the surrounding tissue
- 4. Critical organs for these radiopharmaceuticals
 - a) accumulate the isotope more than other organs
 - b) have greater radiosensitivity
- 5. The gamma camera is used for
 - a) radiometry
 - b) radionuclide imaging of organs
 - c) radiographs
- 6. Characteristic symptoms of central cancer, which are detected during bronchography, include all of the above, except
 - a) lumen of the bronchus is not changed
 - b) large-caliber bronchus amputations
 - c) conical stump of a bronchus
 - d) concentric narrowing of the bronchus
- 7. Surrounding lung tissue in peripheral lung cancer
 - a) sometimes has a difficult path from the tumor to the root
 - b) does not change
 - c) often has focal shadows around it

4. Summary:

Current evaluation criteria in practical training

Rating	Evaluation criteria
Perfectly "5"	The applicant takes an active part in practical training; demonstrates deep knowledge, gives complete and detailed answers to questions; takes an active part in the discussion of the results of the radiological examination, correctly and consistently compiles the algorithm of the radiological examination in relation to a certain pathology; uses additional educational and methodological and scientific literature; expresses his own reasoning, gives appropriate examples, demonstrates clinical thinking. The test tasks are completed in full, all 100% of the answers to the questions are correct.
Fine "4"	The applicant participates in a practical session; knows the material well; demonstrates the necessary knowledge, but gives answers to questions with some errors; participates in the discussion of the results of radiation research, uses basic educational and methodological and scientific literature. The winner expresses his opinion on the subject of the lesson, demonstrates clinical thinking. The test tasks are completed in full, at least 70% of the answers to the questions are correct.
Satisfactorily "3"	The acquirer sometimes participates in a practical activity; partially speaks and asks questions; makes mistakes when answering questions; shows passive work in practical classes; the radiological research algorithm for a certain pathology is inconsistent with significant errors; shows fragmentary knowledge of the conceptual apparatus and literary sources. The acquirer does not express his opinion on the topic for any reason . The testing is done in full, at least 50% of the answers are correct.
Unsatisfactorily "2"	The acquirer does not participate in the practical session, is only an observer; never speaks or asks questions, disinterested in learning the material; does not take part in the discussion of the results of radiological examination, incorrectly compiles the algorithm of radiological examination for a certain pathology, gives incorrect

answers to questions, shows unsatisfactory knowledge of the conceptual apparatus and literary sources. Testing is done, but less than 50% of the answers are correct.
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5. List of recommended literature

Main:

1. Kovalsky O.V. Radiology. Radiation therapy. X-ray diagnostics: assistant. for students higher honey. education closing IV level of accreditation / O. V. Kovalskyi, D. S. Mechev, V. P. Danylevich. 2nd edition Vinnytsia: New Book, 2017. 512 p.
2. Radiology (radiodiagnosis and radiation therapy). Test tasks. Part 1. Kyiv: Book plus. 2015. 104 p.
3. Radiology (radiodiagnosis and radiation therapy). Test tasks. Part 2. Kyiv: Book plus. 2015. 168 p.
4. Radiology (radiodiagnosis and radiation therapy). Test tasks. Part 3. Kyiv: Book plus. 2015. 248 p.
5. Methods of radiation diagnostics: a study guide (Protocol of the Medical Center No. 5 dated 05.25.17) N.V. Tumanska, K.S. Barska. 143 p.

Additional:

6. Radiation medicine: Textbook for medical universities 3-4 academic year. approved by the Ministry of Education and Culture / edited by E. Pylypenka Kyiv, 2018. 232 p. kind. "Medicine".
7. Tomographic methods of radiodiagnostics: a study guide (Protocol of the Central Medical Center No. 5 dated 05.25.17) N.V. Tumanska, K.S. Barska, I.P.Jos, 91 p.
8. Diagnostic, treatment and preventive algorithms in internal medicine: teaching method. manual / under the editorship Prof. V. I. Denesyuk; Vinnytsia national honey. University named after M. I. Pirogov, Cafe. internal Medicine No. 3. Kyiv: DZK Center, 2015. 151 p. : fig., tab.
9. Clinical Radiology : The Essentials Fourth Edition by Daffner MDFACR, Dr. Richard H., Hartman MD, Dr. Ma 4th edition. 2014. 546 p.

Electronic information resources:

1. <https://radiographia.info/>
2. <http://nld.by/help.htm>
3. <http://learningradiology.com>
4. <http://www.radiologyeducation.com/>
5. <http://www.radiologyeducation.com/>
6. <https://www.sonosite.com>