Radiology and radiotherapy

The educational program for the speciality General Medicine
for faculty of foreign students

Faculty: foreign students

Department of oncology with course of radiology and radiotherapy

Year: 3

Semester: 5, 6

Lectures 20 hrs Exam -

Practice (seminar) classes 54 hrs Offset 5, 6 semester

Laboratory classes - Course project -

Total class hours in discipline 74

Total hours In discipline 114 Form of high education - fulltime

Compiler lecturer Auchinikau U.A.

2010
The curriculum is based on the electronic version of a model curriculum for radiology and radiotherapy, developed at the "Belarusian State Medical University", 2010

Reviewed and recommended for approval at the meeting of the oncology department with course of radiology and radiotherapy (15.06. 2010, protocol № 10)

Head of the Department of Oncology with course of radiology and radiotherapy professor  

Approved and recommended for approval by the Board of the Scientific and Methodological of "Grodno State Medical University"
EXPLANATORY NOTE

Radiology and radiotherapy – the discipline, which contains systematized scientific knowledge and methods of radiology and radiotherapy in clinical medicine.

In our days radiology and radiotherapy are the different divisions of medicine. Radiology allow to detect pathogenesis and another important characteristics of pathological processes, and fix it as objective documentation. Radiotherapy is one of the main methods with surgery and chemotherapy of treatment in oncological practice.

Study of the subject “Radiology and radiotherapy” is based on the previous knowledge of normal and pathological anatomy, physiology, biophysics, biology, histology, chemistry, radiation medicine.

Knowledge and skills obtained in the discipline, supplemented by subsequent courses of internal medicine, surgery, oncology, neurology, pediatrics, obstetrics and gynecology.

**Purposes and objectives of discipline**

**Purpose**: formation of the student’s knowledge and skills for the integrated use of modern methods of radiation imaging with the recognition of the most common diseases in clinical practice and radiation therapy in the treatment of neoplastic and non-neoplastic diseases.

**Objectives**: The tasks of the discipline is to acquire the student’s academic competence, which was based on the ability to self-search training and information resources, mastery and understanding of the methods of acquiring knowledge:

− organic-integrated use in clinical medicine ray imaging methods for detecting disease in different age groups

Task of teaching the subject aimed at developing the students' social and personal and professional competence, subject to the rules of medical ethics and deontology, the foundation of which is to know:

− pathological changes in the organs and systems of rights and the relations hip of the complex syndrome with a specific disease;

− strategies for radiation therapy of malignant tumors and benign diseases.

**Requirements for the mastering the discipline**

Student should know:

− the system of protection of radioprotective and safety in diagnostic and therapeutic uses of radiation;

− biophysical properties, radiosensitivity and radioresistance tissues and organs;

− the types of electromagnetic, ultrasonic, and corpuscular radiation used in X-ray diagnostics;

− basic and special imaging techniques in X-ray diagnostics, the system of generation and transmission of digital images;

− the basis of organic and integrated use of modern visualization methods and radiation therapy;

Student should be able:

− explain the result of radiation research at the most common diseases of the lungs, heart, esophagus, stomach, intestine, gall bladder, kidneys, endocrine system, bones and joints.
Study of the subject "Radiology and Radiation Therapy" is held on the 3rd year (5th and 6th semester). Classroom hours - 74, including lectures - 20 - 54 and practical. A total of 114 training hours. The shape of the current certification - differentiated offset in V and VI semesters.

CONTENT OF THE MATERIAL

1. RADIOTHERAPY

1.1. Introduction to radiology. Physical and biological bases of Radiology and Radiotherapy


1.2. Basics and principles of radiotherapy


1.3. Methods of radiotherapy of malignant tumors and benign diseases


2. RADIOLOGY
2.1 Principles and methods of radiology. Role and tasks of radiology clinical research in patients

2.1.1. Methods of X-ray examinations.
X-rays of his opportunities in the modern clinic. The principle of X-ray imaging. Characteristic X-ray image (his summary character, contrast, sharpness). Value omni radiological examination. Basic and special X-ray techniques (radiography, fluoroscopy, fluorography, digital radiography, linear tomography, etc.). Methods of artificial contrast in radiology. Types of contrast agents. The principles and foundations of computer (X-ray) imaging. Features images of CT scan. Densitometry computer X-ray images

Interventional radiology. The main directions of interventional radiology: endovascular (dilatation, embolization, cava-filter installation, etc.), endobronchial, endobiliary, endoureteral, endoesophageal, percutaneous drainage of cysts and abscesses. Therapeutic endovascular interventions of thoracic and abdominal cavities and the retroperitoneal space (dilatation of stenotic segments, stone removal, drainage of abscesses, biliary decompression and drainage of the bile ducts).

Organization of X-ray department. X-ray equipment. The main types of X-ray systems. Demonstration of the basic types of X-ray systems

2.1.2. Principles and basics of the ultrasonic diagnostic examination. Ultrasound techniques: mono-dimensional study (ultrasound), 2-dimensional study (ultrasound, scan) and Doppler. Contrast agents in ultrasound diagnosis. Visualization of organs and tissues. Key terms of research, is used to describe echo-negative and echo-positive site, acoustic shadow.

Priority of use. Limitations of method.

2.1.3. Principles and basics of magnetic resonance imaging.
Magnetic resonance imaging. The phenomenon of nuclear magnetic resonance. Principles for the use in the diagnosis - the ability of the nuclei of certain atoms to behave as magnetic dipoles. Selective (resonant) absorption of electromagnetic energy. Registration of the magnetic signal, contrast agents in magnetic resonance imaging. Magnetic resonance spectroscopy. Features of images of organs and tissues in the magnetic resonance image. Advantages and disadvantages of the method.

2.2. Principles and foundations of nuclear medicine.


2.3. Diagnostics and semiotics of injuries and diseases of the musculoskeletal system
2.3.1. Study of osteoarticular apparatus. Semiotics of pathological processes.
Radiological anatomy of the skeleton. Methods of radiation research.
Radiological anatomy of normal bones and joints. Age features of the bones and joints.
Radiological symptoms and syndromes of injuries and diseases of the skeleton.
Changing the shape of the bones (distortion, deformation of the articular surfaces of
bones, local growths in the bones). Change in bone (bone enlargement and hypertrophy
- hyperostosis, reduced bone - atrophy). Change in bone structure (osteoporosis,
osteosclerosis, osteolysis, destruction, sequestration, periostitis). Changing the X-ray of
the joint space (expansion, uniform and non-uniform narrowing the gap).

Essence, the possibilities and indications for radionuclide diagnosis of bone tumors.

2.3.2. Radiological signs of injuries and diseases of the musculoskeletal system.
Radiological signs of injury musculoskeletal: sprains, fractures, complications
and their healing. Radiographic manifestation injuries of the musculoskeletal system
- sprains, fractures and signs of healing. Age features of fractures. Fractures in childhood
(subperiosteal fracture).

Radiographic diagnosis of diseases of bones and joints. X-ray diagnosis of
osteoarthritis, tuberculosis, tumors, degenerative and systemic diseases. Joint diseases.
Bone tumors. Benign tumors. Spongy and compact osteoma osteochondroma
chondroma primary malignant tumor. Periosteal fibrosarcoma. Osteogenic sarcoma
(osteolytic, osteoblastic and mixed). Ewing's tumor. Plasmacytoma. Secondary
(metastatic) malignant bone tumors. Osteolytic and osteoblastic metastases.
Developmental abnormalities of the musculoskeletal system in children.

2.4. Radiological diagnostics and specific features of pathological symptoms of lung X-ray examination
2.4.1 Radiological examination of the respiratory system. Semiotics of pulmonary
diseases.

Radiologic study of respiratory system. X-ray technique (fluoroscopy,
fluorography, radiography, tomography, bronchography). The major radiographic lung
disease syndromes. Method of analysis of chest radiographs. Radiological normal
anatomy of the chest. The major radiographic lung disease syndromes: an extensive and
limited dimming pulmonary field, circular or ring-shaped shadow in the lung field,
pulmonary dissemination, pathological changes of the root and pulmonary pattern,
disturbance of bronchial obstruction.

2.4.2. Diseases and injuries of the respiratory system
X-ray picture of acute pneumonia, hydrothorax, pneumothorax, tumors,
tuberculosis. Obstructive hypoventilation, emphysema and atelectasis. Radiological
pattern of enlarged lymph nodes in hilar zone, and mediastinum. Emergency X-ray
diagnosis of foreign bodies of the trachea and bronchial tubes, pulmonary artery
thrombembolism, pulmonary edema.

2.5. Radiological examination of the heart and vessels
2.5.1. Radiological examination of the heart and blood vessels.
Invasive and noninvasive radiological examination of the circulatory system: X-
ray, angiocardiography, aortography, arteriography, venography, nuclear medicine
studies. Ultrasound, magnetic resonance imaging. Radiological anatomy of the heart
and great vessels in the normal analysis of the arcs of the heart. Possibility of
radiological methods in the evaluation of morphological and functional state of hemodynamics. Examination of lymph nodes.

2.52. Radiological diagnosis of cardiovascular disease.

Radiological pattern of ischemic heart disease, hypertrophic cardiomyopathy, pericarditis, mitral stenosis, mitral valve insufficiency, aortic stenosis, aortic valve insufficiency, aneurysms of the thoracic aorta, atrial septal defect and ventricular septal defect, open arterial duct, coarctation of the aorta, pulmonary artery stenosis, tetralogy of Fallot.

2.6. Radiological diagnosis of diseases of the gastrointestinal tract, additional digestive organs and genito-urinary system

2.6.1. Radiological diagnosis of diseases of the gastrointestinal tract.


2.6.2. Radiologic diagnosis of diseases of the liver and pancreas.

Radiologic examination of the liver, bile ducts and pancreas: cholecystography, cholangiography, operating cholangiography, endoscopic retrograde cholangiopancreatography, ultrasound, CT and magnetic resonance imaging. The value of nuclear medicine techniques in the study of functional and morphological state of the liver. Indications and contraindications for study. Preparing the patient for examination. Static and dynamic scintigraphy of the liver. Limits and possibilities of nuclear medicine liver. Radiological pattern in traumatic injuries of the liver, hepatitis, cirrhosis, gallstones, acute cholecystitis, tumors, ascites, obstruction of bile ducts. Radiological pattern of acute and chronic pancreatitis, tumors, stones.

2.6.3. Radiological diagnosis of diseases of the genitourinary system.


2.7. The additional affairs nuclear medicine
2.7.1. Nuclear medicine and radiological imaging for investigation of the endocrine system.


2.7.2. Nuclear medicine and radiological imaging for investigation of the nervous system.

Role of nuclear medicine techniques in the study of the central nervous system. Methods of radiological examination and normal appearance of skull, spine, brain and the spinal cord. Radiological pattern in injuries and diseases of the skull and the brain: traumatic injuries, cerebral circulatory disorders, tumors, inflammatory and degenerative diseases. Radiological pattern in traumatic injuries, tumors, inflammatory and degenerative diseases of the spine and spinal cord, abnormal development of the brain.
INFORMATIONAL PART

Literature

Main:

Additional:
5. Линденбратен, Л.Д. Медицинская радиология (Основы лучевой диагностики и лучевой терапии) / Л.Д. Линденбратен, И.П. Королюк. – М.: Медицина, 1993. – 358 с.

Training and controlling software «Libra» by X-ray diagnostics and radiotherapy.
The list of lectures

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<tr>
<th>№</th>
<th>Topic of lecture</th>
<th>Classroom hours</th>
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<tr>
<td>1</td>
<td>Introduction to radiology. Physical and biological bases of radiotherapy</td>
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<td>2</td>
<td>Principles and methods of radiotherapy</td>
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<td>Principles and basics of nuclear medicine</td>
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<td>5</td>
<td>Radiological diagnosis of injuries and diseases of skeletal system</td>
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<td>Radiological diagnosis of diseases of lungs</td>
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<td>Radiological diagnosis of diseases of cardiac system</td>
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<td>Radiological diagnosis of diseases of digestive system.</td>
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<td>Private matters of radionuclide and complex radiology</td>
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## List of practical classes

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<td>Methods of beam therapy of tumors and nonmalignant diseases</td>
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<td>Methods of X-ray inspections</td>
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<td>5</td>
<td>Principles and basics of ultrasound investigation</td>
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<td>Principles and basics of magnetic- resonant tomography</td>
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<td>Principles and basics of radionuclide diagnostic</td>
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<td>Musculoskeletal imaging</td>
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<td>Radiological attributes of damages and diseases of the musculoskeletal system</td>
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<td>Pulmonary imaging. Technical and anatomic considerations.</td>
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<td>Beam attributes of damages and the basic diseases of lungs and mediastinum</td>
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