MINISTRY OF HEALTH PROTECTION OF UKRAINE
UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY

Approved at the meeting of the department
Oncology and Radiology
with radiation medicine
Minutes No. _____ of _____
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GUIDELINES
FOR SELF-WORKING STUDENTS
BEFORE PREPARATION FOR PRACTICAL TRAINING AND ATTITUDE

Educational discipline	Radiology
Module №	I
Theme of the course:	**Radiotherapy methods: radiotherapy, contact methods, DHT and radiation therapy with high energy sources**
Course	III
Faculty	Medicine

Poltava – 2018

1. Relevance of the topic: Radiation therapy (PT) is one of the leading places in the treatment of oncological patients and is used in almost 80% of patients. In connection with the growing role of radio methods in the complex of clinical examination of patients, as well as the increase in the number of patients who need radiation diagnosis and radiation therapy increases every year, it is expedient to teach students of medical nurses material on the basics of nuclear physics, general Radiotherapy and diagnostics questions.

2. Specific objectives:
1. Introduction to radiotherapy;
2. Contraindications to X-ray;
3. General radiological values and units, their measurements;
4. Roentgenotherapy of inflammatory diseases;
5. Roentgenotherapy of postoperative processes;
6. X-rays in neurology.
7. Ability to use units of measurement
8. Ability to behave correctly in the radiotherapy department**.**

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration).

Discipline	Know	To be able to
Normal and topographic anatomy	Anatomy of organs and surrounding tissues, topography for conducting radiotherapy.	To be guided in topographic anatomy for adequate treatment.
Normal physiology	The nature of the physiological processes of the organism.	Distinguish the physiological processes from the catarrh, and to be able to correct the last.
Pathological physiology	The nature of pathological processes in the body.	Pathophysical processes that are nascent in the result of radial te-rapia.
Internal diseases	To establish the final diagnosis and treatment tactics, taking into account the concomitant diagnoses.	To be guided in the course and clinical manifestations of illness.
Oncology	Features of the oncological disease, verification of the diagnosis and treatment of cancer patients.	To be guided in the course and clinical manifestations of oncological illness.
Radiology	Ability to navigate in sufficient volume in X-rays.	Correctly assign one or another X-ray examination and evaluate it.

4. Tasks for independent work during preparation for classes and classes.

4.1. A list of the main terms that the student should acquire when preparing for a course:

Term	Definition
Thrombophlebitis	inflammation of the wall of the veins with education in the lumen of the blood vessels of the blood vessels
Felon	purulent diseases of fingers and hands

4.2. Theoretical questions to the lessons:
1. Stages and stages of radiation damage.
2. Theories of biological effects of IP.
3. Radio sensitivity to the IP, its species.
4. Factors that determine the sensitivity of the cell to the IV.
5. Changes that occur in a cell under the action of ionizing radiation.
6. The most important processes that cause the destruction of the cage.
7. Factors on which the reaction depends on the effect of IP.

8. Reparation of the cell from the action of the IV.

4.3. Practical tasks performed at the lesson:

1) In the form of a situational task to determine the type of radiosensitivity
2) In the form of a situational task to determine the stages and stages of radiation damage.
3) In the form of a situational task to determine the number of collapse
4) Professional algorithms (instructions, orienteering maps), mastery of skills and abilities: educational tasks, tests, tasks, which complement the independent work in a practical lesson, as well as reference materials: materials of post-audit work independently. Subjects of research work of students**.**

Contents of the lesson.

For several decades, radiotherapy has been widely and successfully used in the treatment of many non-tumor diseases. Currently, it is unlikely that its high efficiency in the surgical clinic during boils, carbuncles, hydrodenites, panaritises, parotitis, postoperative infiltrates, anastomozites, thrombophlebitis and other diseases is doubtful. Radiation therapy is widely used in the clinic of nerve diseases, it is the main method of treatment for syringomyelia, very effective at all sorts of neuralgia and neuritis, especially the sciatic nerve, shoulder plexus, trigeminal neuralgia, intercostal nerves and lumbosacral radiculitis.

Radiotherapy is widely used in the clinic of internal diseases, with diseases of the ear, throat, nose, tuberculosis and many other sections of clinical medicine.

Depending on the depth of the inflammatory process and the extent of its extent and practice of treating non-tumor diseases, apart from classical radiotherapy, dis tance gamma therapy may be used. With superficially located processes in skin practice (eczema, neu-rhodermitis), gynecology (erosion of the cervix and some inflammatory diseases), ophthalmology (iritis, scleritis, iridocyclitis, episcleritis), preference remains after close-focal radiotherapy and beta-applicators with radioactive phosphorus.

Wrong understanding of the issues of radiology and biological action has led to an exaggeration of the dangers of radiation therapy in non-tumor diseases and unwarranted restriction, and sometimes the complete refusal of it in the practice of treatment of non-communicable diseases, to the wrong orientation of radiotherapy specialists and doctors of other profiles, and also the sick themselves. Incorrect orientation in the radiation therapy of non-tumor diseases is due to the lack of literature, which contains specific clinical and dosimetry-based recommendations at the present level.

Comparing this method of research with radiotherapy for non-tumor diseases, when applying very limited fields of radiation, small single and total doses, good centering with the direction of radiation beam only on the pathological cell and good efficacy of treatment, involuntarily convinced of the safety, feasibility and validity of the use of this method of therapy. In this regard, we consider it necessary to emphasize that radiotherapy has been and remains one of the effective treatments for many non-tumor diseases that are not dangerous to the life of patients, but they cause suffering for a long time. The analysis of the length of stay on the hospital records showed that a significant percentage of them are patients with acute or chronic inflammatory diseases and degenerative-dystrophic processes in the bones.

It is unlikely to be justified now the use of radiotherapy in diseases such as tuberculosis of various organs and systems, diseases of the cardiovascular system (myocardial infarction, hypertonic illness, obliterating endarteritis), lung gangrene, pleurisy, bronchiectasis. Low-effective radiation therapy and in some diseases of the central nervous system (encephalitis, poliomyelitis, multiple sclerosis, parasites of the brain).

It limits the use of radiation therapy and in the clinic of skin diseases. However, in capillary hemangiomas, neurodermatitis, chronic eczema and some dermatoses and dermatomycosis, despite the emergence of new drugs and therapies, radiotherapy curl still remains one of the most important and effective means of treatment.

Radiation therapy for non-tumor diseases in children should be banned and may only be used for specific indications in exceptional cases. Given the same genetic hazard, radiation therapy is restricted to non-tumor diseases in childbirth, especially when the organs of the internal secretion or the central nervous system get into the radiation zone. In determining the evidence for X-ray non-tumor diseases, it

is always necessary to approach differentiated, incalculating the age of the patient, the nature and localization of the process. Physical and technical conditions, irradiation techniques, single and total doses should be established after dosimetric studies and good centering.

The study of long-term results of treatment and the effects of radiation therapy re-constitutes that there is no reason to refuse this very effective treatment.

When appointing radiation therapy, it is necessary to widely vary the physical and technical conditions of radiation: Depending on the depth of the process, change the generation voltage, the half-wave layer, the source distance - the skin, the magnitude of the irradiated field and the direction of radiation beam. In addition, it must be remembered that one of the main conditions for the improvement of radiation therapy of non-tumor diseases is the desire to get good efficacy when irradiating marginally with minimal doses. It is known that the more acute the inflammatory process proceeds, the less the pog-lined dose at which you can achieve a good effect.

In assessing the effectiveness of radiation therapy of non-tumor diseases it is decided to proceed from the magnitude of the absorbed dose both in the area of the pathological cell, and in the entire volume of irradiated tissues.

It is now considered that, when acute inflammatory processes are most effective, single dose absorbing doses of 10 to 25 radium are considered. Depending on the acuity of the process, a single absorbed dose may be reduced to 3 to 5 radius. Total absorbed doses are often 50 radii, but in some cases can be increased to 100 - 150 radium.

However, in the chronic course of inflammatory processes, especially in degenerative-dystrophic changes in bones and periarticular maturation, depending on the prescription of the disease and the nature of the course of the process, one-time absorbed doses are increased to 30 - 50 radium, sometimes up to 75 radium, and total absorbed doses up to 250 - 500 glad, sometimes up to 600 glad.

Depending on the physical and technical conditions of irradiation and the nature of the irradiated tissues, a single dose of absorbed dose can be obtained at various exposure doses. The average depth of the placement of the pathological cell is calculated from the external skin surface to its center. It is defined by the palpation and is compared with the sketches of transverse sections of the irradiated area. The established absorbed dose will correspond to the average approximate absorbed dose in the inflamed hearth.

In addition to the average focal absorbed dose, the integral absorbed dose in the pathological cell or organ is also determined, that is, we need to have an idea not only about the energy of the γ-radiation absorbed by the given mass of the substance, but also on the integral absorbed dose in the total volume of the irradiated tissues . The latter gives an idea of the radiation load of those surrounding the pathological cell of tissues and critical organs, which is very important in the irradiation of deeply located pathological processes.

Since the circuits for calculating the integral absorbed doses in the inflamed center and in the entire irradiated tissue volume are complex, varying depending on the generation voltage and, except for the one published in the special literature, we do not reduce them.

As is known, the quality of X-rays is determined by the physical and technical conditions, including the generation voltage, the half-loop layer, the filter, the source distance - the skin and the size of the field. Therefore, depending on the depth of the process localization, the corresponding conditions of radiation are selected. To reduce or exclude irradiation of healthy tissues by pathological cells, it is desirable to use less penetrating radiation, that is, to strive to reduce the generation voltage. It is advisable to use a low voltage generation for the superficial location of the inflammatory process and, conversely, in deeply located centers should use more penetrating radiation with high energy.

Pathological cells located near bone tissues (panaritium, thrombophlebitis, radiculitis, arthrosis-arthritis, epicondylitis, etc.), it is expedient to irradiate at the generation voltage of 180-200 sq. A-1 mm Ci. As you know, bone tissues in large quantities absorb low-energy energy, which contributes to increasing the absorbed dose of II in surrounding tissues due to secondary scattered radiation.

Distance source - the skin is determined by the depth of the location of the pathological cell. Surroundly located hearths are irradiated with a minimum distance of 7.5 to 30 cm, and vice versa, with a deep

location of the process, the distance increases to 40 - 50 sm. The size of the field, as in the oncology practice, is to blame for several times the magnitude of the inflammatory process.
In radiotherapy for non-tumor diseases, as in oncology, the value of beam beam centering has recently been added. It is known that depending on the direction of the radiation beam, it is possible to reduce and increase gonadal doses and doses to vital organs.

Among other conditions of radiotherapy of non-tumor diseases is given value and rhythm of irradiation. On the basis of the prevailing ideas about the mechanism of action of radiation on the inflammatory process, depending on rThe acute course of the disease was established interruptions between irradiation from 3 to 5 days, which lasted up to 7 - 10 days in exacerbations. However, in recent years, some changes have been made in the direction of individualization of the rhythm of radiation. Considering the use of significantly lower radiation doses, depending on the severity of the process, there is a tendency to reduce the intervals between the irradiation sessions.

Acute inflammatory processes in the absence of exacerbation after the first session can be irradiated with an interval of 1 - 2 days. In suppurative processes, the intervals between sessions irradiation-tion increase to 3 - 5 days. Chronic inflammatory processes, degenerative-degenerative diseases of the bones in the absence of exacerbation after the first session can be irradiated with an interval of one day. In case of aggravation of the process, the interval increases to 2 - 3 days without reducing the one-time pre-zia.

In chronic inflammatory diseases and exacerbation of the recurring process, radiotherapy is re-assigned, usually 5 to 6 months after the last course of treatment. Repeat the beam, therapy can be 3 to 4 times, but only with the unconditional effectiveness of each previous exposure.

Radiation therapy is the most effective means in the stage of inflammatory infiltration, but can be used in the stage of necrosis, suppuration and regeneration. In the stage of necrosis or suppuration, radiotherapy is used to exacerbate the process, Separation or encroachment of the inflammatory focus prior to surgical intervention. In the absence of outflow purulent content, radiotherapy should not be used. Long-lasting wounds, with sluggish granulation and inflammatory changes, can be irradiated with small doses of radiation in combination with antibiotics.

Types of beams used in radiation therapy for non-tumor diseases

X-ray	10 Kev; 40 Kev; 200 Kev
Gamma rays	60So27 with an energy of 1.02 MeV (C, T1 / 2 = 5.27 years)
Beta rays	32P15 with an energy of 1,701 MeV (P T1 / 2 = 14.3 days) or accelerated electrons with energies of 10 - 15 MeV
Alpha particles	222Rn86 with an energy of 5.49 MeV (Rodon T1 / 2 = 3.8 days)

There are three theories of biological action of ionizing radiation, which underlie hypothesis about the mechanism of therapeutic action in the treatment of non-tumor diseases:

1. Cellular - enzymatic, which is the main factor of the radial effect in the destruction of cells (especially leukocytes) and cellular exudate with the release of protein-rich products and proteolytic enzymes that affect local tissue processes and the whole organism;

2. Neuro-regulatory theory on which the action of rays is based on the neuroendocrine system.

3. Electro-chemical theory is based on the fact that a change in the tissue medium (acid-alkaline state) plays an essential role in the mechanism of therapeutic action of ionizing radiation. These changes are of two-phase nature: immediately after the radiation action, a short-term increase in acidosis occurs, which changes in alkalosis by alkalosis in 6-24 hours.

The effect of radiation therapy of non-tumor diseases is provided by such radiative effects:

- anti-inflammatory
- analgesic
- anti-spastic
- antisecretory
- cytodestructive
- desensitizing

Radial action is used to reduce pathologically enhanced biological activity (suppression of acute and chronic inflammatory reaction, inhibition of proliferative processes, oppression of pain sensitivity, decrease in secretory activity of glands).

The therapeutic effect of radiation in inflammatory diseases leads to an increase in the biological activity of tissues and the acceleration of their healing. Strengthening of destructive processes during irradiation of the center of purulent inflammation contributes to the reduction of the period of maturation of the abscess. The effect is also due to increased vascular permeability, which leads to an increase in exudation and an increase in lymphatic outflow.

Effects of enhancement of biological activity in comparison with the usual or pathologically degraded level of vital activity are secondary in nature, as a consequence of the initially oppressive (damaging) action of radiation (for example, radiation suppression of inflammatory processes in the wound leads to an increase in the biological activity of tissues and accelerates its healing ; the strengthening of the destructive processes in the irradiation of the center of purulent inflammation contributes to the reduction of the period of ripening of the abscess and the like)

Anti-inflammatory effect. The mechanism of therapeutic action of ionizing radiation on the percolation process consists of a local and general action. There is a local pluripotency of irradiated tissues with an increase in the permeability of the walls of the capillaries, increased migration into the tissue of the form-shaped blood elements, the breakdown of leukocytes (especially lymphocytes) with the formation of biologically active substances. Phagocytosis and detoxification increase, regeneration increases. Acidosis is replaced by alkalosis, which promotes the appearance in the tissues of electrolyte balance and pain disappearing, regulates and normalizes cell permeability, osmotic hypertension and all other factors of the inflammatory process. Unspecific immunity is growing.

The analgesic effect in radiotherapy is associated with direct action of radiation on boolean nerve endings, sensibilized with serotonin and products of protein degradation in inflammatory and inflammatory sites, and with a decrease in inflammatory changes (intracavity pressure, acidosis, and concentration of K + ions).

At present, the criterion of radiation in the treatment of non-tumor diseases is not only the effectiveness of treatment, but also possible long-term effects of biological action on the organ, tissue and cellular levels.

Indirect irradiation - irradiation of the relevant parts of the central or peripheral nervous system (for example, reflexogenic zones, spinal cord ganglia with phantom syndrome, projections of the affected nerve in neuritis, upper cervical sympathetic nodes in syringomyelia, etc.) are rarely used, mainly in combination with direct irradiation (for example, in the case of a painful post-amputation syndrome irradiating the reflexogenic zones and the corresponding spinal ganglia).

Means of delivery of a dose at radiation treatment of non-tumor diseases:

1. One-time;
2. Fine;
3. One-way;
4. Multilayer;
5. Moving;

Contraindications for radiation therapy for non-tumor diseases.

Absolute contraindications:

1. Severe general condition with a sharp weakening of the protective forces of the organism;
2. Concomitant diseases in the stage of decompensation;
3. Leukopenia (below 3.2 x 109 / l);
4. Thrombocytopenia (below 150x109 / l);
5. Anemia (expressed);
6. Formed abscesses;
7. Heavy progressive phlegmon;
8. Acute, subacute and generalized form of eczema.

9. Pregnancy, childhood (in this patient population, radiation therapy can be performed only in exceptional cases, in the presence of absolute evidence (sharply expressed pain syndrome, which is not removed by other means; progressing purulent inflammation that does not undergo antibacterial therapy (panaritium , carbuncle of lithium, etc.));
10. Radiation and radiation damage, even transmitted in the past.

Relative contraindications:
1. Acute septic and infectious diseases;
2. Pronounced and common skin inflammatory and other changes caused recently transmitted by general illness or by various physical and chemical agents (including physiotherapy);

Radiation therapy can not be used in such diseases as:
1. tuberculosis of different organs and systems;
2. diseases of the cardiovascular system (except for phlebitis and thrombophlebitis);
3. pneumonia and pleurisy;
4. diseases of the central nervous system (poliomyelitis, multiple sclerosis, muscle parasites, mental illness).
5. with osteochondrosis with signs of pressing the back hernia of the disk.

Plan radiotherapy for non-tumor diseases.
The course of radiation therapy for non-tumor diseases is divided into three periods: pre-radius, pro-man and post-radium.
Pre-radiation period:
1. detailed examination of the patient and the establishment of evidence and contraindications for radiation therapy;
2. choice of radiotherapy type and additional non-radiotherapy therapeutic actions;
3. choice of the optimal single and total radiation dose;
4. determination of topographic anatomical relations of the pathological process;
5. choice of optimal rhythm (schemes of fractionation of dose) irradiation;
6. determination of the technology of radiation (the type of beams, its energy, the method of beam-cutting).
Radiation period:
1. Radiation treatment;
2. application of additional non-radiotherapy methods;
3. observation of patients and correction of the plan of treatment if necessary.
After the period:
1. observation of the patient, including periodic monitoring by the radiation therapist.
2. treatment of the effects of radiation therapy if they arise.

When conducting radiotherapy of non-tumor diseases, along with the formulation of the plan of pro-neu treatment, special documentation is required: a card of radiation treatment of the patient, a book of registration of treatment of patients, a protocol of dosimetric control, and others.

Pre-radiotherapy for non-tumor disease is required:
1. To exclude various additional radial, chemical, thermal, mechanical and other actions on the irradiated area, which can strengthen the biological effect of ionizing radiation;
2. At the beginning of radiotherapy, to cancel physiotherapeutic treatment;
3. To remove irritating ointments;
4. To exclude preparations of iodine, mercury, arsenic, bromine;
5. Conduct medical treatment, aimed at strengthening the therapeutic effect, strengthening the body's protective forces (rational behavior, calorie nutrition, vitamin therapy).

During radiotherapy, you need:
1. Lubricate the skin with anti-inflammatory ointments or neutral fat (lanolin, vaseline, di-creams);
2. In the presence of postoperative wounds or fistulas to make bandages with a hypertonic solution or a solution of furatsillin, powdered with antibiotics;
3. If necessary, put a dry aseptic band on the lesion.

During radiotherapy you can not:
1. Handle brilliant green, alcohol, iodine, cologne, spirits;
2. At the end of the radiotherapy: local and medical treatment, the area subject to irradiation can be renewed in 2-3 weeks;
3. Physiotherapy procedures can be resumed in 6-8 weeks if necessary.

Radiation therapy for inflammatory and purulent diseases of soft tissues.

Radiation therapy is effective and should be used at boils - acute inflammation of the hair sac and associated sebaceous gland, carbuncles - purulent inflammation of several hair bags and related sebaceous glands. When carbuncle there is a spillway purulent-inflammatory process of the skin and subcutaneous tissue with extensive necrosis and tissue disintegration, severe toxicity and vascular thrombosis. In carbuncles and abscesses, radiotherapy can only be used in the stage of inflammatory infiltration in the initial phase of the disease or after surgical treatment and removal of abscesses to accelerate the resuscitation of inflammatory infiltration. The method of radiotherapy for this group of diseases is approximately the same. Depending on the propagation of the process, a generator voltage of 120 or 140 kV, 1 - 4 mm A1 (filter 3 mm A1) is used to generate depth. Distance source - skin 30 cm, field 4x4 or 6x6 cm.

Carbuncles and abscesses can also be irradiated on near-focal radiotherapeutic devices. At the same time, a single absorbed dose is 5 - 10 radium, the total cellular absorbed dose is 25 - 50 radium depending on the acuity of the process. Interruptions between sessions are 3 to 4 days, especially when localization of the disease on the face. In the absence of exacerbation after the first irradiation session, intervals can be reduced to one day.

Panaria - the most common purulent disease of the fingers and the brush. In the surgical clinic there are several forms of panaritis, from which we will focus on the skin, subcutaneous and bony, as well as nail form, or paronychia, in which radiation therapy is successfully applied. With tendon-fume, articular panaratsii, as well as at abscesses and phlegmons of the brush, X-ray therapy is not carried out. These diseases are subject to treatment in a surgical clinic.

Efficiency the treatment of pannathias is determined by the phase of the current and the localization of the process. Skin-like pannitsii on the severity of the flow differs from the subcutaneous, which affects subcutaneous fat from the phenomena of necrosis. Localization of hypodermic panaria also has an effect on the clinical course. The process on the back side of the brush is often accompanied by lymphangitis and the spread is squeezing under the skin. With such a localization almost no lesions of the bone or joint. When localization of the process on the palmar surface of manure penetrates much deeper into the tissue, this form often affect the periosteum and joints. Radiotherapy is used in all stages of the skin and only in the initial stage of the subcutaneous form of panaritium.

Of all types of nail panarization, radiotherapy is used only for paronychia, and the sublingual panaritis, especially with suppuration, requires surgical treatment.

Paronychia is a fairly frequent purulent disease of an envelope roller and nail bed. X-ray therapy is most effective in the initial phase of the disease, when the process is limited to inflammatory infiltration of the circumferon cavity.

In cases where the acute inflammation from the surrounding soft tissues passes to the bone, there is purulent defeat of the bones or bone panaritis. The method of radiotherapy of this form is determined by the peculiarities of the course of the process. Bony panarats, which occur without sequestration, are irradiated with a single absorbed dose of 25 - 30 radium with a break in 2 - 3 days; the total absorbed dose is increased to 100 - 150 radium. In the presence of sequestration, the method of radiation, as in paronychia, is aimed at exacerbating the process with the subsequent acceleration of the melting of

tissues, which contributes to a better self-isolation of sequesterers. Beginning radiotherapy with a higher single dose absorbed about 60 radium, which subsequently gradually decreases to 25 radium. The intervals between sessions are 2 to 3 days. The total absorbed dose amounts to 200 - 250 radium.

In the so-called primary bone panarations, when the process proceeds very sharply, bore-whitish and bone is rapidly affected (this form of flow is rare), surgical treatment is used. X-ray therapy can only be used in the postoperative period for better healing of the wound. Radiotherapy for panaritization is performed at a voltage of 180-200 kV, L-0,97 or 1.2 mm Ci (0.5 mm Ci filter), source distance - skin 30 cm, single absorbed dose of 25 radium. The total absorbed dose may vary depending on the acuity of the process within 100-150 radius. In this form of pannation, the magnitude of the field should be such that to capture not only the primary focus, but also the visible phenomena of lymphangitis.

No less frequent and painful disease, which is subject to radiotherapy, is hydradient - inflammation of sweat, or apocrine, anthrax glands. The pathogen penetrates through the skin, excretory ducts of the glands or hematogenous and causes in the glands and surrounding cells inflammatory digestive infiltrates. For hydradenitis characterized by multiple infiltrate of various sizes, which in some places revealed with the release of oppression. The disease usually has a protracted nature with a tendency to spread and relapse.

In the literature, two methods of radiation therapy hydradenites are known. The first is anti-inflammatory action. The voltage of generation is 140 kV, A4 mm A1 (filter 3 mm A1), source distance - skin 30 cm, single dose 25 radius; the total absorbed dose may vary within 100-150 radius; Interruptions between sessions are 2 - 3 days. In fuller people it is expedient to use a large amount of energy, up to 180 - 200 kA A-97 mm Ci.

The second method is intended to cause what launches sweat glands and epilation of the hair-coat - it is used in chronic recurrent hydradenitis. Under the same physical and technical conditions, a large single dose is absorbed - the so-called epilation - within the range of 450 - 500 radium, which is also the total absorbed dose. Sometimes this dose is given in two doses with a break in 2 - 3 days.

Thrombophlebitis - inflammation of the vein wall with education in the lumen of the blood vessels of the blood vessels. This disease can be a complication of influenza, typhoid, pneumonia, severe operations and rad's. By features of the clinical course distinguish acute, subacute and chronic thrombophlebitis. There is a deep and superficial thrombophlebitis. Most often the wrists of the leg are struck. From clinical symptoms for thrombophlebitis are characterized by pain, edema of the limb, consolidation, thickening of the veins of the veins in the form of cords with separate nodal formations. Acute thrombophlebitis is accompanied by stronger pain and temperature reaction, chronic - puffiness and feeling of severity in the extremity.

One of the main methods for diagnosis of thrombophlebitis is phlebography, which specifies the localization and the length of the process. Radiation therapy is indicated at all three stages of the development of the process. Radiation is best done in stationary conditions, and in acute form, this requirement is mandatory.

X-ray therapy is carried out at a voltage of 180-200 K, D-0.97 or 1.2 mm Ci, distance to Relo - leather 30 sm. The dose absorbed at once varies depending on the acuity of the process within 10 - 20 radius, the total - within 100-160 radium. Spacing intervals between sessions are 2 to 3 days in fast-moving processes; At subacute and chronicly occurring thrombophlebitis, irradiation can be done in a day. The magnitude of the irradiation field is selected on the basis of phlebograms.

X-ray therapy is also used for other inflammatory diseases. The same method of radiotherapy is used in parotitis - inflammation of the parotid salivary gland. Physical and technical conditions, single and total absorbed doses correspond to that used in boils, panaratsii and other inflammatory diseases. The most effective reengentotherapy in acute mumps, which arose as a complication after a heavy operation.

Only in case of epidemic mumps the radiation therapy is contraindicated.

Radiation therapy for postoperative complications.

Despite the use of antibiotics and a wide range of their effects, until recently there are still various inflammatory postoperative complications. Often, postoperative infiltrates are found in patients undergoing surgery for inflammatory or pulmonary diseases with microflora resistant to antibiotics. Other

quite frequent and severe postoperative complications include anastomosis, which is based on inflammatory edema of the mucous membrane, which leads to an abnormality of the function of anastomosis and the need for re-laparotomy. Early use of radiotherapy with anastomists gives better results. After determination of the localization of the inflammatory process, the manufacture of a transverse cut-off eczema and marking of the fields of pro-reduction is assigned gamma- or X-ray therapy under the following physical and technical conditions: voltage generation of 180-200 K, D-0.97 or 1.2 mm Ci (filter 0,5-1 mm Ci), distance source - skin 30 - 40 cm. Once absorbed dose of 10 radium, the total absorbed dose varies from 50 to 80 radium. Field size 6X8 or 8XI0 cm. The intervals between sessions are 1 - 2 days.

Often, it is necessary to conduct radiotherapy after appendectomy in connection with poya-iuu 'inflammatory infiltrates. With these complications, X-rays can be used in all stages, but it is most effective at the onset of the disease. Physical and technical conditions of irradiation are determined by the depth of the inflammatory focus. When irradiating inflammatory infiltrates, located 5 cm from the skin surface, a voltage of 140 kV, A-4 mm A1 is used. At a deeper location of the pathological cell (8 - 10 cm) and its length extends over the width of the applied tighter, penetrating radiation (gamma or X-ray) at a generation voltage of 180-200 K, D-1.2 mm Ci. The immediate absorbed dose is 10 - 25 radius, the total is within 100 - 150 radium. The intervals between sessions are 2 to 3 days, and sometimes it is enough for one day. Depending on the severity of the course of the process and the effectiveness of radiation, one-time and especially total doses can be significantly reduced. In some cases, as with anastomoses and postoperative infiltrates, it is enough to conduct 2 to 3 sessions of radiation with a single absorbed dose of 10-16 radium to completely deprive the patient of a serious illness.

Radiation therapy for nervous diseases.

In connection with high efficiency, radiotherapy is absolutely indispensable for almost all diseases of the peripheral nervous system and especially with neuralgia and neuritis.

Radiation therapy in diseases of the peripheral nervous system should be used only after consultation of the neuropathologist indicating the topical localization of the process and in the absence of the effect of other therapeutic measures, or when other methods of treatment are not feasible.

Patients with neuralgia and neuritis irradiate most often in outpatient settings, but with acutely pronounced treatment, it is best to spend in the hospital with the use of painkillers. Any physiotherapy procedures are contraindicated. Neuralgia can occur as a manifestation of the primary inflammatory process, but there are secondary neu-ralgias, which are usually the result of diseases such as tumors of the spinal cord, osteochondrosis, spondyloarthrosis. Neuralgia are characterized only by pains, without disturbances of conduction, whereas neuritis is accompanied by disorders of motor and sensory functions and phenomena of loss. This is a further stage in the development of the process with a deeper nerve injury. The main clinical sign of the disease is the pain that occurs suddenly, is anaphylactic in neuralgia and persistent - in neuritis. The cause of neuritis is most often trauma, infection, inoculation and cooling. Radiation therapy is used in chronic infectious and cold diseases of the peripheral nervous system, as well as in secondary neuralgia caused by osteochondrosis, spondyloarthrosis, diseases of the ligament apparatus and intervertebral discs.

Very often you have to cry To provide radiation therapy for neuralgia or neuritis trigeminal nerve related diseases of the peripheral nervous system. With neuralgia of the trigeminal nerve, with the defeat of all branches, the best results give an irradiation of a gaseous mucosa that is located on the anteroposterior surface of the temporal bone pyramid.

X-rays are equally effective in neuritis of the facial nerve, when irritated by the place of its output, that is, the area of the parotid gland. In addition, radiotherapy with success-homs is used to relieve pain in neuritis of the shoulder plexus. In cases where the cause of this disease is an additional cervix or aneurysm of the subclavian artery, ren-tgenotherapy is ineffective. When radiotherapy of these diseases is used, the generation voltage is 200 kV, A1 mm Ci (filter 0.5 mm Ci), source-skin distance 30 cm. Once absorbed dose is determined by the severity of the course of the process and can vary from 10 to 20 radium. The total absorbed dose is 75-100 radium.

Intervals between irradiation are also determined by the nature of the course of the process: when acute, they make up 2 to 3 days, with a chronic one day. The size of the field is determined by the length of the process, but more often they are 4x4, 6x6, 8x8 cm. In chronically flowing processes, single and total absorbed doses are increased several times.

It is known that the bulk of the patients with diseases of the nervous system are persons with lumbar sacral scars, characterized by pain in the region of the lower back and the sacrum with irradiation in the legs, sometimes with a disorder of skin sensitivity and reflexes. The features of the clinical course distinguish acute, subacute and chronic lumbosacral radiculitis. Radiation therapy is used in all three stages of the disease, some kind of pain-relieving and anti-inflammatory treatment. Its effectiveness is determined by the stage of the process and the timing of the start of treatment. Inflammation with this disease is the lumbar and sacral roots, and with radiculoneuritis or neuritis-tars of the sciatic nerve and the trunk of the sciatic nerve.

At cervical and thoracic radiculitis the cervical and thoracic spines are irradiated, at intercostal neuralgia - paravertebralaya area at the level of defeat. Physical and technical conditions of X-rays are the same as in neuritis of the facial and trigeminal nerves. One-time and total absorbed doses are determined by the severity of the process; in case of acute illness, single doses are 10 - 20 radians, in chronic processes one-time and total doses increase.

The intervals between sessions in acute processes are 3 - 4 days, with chronic ones one day. The irradiation fields are selected depending on the length of the process. Radiation can be made from one direct field or two fields, located paravertebral at an angle of 20 - 30 °, the size of the fields varies from 8xI0, 6xI0, 6x15 to 6x20 sm.

The method of radiotherapy of syringomyelia, in which radiotherapy is a basic and, probably, the only method of treatment that can delay the further development of the pathological process. In this disease there is a disorder of movements, sensations, vegetative innervation and trophics. In the spinal cord, glial growth occurs with the formation of cavities, which are localized in the gray matter of the posterior and, less, the anterior horns. Caverns come in different sizes. Sometimes they extend over almost the entire spinal cord. Gliosis growth and cavity you call compression and death of the brain tissue, which manifests itself in the form of disorder of movement, hearing loss and trophics. The main symptoms of syringomyelia are agrophysical paresis and paralysis, pain disorder and tactile sensitivity, and trophic vascular and motor disorders. The process often begins in the cervical spinal cord and gradually passes to the chest and lumbar. The disease usually lasts 15 - 20 years, slowly progressing. Death comes most often from complications or other illnesses.

As a result of radiation, the death of young, more sensitive glomerular cells occurs and the capillaries are launched, which contributes to the reduction of transduction and the increase of resorption of fluid from the cavity. All this contributes to a reduction in compression and, if the nerve cells are still not lost, the symptoms of spinal cord injury disappear. However, in cases where irreversible changes have occurred in the brain tissues, one can count on only the delay of the progress of the process. Radiation therapy is most effective in the initial stages of the disease, when there is only an enlargement of the gliosis elements, without the formation of cavities of disintegration. However, in later stages, in the presence of cavities of decay, radiotherapy sometimes delayed the development of the disease for many years.

As is known, with syringomyelia many different methods of radiotherapy have been used. To avoid confusion, we do not consider it necessary to give here all the methods used previously. We will present only one that, in our opinion, is most expedient and effective. First of all, only the affected areas of the spinal cord are exposed to irradiation. The size of the fields is determined by the length of the process. Often radiation is made by narrow long fields 6X15 and 6x20 cm, which are paravertebral with a slope of 25 - 30. to the middle line. At greater length of the process, the radiation is carried out in two pairs of fields. Irradiation is carried out every day or every other day. The use of such absorbed doses can significantly extend the remission (up to 3 years or longer) and significantly reduce the number of re-exposures.

Repeated exposure is prescribed only after mandatory consultation of the neuropathologist and in the presence of symptoms indicating the progress of the process.

Radiation therapy for inflammatory, degenerative and degenerative processes in the bones and joints. Such diseases as deforming arthrosis, spondylosis, bursitis, hepatic and osteophytic leakitis, epicondylitis, osteochondrosis and periarticular maturation are more common in elderly people. The main clinical manifestation of these are pains caused by secondary changes in soft tissues and causing great suffering, and which sometimes lead to prolonged disability. Radiation therapy, as with other diseases, has anti-inflammatory effect on surrounding soft tissues, relieves pain, increases the volume of movements in the joint and the spine. Affecting the nervous and skin receptors, it contributes to the restoration of trophic and metabolic processes in the surrounding tissues.

Radiation therapy in these patients, as a rule, is used in the absence of the effect of medication or physiotherapeutic treatment. Evidence for radiation therapy in all cases should be substantiated, the diagnosis of deforming arthrosis, spondylosis, or periarthritis should be confirmed by X-ray examination, and with changes in the spine, the level and volume of secondary neurological "erenians" should be determined.

X-ray therapy is carried out at a generation voltage of 180-200 K, A 0.9-1.2 mm C, with a source of source - a skin of 30 cm. The size of the field is selected depending on the volume of irradiated tissues. A single dose of 50 radium absorbed, a total absorbed dose of 500 radium. Interruptions between sessions of pro-megalotypes make up 2 to 3 days, and in the absence of exacerbation - one day.

With X-rays of arthrosis and periarticular swabs, great attention should be paid to the centralization, especially in the irradiation of the hip joint, located near the gonads.

When deforming arthrosis of the shoulder joint and periarticular grafting in this region, it is more appropriate to make irradiation with two intersecting fields with an inclination of a beam of radiation at 15 - 20 ° to the outside, which achieves less light irradiation of the lungs and other healthy tissues. Knee joints are irradiated from two opposite fields of size 6x8 or 8x10 cm. Small joints, a cluster of hands and feet, a bone of five are irradiated by one field in size 6x8 or 8x10 sm. It should be remembered that the effect of radiation therapy in degenerative changes and periarticular mucous membranes, as well as in many other non-tumor diseases, does not occur immediately, but only at the end of treatment or some time after its completion.

In the clinic of skin diseases, radiotherapy is used in the treatment of non-tumor diseases, especially chronic dermatoses: eczema, neurodermatitis, flaky and red flat lichen. Irradiation is also indicated with such dermatomycosis, as microsporia, scab. A special role for him is given in the complex treatment of fungal diseases of the volosystem part of the head - the so-called superficial trichophytes, microspores and scales. Since these diseases affect not only the horny layer of the skin, but also the hair follicles and the hair itself, there is a need for complete hair removal - the so-called epilation. In spite of the fact that other methods of hair removal are currently being used (thallium plaster, epilating patch, rosin bean hat, etc.), it is still widely carried out using X-rays.

We consider it necessary to dwell briefly on the issue of cautious attitude towards radiation therapy in skin practice. It is known that earlier, for the treatment of dermatoses and other skin diseases, radiation was generated that is generated at a voltage of 120-150 K, that is, a radiation that is relatively deep penetrating and inevitably gives an undesirable effect on those that fit the tissue , do not take direct part in the formation of the local pathological process. In addition, high single use (75 - 200 g) doses were used.
The performed dosimetry studies have convinced the need to reduce stress to avoid unnecessary irradiation of healthy tissues. In connection with this, there was a need to transfer the experience of close-focal radiotherapy to dermatological practice using the generation voltage from 20 to 50 kV adapted for these purposes by special tubes. When comparing dose curves obtained with different generation voltage (from 20 to 150 sq. Ft.), The most advantageous distribution of ionizing radiation obtained by low voltage strains.

Sharpening of the dose at a low voltage generation of about 20-50 sq. Will begin: in the tissues already at a depth of 5 mm. Knowledge of this is very important, since it is precisely when the eczema process is locally lysed in the first millimeters of the skin. In this regard, in recent years, there has been a significant reduction in single and sub-doses in eczema and neurodermatitis. Among the many proposed methods of radiotherapy for neurodermatitis and eczema is generally accepted, in which a single dose is only 10 g, and the total dose is up to 150-200 g. The intervals between sessions are 6 days.

Materials for self-control.
A. Questions for self-control:
1) Mechanism of action of Iy on non-tumor process.
2) Factors that determine the success of treatment.
3) Radiotherapy planning.
4) Methods of X-ray and tools used.
5) The role of filters in X-rays.

B. Tasks for self-control:
1. How does the biological effect of IV change with an increase in the absorbed dose of IV in the cells that are irradiated?
Answer: with an increase in the dose increases | is aggravated | effect.
2. How does the biological effect of I | when dividing | distribution | one and the same aggregate pre-zi on separate fractions?
Answer: when dividing | distribution | total dose to individual fractions of I | decreases the sto-foam of the radiation damage.
3. In which case will be the greatest biological effect of the action of | | at irradiation of the same dose or thigh and why?
Answer: The biggest effect is the irradiation of the abdomen, because in the irradiation field the intestine is located, the sensitivity of the cells of which | is much greater than that of the thigh tissues.
4. Biological action of I | more effective: in rare-ionizing | or densionizing | Why?
Answer: in densionizing |. Because they have a large linear transmission of irradiation energy.
5. What stage of dividing | separation | cells delay time dividing | separation | the cages of the most?
Answer: the delay time of division | separation | Cages are the longest in irradiation of it in the stage of DNA synthesis.
6. Interphase | the death of the cell comes to | to | enter cages in mitosis | or after it?
Answer: The cell dies to | to | admission to mitosis |.

Recommended literature on the topic:
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2. "Manual on Nuclear Physics" / Under. edit | G.P. Sivachenko - K .: 1991r.
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