1. At the young age disturbances of the intestinal biocenosis occur during the small period of time after intestinal infections and taking the antibiotics. The disturbances of stool are manifested in fermentative processes conditioned by the suppression of functional active forms of Escherichia. In 10% the complications in the form of dermal reactions developed.

2. The patients of the second group according to the microbial picture of feces were given the bio preparations. The course of treatment was determined individually.

3. In the third group of the patients the content of intestinal micro flora was characterized by the large amount of the conditional pathogenic flora without distinct clinical signs. The therapy aimed to the stimulation of the secretory and fermentative function of the digestive system was conducted.

Peculiarities of ion beams interaction with biological tissues

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Abstract: In paper the computer experiments results of simulation of energy distribution of particles in biological media are received by the using of software packages Geant4 and Fluka. The possibilities of these packages for the calculation of the absorbed dose distribution with the atomic composition of the target and the type of particles are shown.

Key words: ion beam, biological tissue, hadrons beam, Bragg curve, radiation therapy, cancer

The modern investigations in the area ofthe interaction of radiationwith matter are characterized by a broadandmultifacetedinvolvement ofall branches of physicsfor the interpretationof the results [1, 2]. The development ofaccelerator technologyhas ledto the use ofthe achievements of nuclearphysicsin medicine. Forexample, the radiation therapy-one of the mosteffective treatments formalignanttumors. This method consistsof irradiatinghigh-energy chargedparticlebeam.

The disadvantage of thisapproach isthat by usingof electron beamsand gamma raysoccursnot onlymalignantlesion, but also healthy tissue. To reduce sideeffectsallows using ofbeamsof hadrons(protonsandcarbon ionsC^{12}).The therapeutic effectisbased on the abilityof chargedparticlesexperience asharp slowdownand to transfermost of the energyabsorbed by thematerial.This propertyis reflectedin the graph ofthe lossofenergy of the particlepenetrationinto the substance(Bragg curve) as defined peakshortly beforestopparticles. This peakis calledthe Braggpeak. [3] This phenomenonallows us to localizethe impact ofthe beam, limiting its area oftumor.

However, effectivetreatment requirescarefulpreparation. One of the conditionsof this trainingis to simulate theprocesses occurringin biologicaltissues.In this case,considerthe physical properties, chemical composition of thetissue, the actual geometryof the irradiatedbody should be considered. The data source forthiscan be pre-conducted diagnostic studies,as well as datatomographyexamination of the patient.

Materials and methods

To solve thisproblem we suggestusingthe tools thatare usedin nuclear physics.The standard tool formodelinghereare the methods ofMonteCarlo.They are usedin a number ofpackagesintended formodelingthe interactionwith the substanceof the various particles. Extensiveuse is made ofsoftware packagesFlukaandGeant4 [4, 5]. Both packagesare used to modelthe propagationof chargedparticles andhardelectromagnetic radiationin matterand are based onsemi-empiricalmodelsof nuclear physics.Software packagesGeant4andFlukaallow taking into accountthe various processes, the geometryof the simulated system, the characteristics of the particlesinvolvedin the interaction.

Resultsanddiscussion

In thispaper we obtainthe Braggcurvefor beamsof protonsand singlyionizedcarbon ionsin biological tissueunder normal conditions.As a biologicaltissueis considered the medium inwhichthe tissueis equivalent toa realhumanin theiratomiccomposition (Table.1) [6].

Fig. 1 shows thecurve obtainedforthe Braggbeam of ionsof carbonC^{12}.

Table 1 − Percentage ofvarious elements inthe human body.

Element	Atomic content in thetissue (%)
^{1}H	61,7
^{12}C	8,3
^{16}O	26,2
^{14}N	1,7

These figures illustrate thewell-localizedpeak corresponding tothe Braggpeak. Inradiotherapyshould be consideredthat the tumorhasextended structure. Necessaryto irradiate, changing the energyin small steps. When modifying energy,localization of depthof the Bragg peakis also changing.

Figure of total dose which tissue cells received under scanning, called the modifiedBraggcurve[7]. Graph of the distributionof the totaldosehasa pronouncedmaximum.The bestcase iswherethe Bragg peakis a"plateau"in a sizeequal to the sizeof the tumor.This is necessary toensure that alltumor cellswereequallydose. Fora "plateau"should be summeddosefrom individualBraggpeakswith different weights. Weightsdetermined by the numberof particlesduring irradiation.

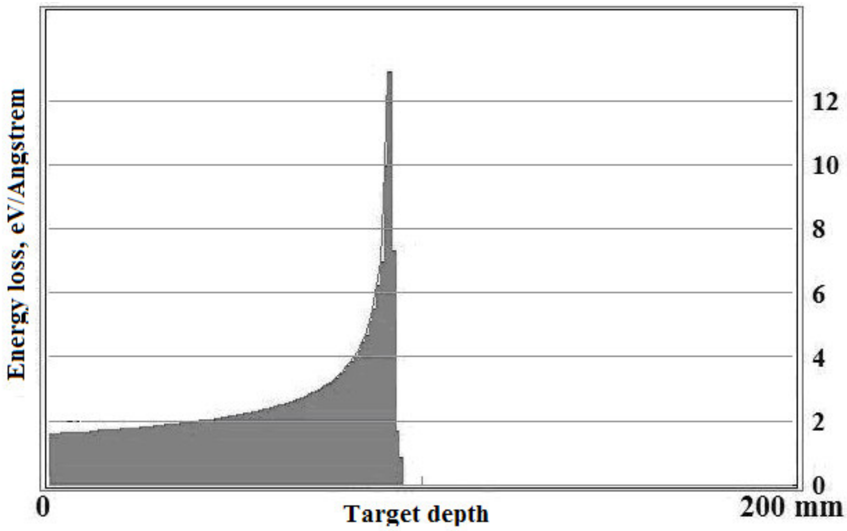

Fig.1 -The dependenceof the absorbed doseon the depthof penetration ofcarbonC12 +ionsinbiological tissue(the energyof the primary particles-2.5GeV)

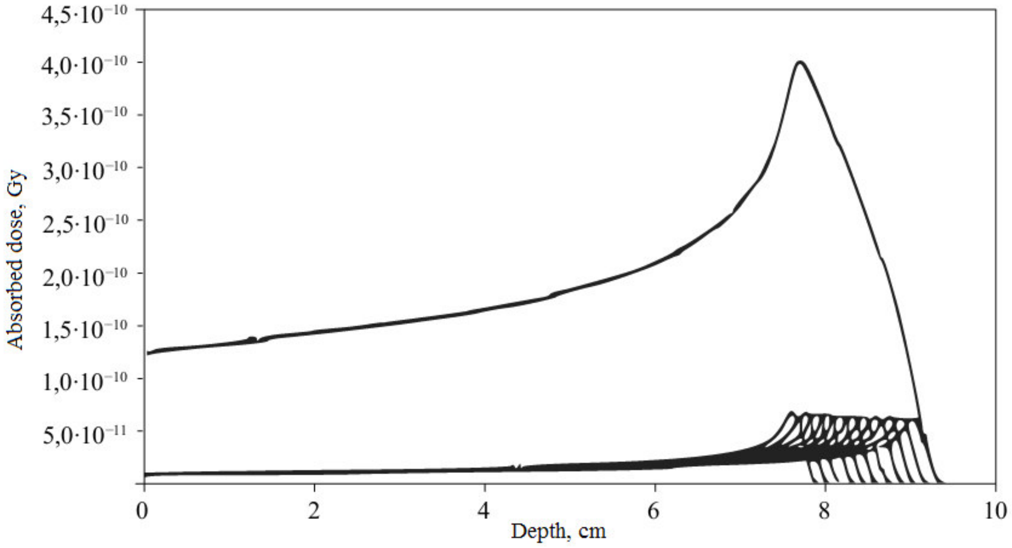

Fig.2 -ModifiedBraggcurvefor protons(energy range -100-110MeV)

Figure 2 showsthat thetotal dosehas apronounced maximum. The bestcase iswherethe Bragg peakis a"plateau"in a sizeequal to the sizeof the tumor.This is necessary toensure that alltumor cellshave receivedsamedose. Fora "plateau"should be summeddosefrom individualBraggpeakswith different weights. Weightsdetermined by the numberof particlesduring irradiation.

Figure3shows plots of"weighted"Braggpeakand totaldose.

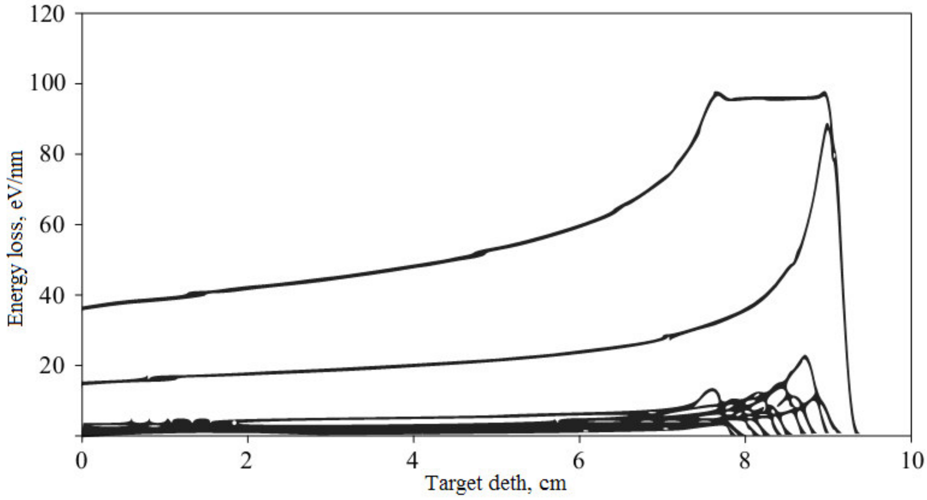

Fig. 3 -OptimizedmodifiedBraggcurvefor protons(energy range -100-110MeV)

Conclusions

Radiationwith highlinear lossis more effectivethanirradiationby electrons and photons, since such exposuremay affectcellular structuresdirectly,locallyrepeatedlybreaking themolecularstructure of thecell.Irradiationwithlow specific losses(photonsandelectrons) affects the molecularstructure of thecellsonlyindirectly throughintermediatechemical mechanisms.

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Infectious complications in patients with hematological malignancies

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Abstracts: The analysis of infectious complications in cancer patients receiving chemotherapy in soft hematology department of the Amur Regional Hospital were conducted in 2002 - 2011 years. In patients with acute lymphoblastic leukemia infectious complications reported in 88% of cases at the time of induction of remission, during the re-induction of remission and consolidation in 40%, in patients with acute leukemia non lymphoblastic 90% of cases at the time of induction of remission, during the consolidation of remission in 80% and during maintenance therapy in 10% of cases in patients with chronic lymphocytic leukemia in 85% of multiple myeloma is 40%, with 50% of NHL cases. The most frequent complication of Leukemia is febrile neutropenia, mucositis, and pneumonia. The most severe complications are pneumonia, sepsis and necrotizing enteropathy. The features of the course and prognosis of these diseases were analyzed.
Keywords:hematological malignancies, infectious complications.

Modern cytostatic therapy can achieve long-term remission and, in some cases, even cure many patients with blood diseases [2, 8]. However, these results are achieved through intensification of chemotherapy [8]. In the process of software hematological malignancies treatment in the majority of patients develop serious complications associated with hematologic and non-hematologic toxicity of chemotherapy. Joining infection can cause death of patients even in the absence of progressive tumor growth. The main factors determining the development of infection in patients with hematological malignancies were neutropenia (depth, duration, and speed of development), impaired cellular and humoral immunity, mucosal lesion of the gastrointestinal tract, central venous catheter [4, 6]. The most dangerous are the infections that have joined in the presence of neutropenia. By reducing the white blood cells less than 1×10^9/L and / or granulocytes less than $0{,}75 \times 10^9$/L (agranulocytosis), the risk of infectious complications increases significantly, they take an atypical, severe and protracted course [1, 2, 9]. In addition to bacterial infections in these patients are more often diagnosed with invasive fungal infections [3, 5].

In this context, the problem of diagnosis and treatment of infectious complications in patients with hematological malignancies receiving chemotherapy program is very important.

The aim of the study was to investigate the characteristics of infectious complications in patients with hematological malignancies who underwent chemotherapy program.

Materials and methods.

Studied history and hospital records 284 patients with acute leukemia (AL) over the age of 18 years, 180 with chronic lymphocytic leukemia (CLL) in stages B and C by Binet, 125 with non-Hodgkin's lymphoma (NHL), 123 with multiple myeloma (MM), 10 patients with chronic myeloid