

Keywords: radiotherapy, fractionation, TDF, LQ-model, radiobiology.

A properly planned course of radiation therapy increases the chances of achieving a positive result in the treatment of cancer. One way to achieve this is to minimize the influence on the course of treatment of deviations from the chosen scheme of therapy occurring from a number of random factors, for example, problems with equipment, staff work schedule, errors in dose calculation, etc.

Studies in the field of fractionated radiotherapy have developed intensively over the past four decades and continue today. According to the findings in clinical radiation biology, it is believed that there is a relationship between dose per fraction and normal tissue response. The value of the optimal dose per fraction is determined from the relationship of the total dose and the number of fractions for early and late manifestations of the radiation effect for normal tissues and tumors.

Currently, calculations of isoeffective doses in the Republic of Belarus are made using the TDF table (time-dose-fractionation). At the same time, in the area of large and small dose per fraction, the values of the maximum tolerated dose are usually overstated. This is supported by experimental and clinical data and means that the use of TDF tables for calculations in these dose ranges may result in incorrect values. In addition, the use of the TDF model does not take into account the peculiarities of response of different tissues and tumors to radiation, such as incomplete reparation and tumor proliferation changes. It is believed when changing treatment mode in the range of doses per fraction between 1 and 6 Gy LQ-model with the correct parameters allows to estimate the equivalent dose much more accurately than the model TDF. This conclusion is supported by clinical data [1]. It should be noted that the use of this approach in clinical practice requires a significant increase in the calculation volume of the changed parameters of treatment. Currently, there are no easy-to-use recommendations and tools to assess the radiobiological consequences of deviations from standard irradiation regimes and methods of their compensation.

The need to change fractional schemes in the course of treatment can be caused by a number of reasons: poor health of the patient, malfunctions of the linear accelerators, weekends and holidays, etc. Relatively often in the clinic, deviations from the standard scheme affect the parameters of dose fractionation in the final days of treatment. For example, sometimes it is advisable to carry out the last treatment on the day before providing mode two irradiation fractions per day. Similar deviation allows to prevent possible long interval between fractions, reduce the total time of irradiation of the patient as well as reduce the time spent in the hospital. Certainly, radiological principles should prevail over cost and convenience factors. In this regard, there is a need for evaluation of assessing the impact of such changes on the final result of treatment, as well as determining ways to minimize the consequences of deviations from standard schemes. Dose recalculation in case of an unplanned change in the fractionation scheme during treatment is a step towards adaptive radiotherapy, which will help to adjust the radiation regimen individually for each specific case.

Thus, the problem of accounting for dose changes in uneven and non-standard fractionation requires further study and clinical justification.

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ASSESSMENT OF ENVIRONMENTAL STATUS IN OVERWEIGHT INDIVIDUALS

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The paper proposes a new approach to solving the problem of overweight using the method of X-ray fluorescence analysis to determine the bio elements in the hair, as an indicator of metabolic disorders in the body.

Keywords: X-ray fluorescence analysis, biomaterial, body mass index.

The purpose of the work is to identify the imbalance of bio elements using a non-invasive method.

According to the WHO, 55 percent of Belarusians are overweight and obese. The critical mark after which it can be said that the nation is sick has already been passed. Therefore, the problem of obesity in our time is becoming

increasingly relevant and begins to pose a social threat to the lives of people, especially young people. To identify the features of the formation of imbalances in the micro- and macro elements among the youth of the city of Grodno and the Grodno region, observation groups of 18-30 years old with BMI = 19-24,9 and BMI = 25-30: women and men in the amount of 100 people were selected. For the study, biomaterial samples (hair) were selected according to the MBI.MN 3730-2011.

The macro- and microelement composition of the hair was determined by X-ray fluorescence analysis on a device of the type SER-01 or Elva X with the software Elvatech MCA Software and MK-RE-06. The XRD method allows express analysis of the chemical elements of the periodic table from sulfur to uranium in various media: solid, liquid, powder, to identify impurities with a concentration of 0.1 µg or more. Advantages of the method: obtaining a survey spectrum for all elements in one dimension; speed of receiving information; minimal sample preparation, without sample destruction; study of samples in various matrices; low energy consumption; the possibility of repeated measurements repeatedly.

The resulting material was processed using the statistical software package SPSS Statistics 22,0 as well as MS Excel. The median values of the content of essential elements in the biomaterial (hair) were calculated in groups of men and women with a body mass index of 19-24,9 and 25-30, the first and third quartiles. In young people aged 18-30 years, regardless of gender, with an increase in BMI = 25-30, there is an imbalance of vital essential elements: calcium, potassium, zinc, copper, iron. In the group of women, the most pronounced imbalance in calcium, zinc, copper. In the group of men, the most pronounced imbalance in potassium and iron. In the group of women, the accumulation of heavy metals such as mercury and cadmium are more intensive, and in the group of men, lead accumulates more intensively. All this contributes to the violation of metabolic processes in the body, which is possibly expressed in an increase in body mass index of both women and men. In the group of men with an increased body mass index, there are statistically significant correlations of element concentrations with BMI only according to the nonparametric Kendall and Spearman criteria. According to Kendall, there is an inverse relationship with BMI concentration of sulfur at a significance level of 0,05. With increasing BMI, the sulfur concentration decreases. According to Spearman, the inverse dependence of sulfur concentration on BMI is confirmed with a significance level of 0.01. There is also a direct dependence on the BMI concentration of lead in the body at a significance level of 0.05. In the Pearson group of women, there is a statistically significant (significance level 0,05) inverse correlation between the concentration of manganese in the biomaterial (hair) and body mass index. Thus, the lower the BMI, the more Mn accumulates in the body. According to Kendall and Spearman, the inverse dependence on the body mass index of manganese concentration at a significance level of 0,01, tin concentration at a significance level of 0,05 is statistically significant.

Conclusion

A non-invasive method (X-ray fluorescence) for determining the imbalance of bio elements and as a result of metabolic disturbances at an early stage of formation will allow for preventive measures and thereby maintain health at a young age.

PERIPHERAL BLOOD MEMORY T-CELLS SUBPOPULATIONS IN PATIENTS WITH SECONDARY COMPLICATIONS IN CHRONIC HCV INFECTION

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In this work, we studied the subpopulation composition of peripheral blood memory T cells in patients with chronic HCV infection with extrahepatic complications - cryoglobulinemia.

Keywords: immunological memory, chronic hepatitis C, memory T cells.

Chronic HCV infection is characterized by a long-lasting infectious and inflammatory process in the liver tissue, which, ultimately, leads to the development of liver cirrhosis. However, in some cases, against the background of the disease, extrahepatic complications of the infection develop, including diseases such as mixed cryoglobulinemia, vasculitis, autoimmune thrombocytopenia, etc. [1]. The exact mechanism leading to the