

Long-term effects in immunocompetent organs during simulation of radiochemotherapy in mature rats

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Standard radiotherapy for neoplasms is associated with a high risk of post-radiation damage. Due to this, the task of increasing the radiosensitivity of the tumor to radiation is relevant. One such promising medication is the synthetic nucleoside AraC (cytosine arabinoside). The aim of the work was to study the effect of the combined use of protons at a dose of 3 Gy and AraC on the physiological parameters of immunocompetent organs on the 90th day. The experiment was carried out on 22 mature male SD rats at the age of 8-10 weeks. Animals were randomized by weight into 4 groups: control, control+AraC, irradiation and irradiation+AraC. The animals were irradiated totally with protons in the cranio-caudal direction at a dose of 3 Gy with an energy of 170 MeV, the dose rate was 0.8 Gy/min. The medication was administered into the tail vein 1-1.5 hours before irradiation. body weight and immunocompetent organs were measured. White blood cell count (WBC) and leukogram was carried out by standard cytological methods. Statistical processing of the obtained results was carried out in the PAST and OriginPro 2018 programs. A comparative analysis of the number of leukocytes revealed a significant difference in the AraC group, however, the average values in all groups are included in the reference interval for rats of this line of this age, and a cytological examination of all blood smears did not reveal any abnormalities from the clinical norms, nor changes in the leukogram. A comparative analysis of the thymus mass showed a significant decrease in this indicator in the "Protons + AraC" group, which is the expected effect with total irradiation. The data obtained did not reveal functionally significant differences in the side effects of proton therapy when it was modified with cytosine arabinoside, since all significant changes correspond either to the physiological norm of rats or the expected effects of total irradiation. The results of the study on normal tissues indicate that the use of cytosine arabinoside in combination with proton irradiation does not lead to significant side effects in the long term, therefore, it can become a promising method of therapy. Further studies in tumor models are needed to determine efficacy and the presence of unrecognized side effects.

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