Fast neutrons action on tumor chromatin

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Chromatin is the complex of deoxyribonucleic acid (DNA) with basic proteins (histones) and acidic proteins (nonhistones), that exists in eukaryotic cells nuclei.

Chromatin samples (extracted from livers and from Walker carcinosarcoma of Wistar rats) were irradiated with fast neutrons (in doses of 10-100 Gy), produced by deuterons (13 MeV) on thick Be target at an IPNE U-120 Cyclotron.

The methods used in the analysis of chromatin structure modification produced by fast neutrons were: the determination of the chromatin intrinsic fluorescence, of the fluorescence intensities and also of the excited states lifetimes of the chromatin complexes with the ligand proflavine and by the measurement of the efficiency of Forster energy transfer between a pair of fluorescent ligands dansyl chloride and acridine orange, coupled at chromatin. The relative contributions of excited states lifetimes of bound and free ligand and also the mean distance between the pair of ligands coupled at chromatin were determined.

The fast neutrons action on chromatin determines multiple chromatin structure modifications: DNA strand breaks with the decrease of double helix proportion, acidic and basic proteins destructions and changes of global chromatin structure.

The tumoral chromatin has a greater fast neutrons sensitivity than a normal chromatin, maybe due to the bigger euchromatin/heterochromatin proportion.

The used methods permitted to establish the degree of chromatin radiolysis at different fast neutrons doses.

The influence of combined treatment with some cytostatics and also the effect of some radiosensitizers and radioprotectors and the administration of medicaments bearing -SH groups were analysed.

The results of the presented studies are useful in radiochimiotherapy schedule in clinical applications.