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Studies on the DNA damage induction and their subsequent repair in human lymphocytes exposed to various LET radiation

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The main goal of this study was to evaluate the DNA damage in human lymphocytes exposed to different type of radiation. The kinetics of the DNA damage repair in irradiated cells was also estimated. Freshly isolated lymphocytes (suspended in RPMI 1640 with a supplement of 15% calf serum) were exposed to various doses of : high LET neutrons (from ^{252}Cf source), low LET X and γ -rays (gamma rays from ^{60}Co source). Following irradiation the cells underwent the SCGE procedure. For lymphocytes irradiated with neutrons we observed the linear increase of DNA damage with dose. For X and γ -rays irradiated cells the linear-quadratic dose dependence was observed. In order to estimate the repair efficiency, cells irradiated with a certain dose were incubated at 37°C , and the DNA rejoining was investigated through an estimate of the residual damage after various times of post-irradiation incubation (5, 10, 15, 30 and 60). In the cells irradiated with neutrons, within first 30 min the DNA damage decreased to 50%. One hour after the irradiation 20% of the residual DNA damage was still observed. In case of X and γ -rays irradiated cells within first 15 min of incubation, the damage decreased to about 70% of the initial values. The residual DNA damage became minimal at 1 h after exposure.