BIOLOGICAL EFFICIENCY OF DIFFERENT QUALITY X-RAYS ESTIMATED BY mFISH ANALYSIS OF CHROMOSOME ABERRATIONS INDUCED IN VITRO IN HUMAN LYMPHOCYTES

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Structural rearrangements of chromosomes – chromosome aberrations (CA) – are the most sensitive marker of radiation exposure. The analysis of radiation induced CA in metaphase cells of peripheral blood lymphocytes is the only valuable method of human biodosimetry. It allows to estimate the dose to which an individual has been exposed occupationally, accidentally or therapeutically.

The advanced method of molecular cytogenetics multicolor FISH (mFISH) based on the whole genome painting allows visualizing all chromosome rearrangements with higher precision than routine methods. For the first time, we exploited multicolor FISH method to investigate the biological efficiency of different quality X-rays delivered at two LRB facilities that replaced recently deconstructed γ-^{60}Co unit ROKUS-M: CellRad (Precision, USA) and SARRP (Xstrahl, USA) and their suitability as a reference radiation in radiobiological research. For this study, lymphocytes obtained from the blood of one healthy donor were irradiated *in vitro* with 130 kVp X-rays + 0.5 mm Al manufacturer-supplied filtration or 0.1 mm Cu custom-made filtration (CellRad) and with 130 kVp X-rays with 1mm Al or 220 kVp with 0.15 mm Cu filtration (SARRP) at doses 1-4 Gy. The cells were harvested after 48 h of post-irradiation culturing and CA in metaphases of the first post-irradiated cell cycle were assessed. The cytogenetic effects of X-ray radiation were compared with the results obtained previously at the γ-^{60}Co unit (ROKUS-M, JINR) and with the results obtained earlier by one of the authors at the 250 kVp X-ray unit (Seifert, GSI, Germany) [1].