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PROTON RADIATION DOSE INFLUENCE ON NUMBER OF DSB'S IN CANCER CELLS

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In this investigation pancreatic cancer cells MIA PaCa-2 were irradiated with various doses of proton radiation: from 1 Gy to 30 Gy. Experiments were done using Tandetron 4110 accelerator in Center for Physical Sciences and Technology(which is in Vilnius, Lithuania). Irradiation was executed when cells formed monolayer. Distance from exit window to sample was 22 mm. Diameter of proton exit window was 0.175 mm, window was cover with 5 um Mylar film.
Properties of proton beam was evaluated with GEANT 4 (energy losses in Mylar and air, range in matter, processes of interaction, spectra of electrons created by protons etc.) and MCNPX (beam radius dependence on distance from proton exit (to the atmosphere) to the sample. Initial energy of protons were 1.6 MeV, beam radius (FWHM) at sample plane was 0.85 mm. It is important to know beam radius to assure even dose distribution.
It was calculated number of protons and created electrons per cell and per DNA volume. From modeling results (processes of interaction) possible number of lesions in DNA was evaluated. From these numbers presumptive number of DSB's per cell could be calculated. Actual number of DSB's was checked using flow cytometer.
Survival using colony method was also measured for dose control.

Primary author: MALCIUS, Mindaugas (Center for Physical Sciences and Technology, Vilnius, Lithuania)

Co-authors: Dr PLUKIS, Artūras (Center for Physical Sciences and Technology, Vilnius, Lithuania); LIUBAVIČIŪTĖ, Aušra (Center for Physical Sciences and Technology, Vilnius, Lithuania); GASPARIŪNAS, Mindaugas (Center for Physical Sciences and Technology, Vilnius, Lithuania); Dr REMEIKIS, Vidmantas (Center for Physical Sciences and Technology, Vilnius, Lithuania); Dr KOVALEVSKIJ, Vitalij (Center for Physical Sciences and Technology, Vilnius, Lithuania)

Presenter: MALCIUS, Mindaugas (Center for Physical Sciences and Technology, Vilnius, Lithuania)

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