Chromosome aberrations in human peripheral blood lymphocytes and hTERT-RPE1 cell line after exposure to the Auger electron emitter I-125

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Introduction: Auger electron emitters (AEE) have a high potential for targeted tumour therapy due to their strongly localised energy deposition. DNA-associated AEE induce cellular damage leading to high-LET-type cell survival curves and possess enhanced relative biological effectiveness. They are presumed to cause complex DNA lesions as well. To elucidate the genotoxic potential of DNA-associated AEE, chromosomal/chromatid aberrations were analyzed in Iodine-125-deoxyuridine (I-125-UdR) exposed human peripheral blood lymphocytes (PBL) and in human telomerase-immortalized retinal pigment epithelial cells (hTERT-RPE1).

Methods: For each donor, PBL were incubated with I-125-UdR for 5 h (2.5 and 5 kBq/ml). The culture was fixed for aberrations at 72 h post-stimulation. hTERT-RPE1 cells were exposed to I-125-UdR activities ranging from 0.5 – 4 kBq/ml. The cells were harvested for aberrations at 26 h after initiation of the culture. All slides were stained with 10 % Giemsa. For each dose point 100 metaphases were analysed. For both PBL and hTERT-RPE1 cells, cell cycle analysis using EdU Flow Cytometry Assay Kits (Invitrogen) was performed.

Results: Our preliminary data show that I-125-UdR primarily induce chromatid-type aberrations. An enhanced level of aberrations was observed at already 100 accumulated decays per cell, whereof one decay per cell per 20 min was calculated. The cell cycle of both PBL and hTERT-RPE1 cell line are delayed due to incorporation of I-125-UdR in the DNA, when compared to control cells.

Conclusions: I-125-UdR posses a strong genotoxic capacity in PBL and hTERT-RPE1 cells even at very low numbers of accumulated decays.

Supported by the Bundesministerium für Bildung und Forschung (BMBF), Kompetenzverbund für Strahlenforschung (KVSF), Project No.: 02NUK005A