ANALYSIS OF ^{125}I-INDUCED CHROMOSOME ABERRATIONS

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DNA-associated Auger-electron emitters (AEE) induce cellular damage leading to high-LET type cell survival curves and possess enhanced relative biological effectiveness. Moreover, DNA dsb induced by ^{125}I-deoxyuridine (^{125}I-UdR) decays are claimed to be very complex. To elucidate the assumed genotoxic potential, chromosome aberrations were analyzed in ^{125}I-UdR-exposed human peripheral blood lymphocytes (PBL).

After 18 h labeling with ^{125}I-UdR the cell cycle distribution is severely disturbed. Furthermore, 40% of PBL are fully labelled and 20% show a moderate uptake. Primarily chromatid-type aberrations are induced. PBL reveal a very broad dose-dependent response spectrum: equal numbers of cells have either no aberration, or display a moderate aberration level. Few cells exhibit a high aberration score (> 10 aberrations). A dose-dependent increase of aberrations is measured in the range of 0.2 to 2 Gy, followed by a plateau between 2 and 4.5 Gy. The data indicate that even the lowest dose of 0.2 Gy leads to a 4.5-fold increase of aberrations in PBL compared to the controls. Furthermore, a dose-dependent increase of cell death is observed.

^{125}I-UdR has a very strong genotoxic capacity in human PBL even at very low doses of about 0.2 Gy. Efficiently labeled cells display a prolonged cell cycle compared to moderate labeled cells and cell death contributes substantially to the desynchronisation of the cell cycle. It can be concluded that every fourth intracellular ^{125}I decay give rise to a single chromosome aberration.