

PROTON AND FE ION-INDUCED EARLY AND LATE CHROMOSOME ABERRATIONS IN DIFFERENT CELL TYPES

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An early stage of cancer development is believed to be genomic instability (GI) which accelerates the mutation rate in the descendants of the cells surviving radiation exposure. To investigate GI induced by charged particles, we exposed human lymphocytes, human fibroblast cells, and human mammary epithelial cells to high energy protons and Fe ions. In addition, we also investigated GI in bone marrow cells isolated from CBA/CaH (CBA) and C57BL/6 (C57) mice, by analyzing cell survival and chromosome aberrations in the cells after multiple cell divisions. Results analyzed so far from the experiments indicated different sensitivities to charged particles between CBA/CaH (CBA) and C57BL/6 (C57) mouse strains, suggesting that there are two main types of response to irradiation: 1) responses associated with survival of damaged cells and 2) responses associated with the induction of non-clonal chromosomal instability in the surviving progeny of stem cells. Previously, we reported that the RBE for initial chromosome damages was high in human lymphocytes exposed to Fe ions. Our results with different cell types demonstrated different RBE values between different cell types and between early and late chromosomal damages. This study also attempts to offer an explanation for the varying RBE values for different cancer types.