31 RBE for scid cells irradiated with high LET radiations

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RBE for scid cells, which lack DNA-PK, irradiated with high LET radiations was analyzed. As control cells, a hybrid cell line, which was introduced a segment of No. 8 chromosome of human and recovered DNA-PK, was used. For high LET radiations, C-ions were used, which were produced by HIMAC at NIRS and whose LET was 50 keV/μm. Estimated RBE was 1.3 and 1.47 for scid cells and hybrid cells, respectively. By the analysis of RBE, it was elucidated that (1) changes in RBE for different high LET radiations is caused by various radiation-induced damages and the amounts of repair depend on these damages, (2) the amount of damages reparable by DNA-PK is constant for different LET, and (3) the reparable amount of damages which are not repaired by DNA-PK decreases with LET.

32 Evaluation of Indirect Effects in the Inactivation of Human HL-60 Cells Using Dimethylsulfoxide as a Scavenger of OH Radicals

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The contribution of ·OH in the inactivation by heavy ions with different LETs was evaluated using DMSO, an ·OH scavenger. Human leukemia HL-60 cells were exposed to carbon ions (LET=100 keV/μm) and silicon ions (LET=300 keV/μm) in the presence of various concentration of DMSO. The protectable fraction of cell inactivation was estimated following definition by Shinohara et al. (Acta Oncologica, **35**, 869, 1996). At the LET of 100 keV/μm protection was about 54%, in contrast to 88.2% for ^{60}Co-γ rays. Even if the LET was raised to 300 keV/μm, the protectable fraction did not decrease significantly. These results indicate that cell inactivation was caused by indirect action even in the high LET radiation, and that the protectable fraction was saturated at the high LET region. In accordance with this conclusion, H_2O_2 resistant mutants of HL-60 exhibited only slight resistance at the LET of 300 keV/μm.

33 Effects of Heavy Ion Particle Irradiation to Bone Metabolism of the Rats of Different Ages

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Effects of heavy ion particle irradiation on bone low turn over with aging, in the process of change in the bone formation with the old or aged rats. Female rats, aged 3-, and over 30 months: heavy ion particle (Carbon beam, 290MeV, LET; 40keV/μm) was irradiated to the whole body: 1.25, 2.5 and 5.0Gy. Three months after irradiation, the bone mineral density (BMD) of femur had a tendency of the decrease in over 9 months old groups irradiated 2.5, 5.0Gy. Histomorphometric measurement was performed at the tibial proximal metaphysis. There is no significant difference in the bone strength in different ages. The results indicate that heavy ion irradiation accelerated the bone mineral loss in addition to age alternation, because of high radiosensitivity of osteoblasts.