RECOVERY FROM POTENTIALLY LETHAL DAMAGE OF HUMAN NORMAL FIBROBLAST IMR 90 CELLS AFTER IRRADIATION OF NITROGEN ION BEAMS

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Irradiation with high LET charged particles may be effective therapy for solid malignant tumors. Many investigations have been done on tumor cell inactivation after irradiation with high LET radiation, however, there is no concrete evidence regarding the extent of recovery from potentially lethal damage (PLD) in normal human cells after irradiation with high LET particles.

Because of discrepancies regarding the recovery from PLD in tumor cells after irradiation with neutrons and particles, recovery from PLD in normal human lung fibroblasts after irradiation with nitrogen ions accelerated in the IPCR cyclotron and ^{60}Co γ-rays was examined.

Human normal fibroblast IMR 90 cells were grown on a cover glass up to its saturation density. The recovery from PLD was observed after the nitrogen ion irradiation but the extent was much less than that after γ-irradiation. Ratios of D_0 before and after the 6 hour incubation at the saturation density were 1.1 and 1.8 for the nitrogen ion beams and γ-rays, respectively. The half maximum recovery time was 3.1 hours after nitrogen ion irradiation while it was 1.3 hours after γ-irradiation (Figure 1). These results suggest that the recovery from PLD in normal human cells may be virtually identical but practically appears with a large difference after irradiation with low- and high-LET radiation.

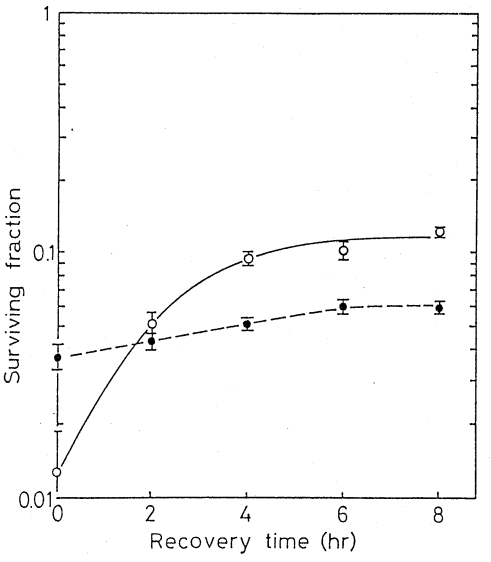

Figure 1. Time course of recovery from potentially lethal damage after irradiation with nitrogen ion beams and ^{60}Co γ-rays in normal human fibroblasts, IMR 90.

Plateau-phase culture of IMR 90 cells were irradiated with nitrogen ion beams and ^{60}Co γ-rays. Divison ages of the cells and dose of the irradiation used were 36 PDL and 3.6 Gy for nitrogen ion beam irradiation (●) and 39 PDL and 5.2 Gy for γ-irradiation (○), respectively. Virtical bars are standard deviation of mean 4 dishes.