197 Analgesia Induced by Repeated Exposure to Low Dose X-Rays in Mice, and Involvement of the Accessory Olfactory System in Modulation of the Radiation Effects

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The effects of low-dose X-rays on mouse nociceptive behavior were examined using a formalin injected test which rated the amount of time the animals spent licking the injected hind-paw. Male ICR White Swiss mice showed a marked suppression of licking behavior after repeated low-dose X-irradiation (5 cGy/day, 6 consecutive days). The most profound effect was observed on the day 30 after irradiation. The decline of licking behavior, however, was not observed at all following olfactory bulbectomy or vomeronasal tract cut. The analgesic effects could be observed in writhing animals administered acetic-acid intraperitoneally. Moreover, analgesia was totally blocked by the administration of *N*-nitro-L-arginine, a nitric oxide synthase inhibitor, to accessory olfactory bulbs prior to the exposure. The present results indicate that the olfactory system plays an important role in modulation of radiation-induced analgesia, and a possible involvement of nitric oxide in the formation of recognition memory subjected to repeated X-rays. Relatively higher doses (5 cGy for 9 days, for 12 days), however, did not induce such effects, namely, the decline of nociceptive response was limited to the animals irradiated with the smaller dose.

198 **Effect of low dose of X-rays on chromosome constitution in human embryo cells during long term culture**

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In the previous study, we observed that multiple exposures to low dose of X-rays expanded life span (population doubling numbers) of human embryo (HE) fibroblast cells to 118-124 % over non-irradiated control cells. Also, we found that telomerase activity remained in HE cells was not always correlated with extension of life span *in vitro*. In the present study, we investigated the effect of low dose irradiation on changes of chromosomal constitution and telomere length in HE cells during long term culture. Chromosome analysis revealed that loss of a chromosome was the predominant abnormality rather than gain of a chromosome or structual alterations. Missing chromosomoes were non-randam, showing a frequent loss of chromosomes 8, 17 and 20. However, a clonal expansion of the cell population showing a specific karyotype was not observed. Telomere length decreased with increasing passages in culture. Our results show that the prolonged life span in the HE cells irradiated with low dose of X-rays is not due to a clonal expansion of the cells retaining specific chromosome aberrations.

199 The suppressive effect of very low dose X-irradiation on aggressive behavior is strain specific (a preliminary report)

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We examined suppressive effect of very low dose X-irradiation on aggressive behavior of Balb/cJ mice. Balb/cJ mice are extremely aggressive, probably due to mutation of a single gene that involves in biosynthesis of catecholamine. Four week-old male mouse was housed separately in cages for 7 weeks (resident), and was irradiated with 10 cGy X-rays at a dose rate of 20 cGy/min. After 3-14 days, a non-irradiated intruder, housing in groups (5 mice/cage) was introduced into a resident cage. The behavior was recorded by video recorder for 5 min, and attack latency (time interval from introduction of the intruder to the first attack) was determined as an indicator of aggressiveness. Attack latency was the same between irradiated and non-irradiated residents. The same test was used in a non-aggressive substrain, Balb/cByJ. There was no difference. A decrease in aggressive behavior was, on the other hand, found in X-irradiated ICR mice as is reported by Miyachi et al. These results indicate that the radiation effect on aggressive behavior is dependent on mouse strains.