40 RBE of heavy ions(carbon, proton ) for acute cell death of pancreatic slet cells of the golden hamster (Mesocricetus auratus).

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This study was designed to obtain RBE of heavy ions(carbon, proton)for acute cell death of pancreatic islet cells of the young golden hamster (Mesocricetus auratus). Dose response relations in acute cell death of pancreatic islet studied histologically after whole body irradiation of golden hamster with X-ray, proton and carbon beams indiated that Dos of the each three beams were 58 Gy, 35-40 Gy, and 75 Gy, respectively. Estimated RBEs of proton and carbon beams from Do values were 1.7-1.5 and 0.77. Low RBE of carbon beams with repeated experments were consisitent with the results of oocytes and lymphocytes.

41 Heavy ions-induced cognitive dysfunction in the ddy mice

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Cerebral dysfunction is one of the major concerns associated with radiotherapy of brain tumors. The delayed consequences of radiation damage on learning and memory in mice were assessed over a period of 20 weeks, commencing 16 weeks after local irradiation of the brain with a single dose of carbon ions(30Gy). Mice were tested for water maze acquisition. Irradiated mice showed a significant increase in both the swimming time and the swimming length, indicating that carbon ions of 30Gy impaired a reference memory. A working memory was also reduced in the irradiated mice, so the swimming length increased when the goal position was altered. These memory impairments could be reflected from the disorder of acetylcholine nervesystem at hippocampus.

42 Early effects of carbon ion beam on adult mouse brain tissues: damage to the hippocampus

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The aim of this study is to clarify early effects caused by heavy ions in normal brain tissues. A partial brain including hippocampus of adult C3H mice were irradiated locally with single acute doses of carbon ions. Irradiated mice and controls were sacrificed at selected intervals. Their brains were examined histopathologically for cell death. Karyopyknosis and TUNEL positive cells were observed in part of dentate gyrus. Karyopyknosis increased rapidly, peaked (about 4.4%) at 4-6 hours after irradiation, then decreased to the control level by 24 hours. TUNEL positive cells increased gradually, peaked (about 2.5%) at 8 hours, then decreased to non-detectable level at Day 10. These results support a suggestion that radiation-induced apoptotic cells localize at specific site of dentate gyrus in adult mice. As some neurons in the dentate gyrus proliferate and differentiate in adult rodents, clarifying the relationship between apoptotic cells we here observed and proliferative neurons would provide mechanisms involved in the radiation damage to hippocampus.