Latency Period of Malignant Lesions in Mice Exposed to Continuous Low Dose-rate Gamma-rays – Pathological Study –

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Abstract

Late effects of low dose and low dose-rate (LDR) ionizing radiation are potential hazards, and they have become a serious concern since the nuclear accident at the Fukushima Dai-ichi Nuclear Power Plant. Chronic exposure of 4000 mice to LDR gamma rays showed that the average life span of female mice irradiated at 21 mGy/22 h/day (909 μGy/h) for 400 days (total dose: 8000 mGy) were shortened by about 120 days due to premature death from various neoplasms including malignant lymphomas. This suggests that long-term exposure to LDR gamma-rays caused early onset or increased progression of neoplasms. A cross-sectional study to observe the development and progression of neoplasia and non-neoplastic lesions is underway.

Preliminary findings showed increased incidences ($p<0.05$) and early emergence of malignant tumors of liver and lung origins in the irradiated group (20 mGy/22 h/day). Malignant lymphomas and benign tumors of the liver appeared at the same age in both irradiated and non-irradiated groups. The numbers of non-neoplastic lesions (ovarian atrophy) increased significantly ($p<0.01$) in mice exposed for 200 days (total dose: 4000 mGy). These suggested that the effects of LDR irradiation on neoplastic and non-neoplastic lesions varied depending on the organ and/or tissue.

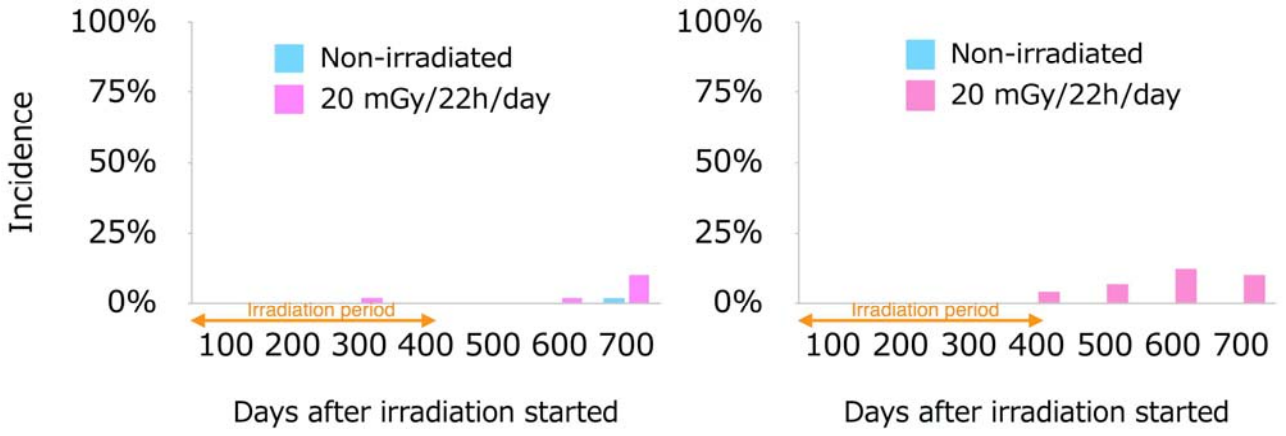

Fig.1 Hepatocellular carcinoma(Left). Bronchiolo-alveolar carcinoma (Right)

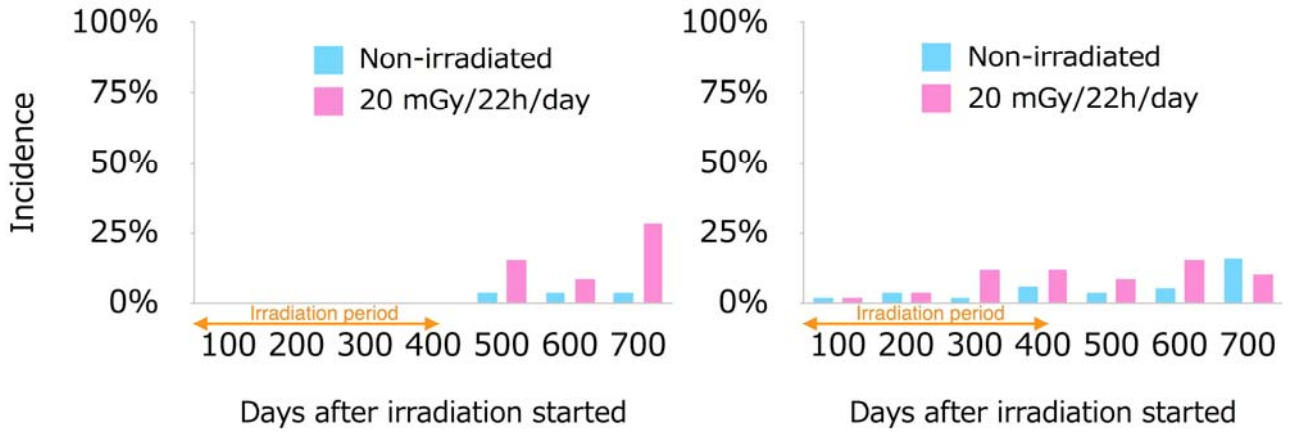

Fig.2 Hepatocellular adenoma (Left). Bronchiolo-alveolar adenoma (Right).

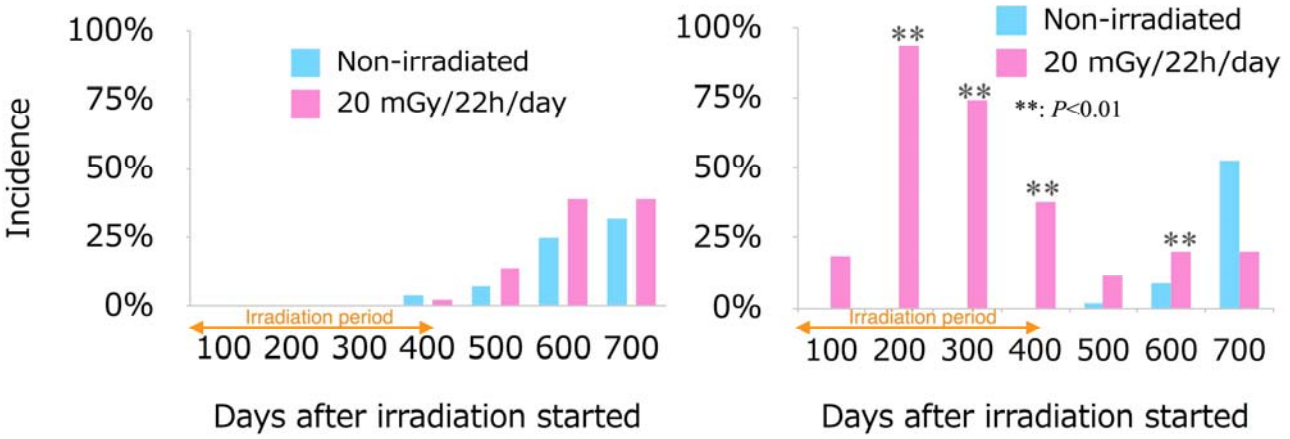

Fig.3 Malignant lymphoma (Left). Ovarian atrophy (Right).

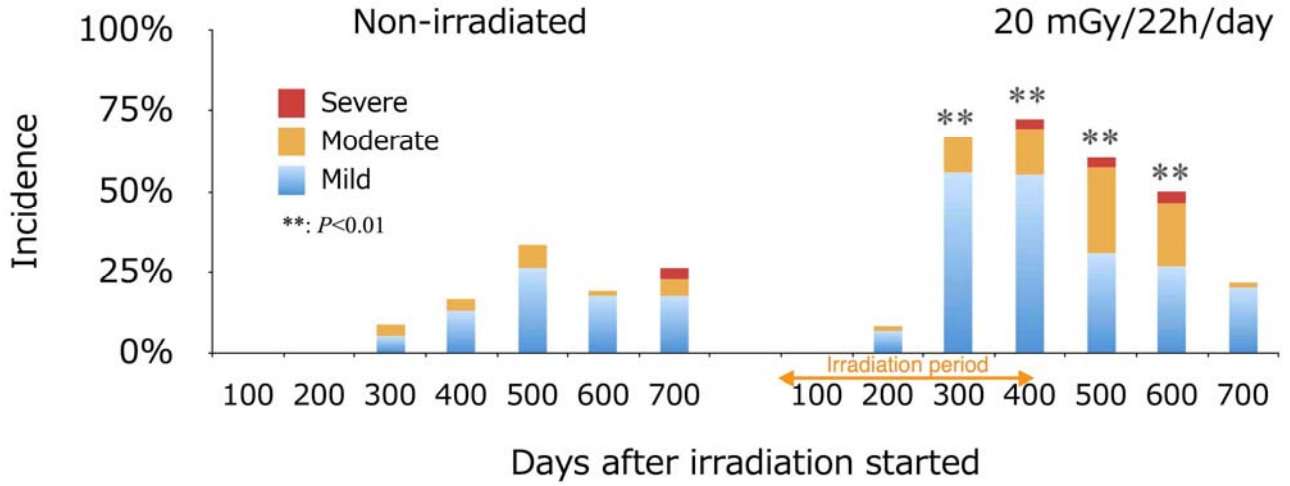

Fig.4 Liver fatty degeneration.