Potential Biomarkers in Mice Exposed to Continuous Low-dose-rate Gamma-rays -Analysis of Serum Proteins

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Abstract

A previous life span study revealed that continuous low-dose-rate (LDR: 21 mGy/ 22hr/ day) gamma ray exposure in mice induced a shortening of the life span by approximately 120 days due to premature death from various neoplasms, mainly due to malignant lymphomas (MLs). Moreover, analysis of gene expressions using a microarray was performed to identify candidate bio-active molecules in sera from non-irradiated or irradiated mice with MLs. By stimulating mouse embryonic fibroblasts (MEFs) with serum, *Nr3c1* was considered a candidate as predicted by transcription factor analysis in the IPA software. In 2012, we measured the quantity of cortisol, which is known to be a *Nr3c1* ligand, in mice sera. The amount of cortisol in LDR-irradiated mice sera was significantly decreased; thus these results suggested cortisol may have some roles in irradiated mice or mice with developed MLs. Furthermore, the quantity of alpha-fetoprotein (AFP) was measured, and we confirmed AFP in sera from mice which developed liver adenoma was increased. Therefore, we considered that the levels of hormones or proteins in mice sera may be used to analyze tumor developments or effects of LDR-irradiation in mice.

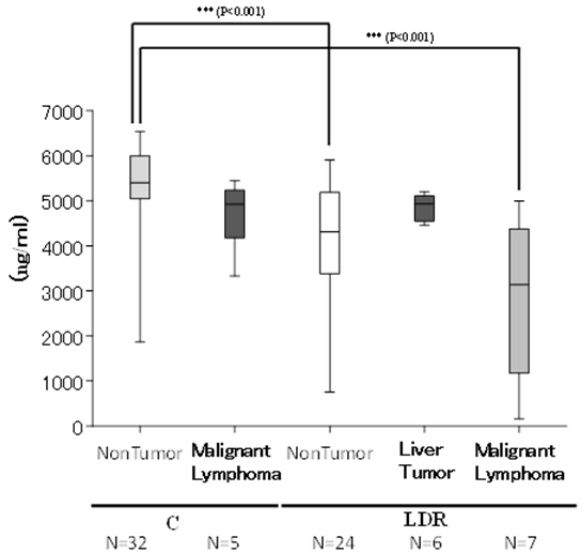

Fig. 1 ELISA analysis of cortisol in sera from irradiated or non-irradiated mice. LDR, Low-dose-rate irradiated; C, non-irradiated.

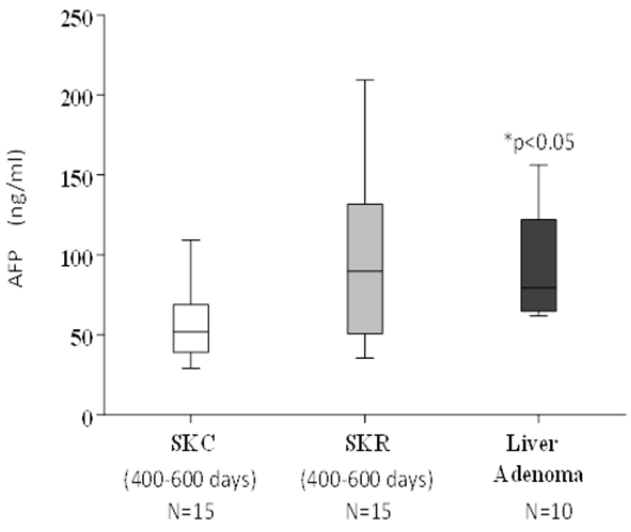

Fig. 2 ELISA analysis of alpha-fetoprotein (AFP) in sera from LDR irradiated mice or non-irradiated mice. SKC, non-irradiated mice; SKR, LDR irradiated mice, Liver adenoma, irradiated mice with liver adenoma.