Shortened Latent Period of Malignant Lymphoma and Potential Biomarkers in Mice Exposed to Continuous Low-Dose-Rate Gamma-Rays -Analysis of Serum Proteins-

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Abstract

Previously, a life span study revealed that low-dose-rate (LDR: 21 mGy/ 22 h/ day) gamma-rays induced a shortening of the life span by approximately 120 days due to premature death from various neoplasms, mainly due to malignant lymphomas (ML). We analyzed serum proteins from LDR gamma-ray irradiated mice using cell-based assays, a newly developed method for measuring the physiological activity of substances in sera, combined with gene expression analyses of mouse embryonic fibroblasts (MEFs). Gene expressions using a microarray were performed to identify candidate bio-active molecules in sera from non-irradiated or irradiated mice with ML. When the gene expressions from the LDR irradiated groups were compared to those of the non-irradiated groups, 291 genes were found to be changed significantly by LDR irradiation. Moreover, Pparγ, Nr3c1, Thrb and Myc were considered as bio-active candidate molecules based on prediction of transcriptional analysis using IPA software that stimulates MEFs with serum proteins. These results suggest that irradiated mice or mice that developed ML may have bio-active molecules in their serum.

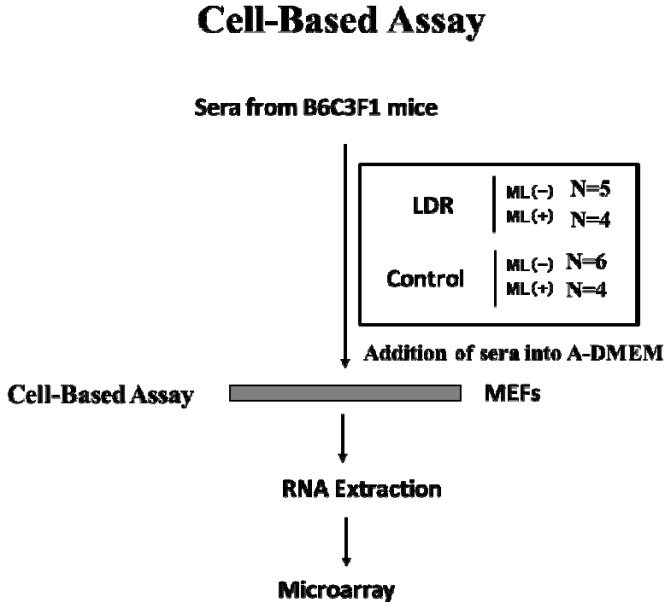

Fig. 1 Cell-based assay (CBA) using sera from irradiated mice. Legend: LDR, Low-dose-rate; ML, Malignant Lymphoma; A-DMEM, Advanced DME medium.

Table 1 Candidate bio-active molecules detected by addition of sera from 4 different groups in the transcription factor analysis of IPA. Legend: LDR, Low-dose-rate; ML, Malignant Lymphoma.

ML(-) vs ML(+)		**LDR(-) vs LDR(+)**	
LDR(-)	**LDR(+)**	**ML(-)**	**ML(+)**
Pparg	***Cebpb***	***Myc***	***Pparg***
	Spi1	***Nr3c1***	***Stat3***
	Notch1	***Thrb***	
	Nr3c1	***Cebpb***	