

Latency Period of Malignant Lesions in Mice Exposed to Continuous Low Dose-rate Gamma-rays -Analysis of Serum Marker-

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Abstract

Our previous study has revealed that exposure of mice to continuous low dose-rate gamma-rays (LDR: 21 mGy/22 h/day) shortens the life span by approximately 120 days due to premature death from various neoplasms including malignant lymphomas. We have been searching for serologically detectable changes in LDR-irradiated mice and in mice that develop neoplasms after LDR-irradiation. In this study, we used standard clinical biochemistry tests to analyze the serum samples of the LDR-irradiated mice. Comparison of the mice that were LDR-irradiated and developed hepatocellular adenoma (HCA) and the non-irradiated mice without HCA revealed significant changes in many parameters of clinical biochemistry, including AST (aspartate transaminase) and LDH (lactate dehydrogenase). Comparison of the LDR-irradiated mice without HCA and the non-irradiated mice without HCA revealed a significance change in one parameter, TG (triacylglycerol). Thus, standard clinical biochemistry tests should be useful for detecting the effects of LDR irradiation.

Table 1 Clinical chemistry tests for B6C3F1 mice : C_HCA-: No-irradiation /No-hepatocellular adenoma, LDR_HCA-: LDR-irradiation/ No-hepatocellular adenoma, LDR_HCA+ : LDR-irradiation/ No-hepatocellular adenoma, Significance test : Steel test, ↑ : Increase, ↓ : Decrease

	C_HCA-	LDR_HCA-	LDR_HCA+	LDR_HCA-	LDR_HCA+
Fe (µg/dL)	203.3	195.8	264.4		
AST (IU/L)	98.3	125.2	189.8	*** (P<=0.001)	↑↑
ALT (IU/L)	34.8	37.4	124.3	*** (P<=0.001)	↑↑
ALP (IU/L)	480.7	561.4	551.4		
LDH (IU/L)	326.1	323.2	613.9	** (P<=0.01)	↑↑
LAP (IU/L)	54.6	59.1	110.7	*** (P<=0.001)	↑↑
ChE (IU/L)	37.1	40.3	44.2		
T-CHO (mg/dL)	134.8	139.4	187.9		
F-CHO (mg/dL)	23.5	24.8	37.0		
E-CHO (mg/dL)	111.3	114.6	150.9		
E/T (%)	82.6	81.2	78.9		
TG (mg/dL)	115.4	89.1	91.2 * (P<=0.05)	↓	
LDL-C (mg/dL)	14.3	15.8	25.1	* (P<=0.05)	↑
HDL-C (mg/dL)	66.8	64.5	70.4		
T-BIL (mg/dL)	0.097	0.135	0.331		
D-BIL (mg/dL)	0.072	0.103	0.241		
I-BIL (mg/dL)	0.026	0.032	0.090		
TBA (µmol/L)	6.2	16.1	38.0	** (P<=0.01)	↑