

Transgenerational Effects in the Progeny of Mice Exposed to Acute High and Chronic Low Dose-rate Gamma-rays – Life Span, Cause of Death, Neoplasm Incidence –

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Abstract

To study the effects of irradiation on progeny, male (sires) C57BL/6J mice were irradiated with ^{137}Cs gamma-rays at an acute high dose-rate of 770 mGy/min to a total accumulated dose of 3000 mGy, or at a chronic low dose-rate of 20 mGy/day for 150 or 300 days to total accumulated doses of 3000 mGy or 6000 mGy. After completion of irradiation, the male mice are bred to non-irradiated virgin females to produce F1 mice. All mice, except the dams, will be kept until they succumb to a natural death and then subjected to pathological examination. The number of offspring, lifespan and neoplasm incidences will be used as parameters to evaluate the biological effects of high and low dose-rate irradiation. Irradiation of the mice has been divided into 5 batches. Irradiation of the all batches is currently in progress. As of March 31, 2017, nine sires from the non-irradiated group, 10 sires from the 20 mGy/day x 150 days group, 17 sires from the 20 mGy/day x 300 days group and 14 sires from the 770 mGy/min group have died. There were no differences in cause of death between groups. At the time of writing, experiments are progressing smoothly.

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Table 1 Reproductive performance

	Non-irradiated	20 mGy/day×150 days (Total dose 3000 mGy)	20 mGy/day×300 days (Total dose 6000 mGy)	770 mGy/min×3.9 min (Total dose 3000 mGy)
Pregnancy rate (%)	32.1	30.3	30.4	30.6
Average litter size	5.5±2.5	5.0±2.3	4.7±2.1	5.4±4.2
Weaning rate (%)	96.1	87.4	79.1	89.8
Average no. weaned	5.4±2.5	4.2±3.0	4.2±2.7	4.9±3.8

Table 2 Mortalities and causes of death as of March 31, 2017

	Non-irradiated	20 mGy/day×150 days (Total dose 3000 mGy)	20 mGy/day×300 days (Total dose 6000 mGy)	770 mGy/min×3.9 min (Total dose 3000 mGy)
No. of mice	148	148	148	108
No. of dead mice	9	10	17	14
Neoplasms	3	4	9	4
Liver	2	3	5	3
Lung			1	
Malignant lymphoma	1	1	2	1
Inflammation	1		1	1
Dermatitis	1		1	1
Others	1	3	1	4
Ascites		1		
Cardiomyopathy				1
Intestinal lesion		1		
Intestinal obstruction		1		
Liver lesion				1
Pulmonary edema	1			
Seminal vesicle torsion			1	
Spleen lesion				1
Trauma				1
Processing	4	3	6	5