Transgenerational Effects in the Progeny of Mice Exposed to Acute High and Chronic Low Dose-rate Gamma-rays – Germ Cell Mutation Analyses–

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Abstract

Transgenerational effects of continuous low dose-rate (LDR) γ-ray irradiation of male mice have not been well studied. We have been analyzing the incidence of copy number aberrations (CNAs) in the progeny of male C57BL/6J mice continuously exposed to LDR (20 mGy/day, 1mGy/day, 0.05mGy/day) γ-rays for 400 days (total dose: 8000 mGy, 400 mGy, 20 mGy) and to high dose-rate (HDR, 770 mGy/min) γ-rays (total dose: 3000 mGy). This year, we analyzed 24 progenies from 4 pairs of parents in the 3000 mGy HDR irradiated group using oligo-microarray CGH (Agilent Technologies), and found two mice with Type L genomic aberrations. We also verified by the TaqMan® Copy Number Assay the aberrations in the 20 mGy/day irradiated group and non-irradiated group as "real new mutations".

Table 1 Mice with aberrations detected by oligo-microarray CGH

		No. of mice examined using oligo-microarray assay	No. of mice with type L aberrations	
20 mGy/day (Total dose 8000 mGy)	Female	48	3	6.3 (%)
	Male	63	8	12.7(%)
	TOTAL	111	11	9.9 (%)
1 mGy/day (Total dose 400 mGy)	Female	24	2	8.3 (%)
	Male	21	3	14.3(%)
	TOTAL	45	5	11.1(%)
0.05 mGy/day (Total dose 20 mGy)	Female	21	1	4.7 (%)
	Male	25	0	0.0 (%)
	TOTAL	46	1	2.1 (%)
770 mGy/day (Total dose 3000 mGy)	Female	14	0	0.0 (%)
	Male	10	2	20.0(%)
	TOTAL	24	2	8.3 (%)
Non-irradiated	Female	73	2	2.7 (%)
	Male	67	2	3.0 (%)
	TOTAL	140	4	2.8 (%)

Table 2 Results of aberration verification by TaqMan® Copy Number Assay

No. of probes with aberrations		No. of aberrations detected by oligo-microarray CGH		No. of aberrations verified by TaqMan® Copy Number Assay	
		Non-irradiated	20 mGy/day	Non-irradiated	20 mGy/day
Type L		5	11	5	11
Type S	≥ 5	2	3	2	3
	4	1	2	0	0
	3	2	2	1	1
	2	12	3	1	0
	Total	17	10	4	4
TOTAL (Type L + S)		22	21	9	15