

Analysis of Biological Responses to Low Dose-rate Radiation at the Molecular Level

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Abstract

Previously, we have shown that irradiation at a low dose-rate (LD; 20 mGy/day for 100 days; total dose: 2,000 mGy) or a middle dose-rate (MD; 400 mGy/day for 5 days; total dose: 2,000 mGy) significantly alters the genome-wide gene expression profile in the liver of male mice. This year, we performed pathway analysis of these data. In the liver of the LD mice, 15 significantly altered pathways were identified, including “Calcium signaling” and “PKC θ signaling in T lymphocytes”. In the MD mice, 19 significantly altered pathways were identified, including “Paxillin signaling” and “p53 signaling”. These results suggest that, even though the total dose is the same, low dose-rate radiation and middle dose-rate radiation might have quite different effects on gene expression.

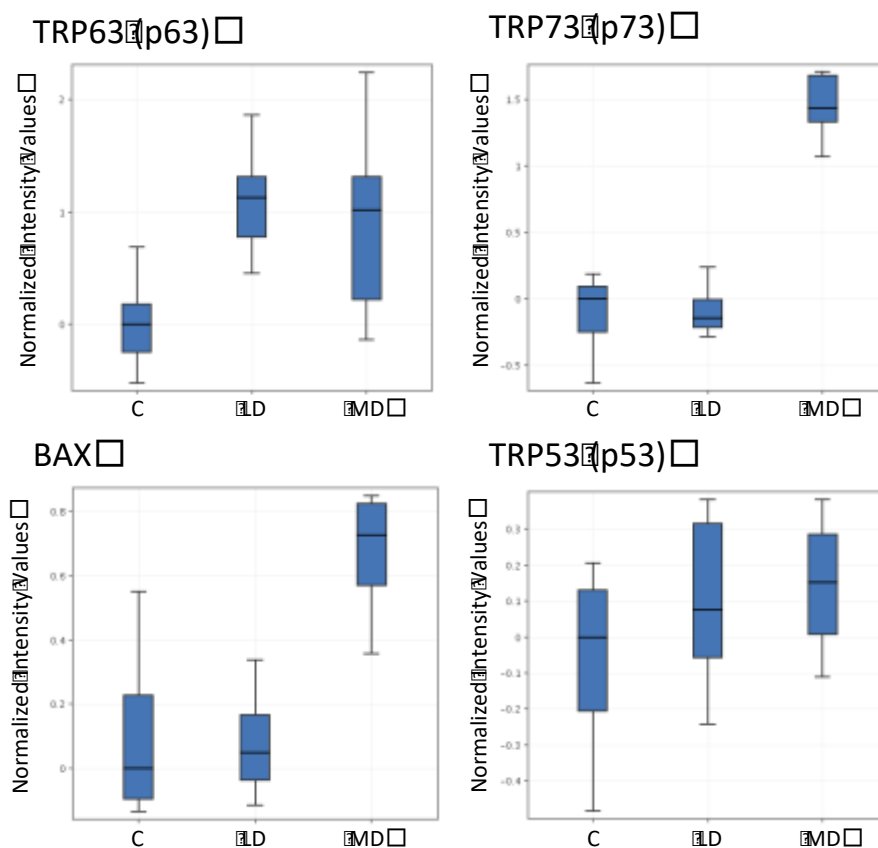


Fig. 1 Expression of 4 genes in the p53 signaling pathway in the liver of non-irradiated (C), low dose-rate-irradiated (LD) and medium dose-rate-irradiated (MD) mice. These genes showed significant alterations in expression in the MD mice.

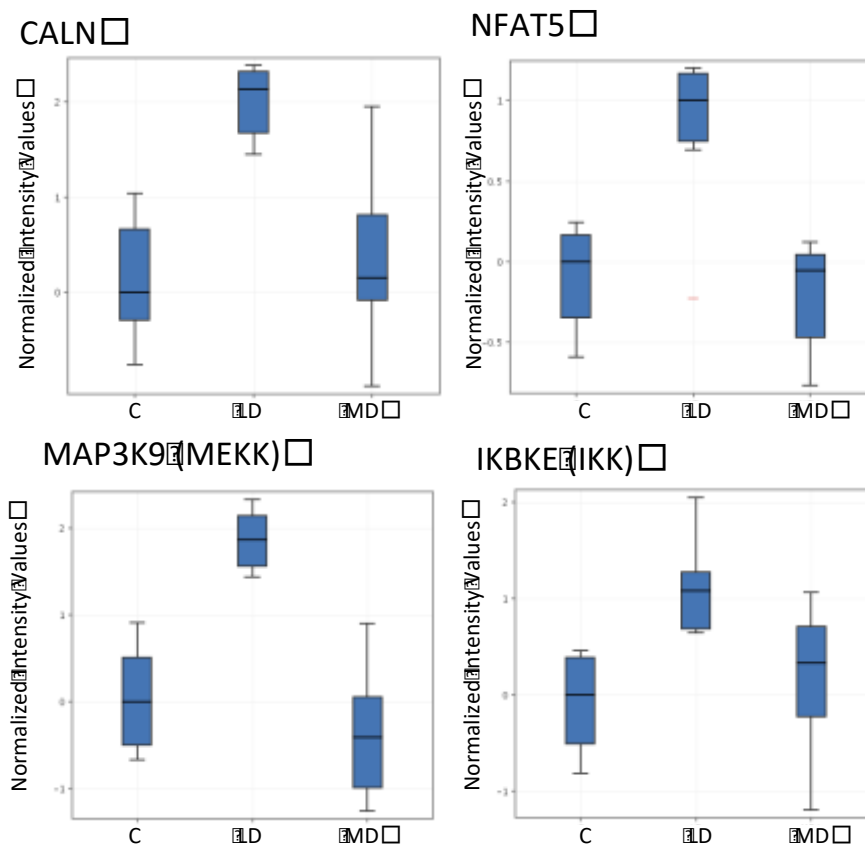


Fig. 2 Expression of 4 genes in the PKC θ signaling pathway in the liver of non-irradiated (C), low dose-rate-irradiated (LD) and medium dose-rate-irradiated (MD) mice. These genes showed significant alterations in expression in the LD mice.