Effects of DNA damage on the Life Span of Mice Exposed to Chronic Low Dose-rate Gamma-rays

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Abstract

We have shown that chronic exposure of mice to low dose-rate gamma-rays shortens their life span. The mechanism(s) regulating this effect however is not known. To further study the effect of radiation on life shortening, we carried out two experiments.

I. We exposed mice lacking a DNA mismatch repair gene (*Msh2*) to middle dose-rate (120 mGy/day) gamma-rays for 67 days. A life span study of these mice is presently underway.

II. We exposed female B6C3F1 mice to low dose-rate gamma-rays (20 mGy/day) for 400 days, while adding an anti-oxidant, *N*-acetylcysteine (NAC, 40 mM), to the drinking water, supplied *ad libitum*, during the irradiation period. After irradiation, the mice were supplied with standard drinking water for the remainder of their life span. The rate at which the body weight increased was slower in NAC-treated mice, regardless of irradiation. Irradiated mice treated with NAC had a significantly ($P > 0.05$) longer life span compared to irradiated mice without NAC. Treatment with NAC, however, did not extend the life span of non-irradiated mice. These results suggest that the life-shortening effect of chronic low dose-rate gamma-ray irradiation may be partially alleviated by treatment with the anti-oxidant NAC during irradiation.

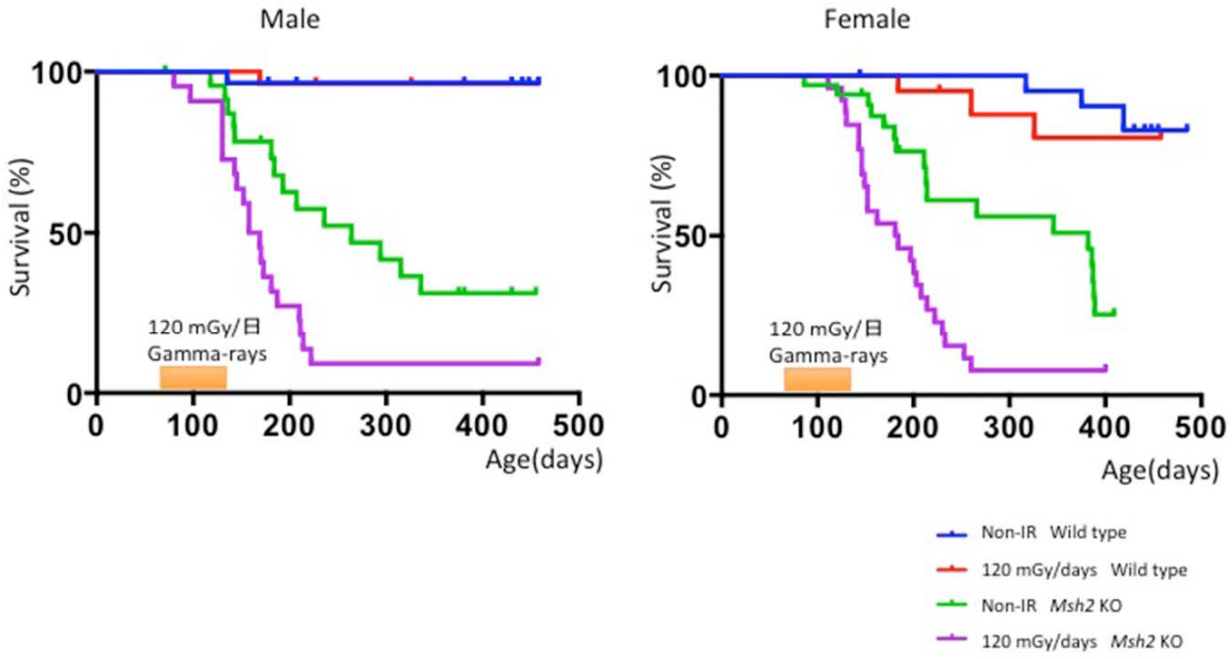

Fig.1 Survival curves of Msh2 Knockout mice(*Msh2* KO) irradiated with middle dose-rate of gamma-rays.

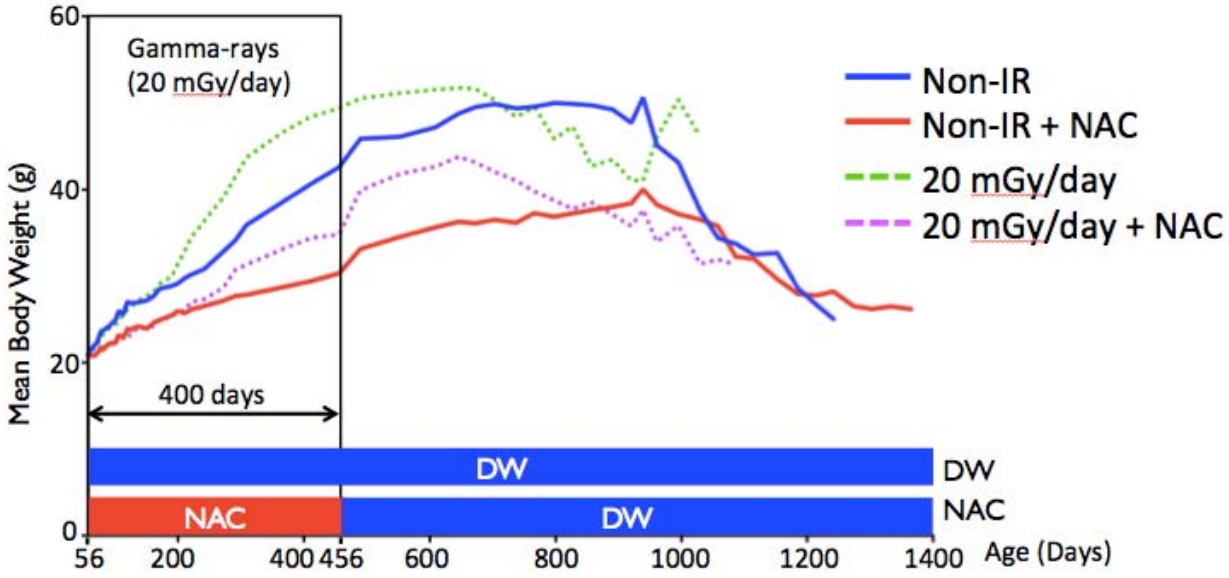

Fig.2 The body weight was significantly reduced in NAC-treated mice, regardless of irradiation.