Proportions of T Cell Subsets and Proliferative Responses of T Cells in the Spleen of Mice Continuously Irradiated with Low-Dose-Rate Gamma-Rays

Daisaku TAKAI, Kazuaki ICHINOHE, Kimio TANAKA, Yoichi OGHISO Department of Radiobiology

Abstract

To examine whether the immune system of mice is changed even after continuous low-dose-rate (20 or 1 mGy/22h/day) gamma-irradiation, we compared the proportions of T cell subsets (Th1, Th2, Th17 and Treg) and the proliferative responses of T cells in the spleen between non-irradiated and irradiated female B6C3F₁ mice. The numbers of Th1 cells were significantly increased in irradiated mice but numbers of Th2, Th17 and Treg cells were not significantly different between irradiated and non-irradiated control mice. In spite of increased proportions of Th1 cells, the Th1/Th2 ratio did not change after irradiation. Thus, the proportions of T-helper cells were not altered even after low-dose-rate gamma-irradiation for 400 days, accumulating to a high dose (8000 mGy). ConA-stimulated proliferative activity of T-cells was not significantly different, whereas allogeneic T cell proliferation (allo-MLR) of irradiated mice was significantly lower than that of non-irradiated mice. Such changes of the immune system may lead to early neoplastic death as observed in B6C3F₁ mice continuously irradiated with low-dose-rate gamma-rays.



Fig. 1 Proportions of Th1 cells after high (900 mGy/min), intermediate (400 mGy/22h/day), and low (20 or 1 mGy/22h/day) -dose-rate irradiations. C, control; R, irradiated; *, p<0.05; **, p<0.01</p>



Fig. 2 Comparisons of proliferative response of splenic T cells after high (900 mGy/min), intermediate (400 mGy/22h/day), and low (20 or 1 mGy/22h/day) -dose-rate irradiations. C, control; R, irradiated; *, p<0.05; **, p<0.01