Correlation between Hematopoietic Stem Cell Changes and Life Span

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Abstract

With the objective of clarifying whether the decrease in the number of hematopoietic stem cells (HSCs) after continuous radiation exposure is due to a direct effect on HSCs or indirectly via changes in the microenvironment in the bone marrow, we have planned to transplant irradiated HSCs and investigate their self-renewal capacity, differentiation ability and possible contribution to mouse life span.

Experiments are underway to determine the effect on the life span of non-irradiated mast cell-deficient WBB6F1-*W/W^v* mice transplanted with HSCs from wild type (+/+) mice irradiated at a low dose-rate (20 mGy/day; total dose: 8000 mGy) or a high dose-rate (770 mGy/min; total dose: 2000 or 4000 mGy). As of March 31, 2018, there is no significant difference in the survival rates among *W/W^v* mice transplanted with 1×10^5 HSCs derived from low or high dose-rate-irradiated or non-irradiated wild type (+/+) mice.

We also started *in vitro* culture of HSCs from the bone marrow of the mice continuously irradiated with low dose-rate gamma-rays (20 mGy/day; total dose: 8000 mGy). So far, we observed no significant difference in cell counts between cells cultured from irradiated and non-irradiated mice.

Table 1 Ongoing experiments of transplantation of HSCs from irradiated +/+ mice to non-irradiated *W/W^v* mice; status at March, 2018.

	Non-irradiated group	20 mGy/day × 400days (8000 mGy)	770 mGy/min (2000 mGy)	770 mGy/min (4000 mGy)
Number of donor (+/+) mice	6	8	2	3
Number of host (*W/W^v*) mice	17	25	6	8
(Number of deaths)	(0)	(0)	(0)	(1)

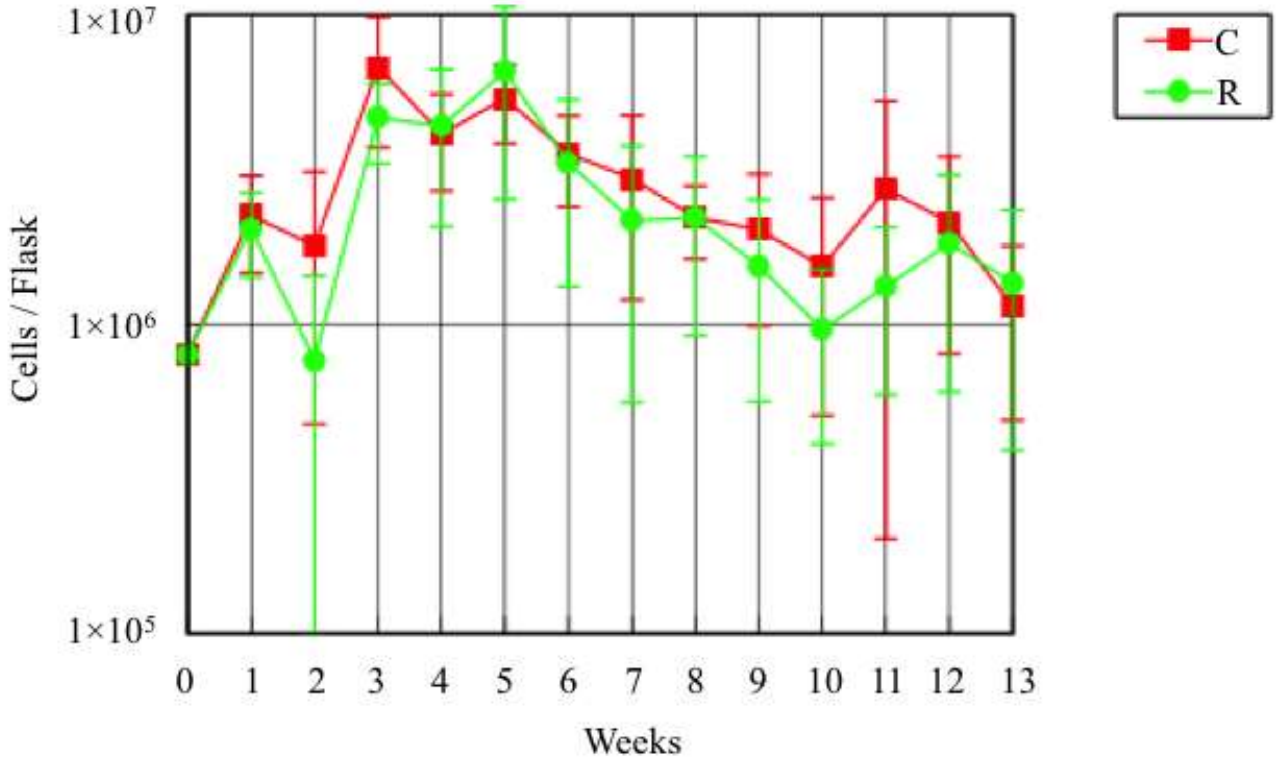

Fig. 1 Number of HSCs in culture (per flask). Cells were subcultured every week at a split ratio of 1:8.
C: cells derived from non-irradiated mice.
R: cells derived from irradiated (20 mGy/day; total dose: 8000 mGy) mice.