Tumor Transplantability in Mice Kept in Standard Non-enriched Environment (Control) or Enriched Environment

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Abstract

We have previously shown that the transplantability of a murine ovary granulosa cell tumor cell line, OV3121, was significantly enhanced in syngeneic B6C3F$_1$ female mice irradiated with gamma-rays at a low dose-rate of 20 mGy/day for 400 days. Transplantability, however, was reduced when mice were kept in an enriched environment (EE). The purpose of this study is to clarify whether adverse effects caused by exposure to continuous low dose-rate gamma-rays are reduced by environmental enrichment, using tumor transplantability as an index. Last year, we showed that the EE tended to mitigate the adverse effects, but could not find a significant difference. This year, we conducted an experiment with an additional number of mice and found that EE treatment could significantly mitigate the adverse effects by the low dose-rate radiation. The composition of cells involved in immunity in the peripheral blood of mice after irradiation for 400 days suggested that natural killer cells were involved in the mitigation. In an attempt to enhance the ability of EE, we performed EE treatment throughout the experimental period, but no significant mitigation of the adverse effects of EE was observed.
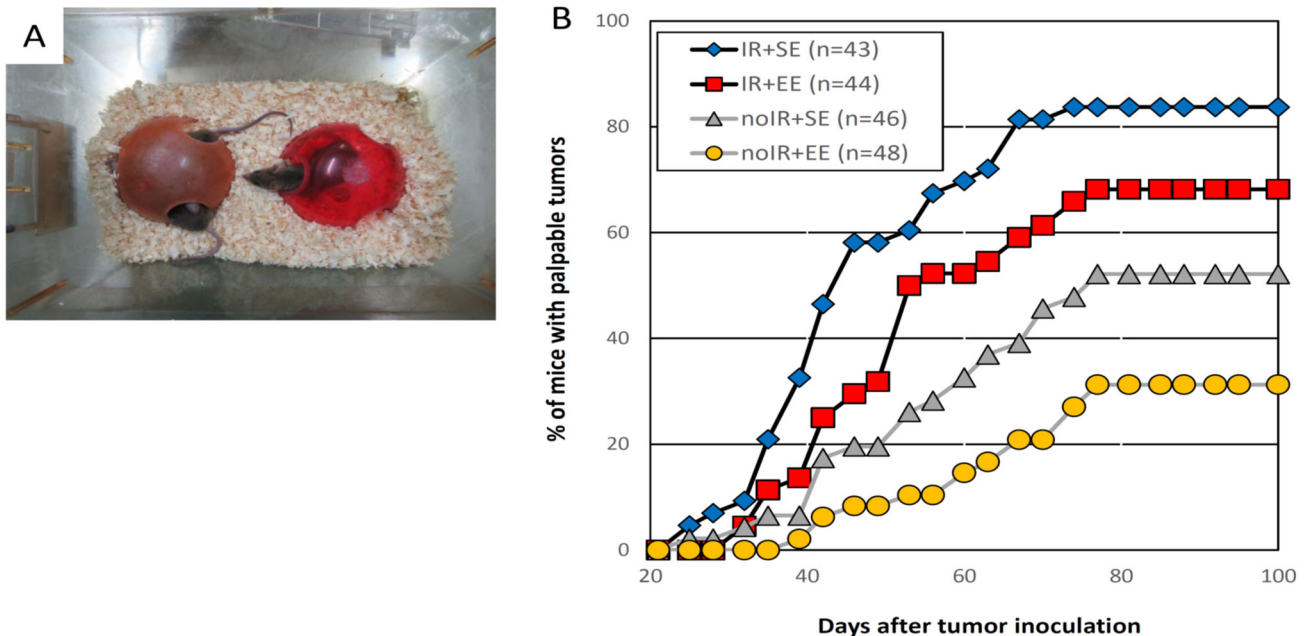
Fig. 1   Comparison of tumor transplantability. A) Four mice were housed in the EE with two igloos in a cage. B) Graph of tumor transplantability of each group. IR, irradiated; C, nonirradiated; EE, enriched environment; SE, standard environment.
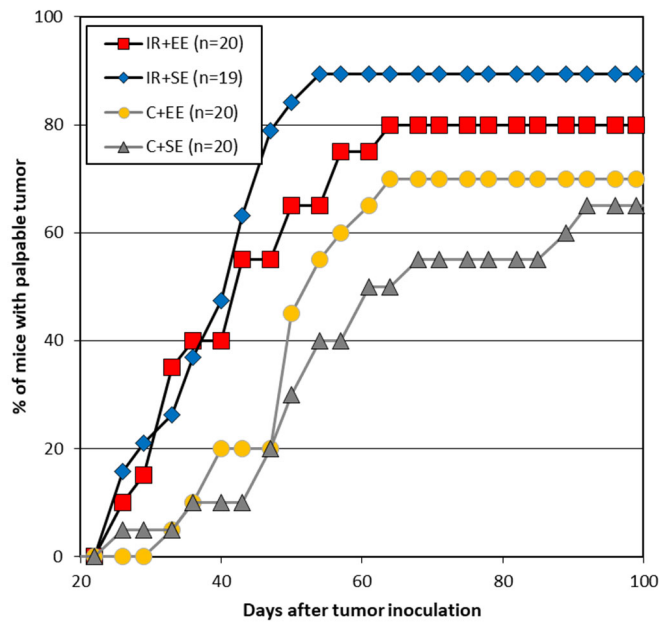
Fig. 2   Graph of tumor transplantability of each group when EE treatment was performed throughout the experimental period. IR, irradiated; C, nonirradiated; EE, enriched environment; SE, standard environment.
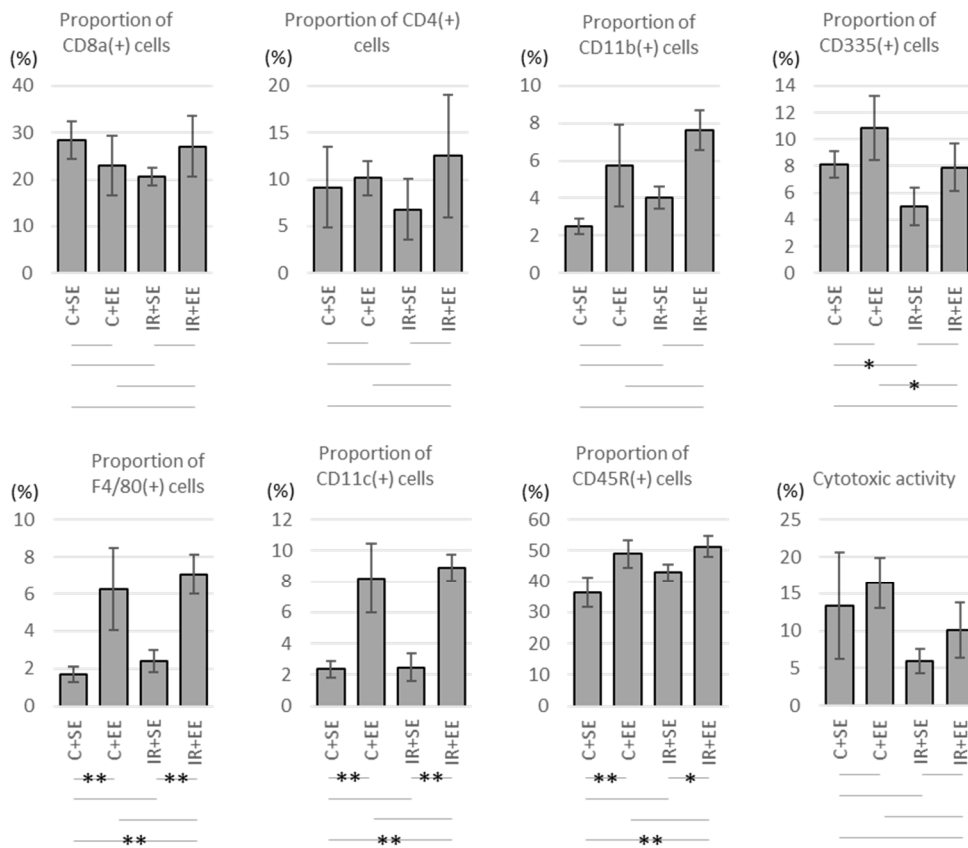

Fig. 3   Results of flow cytometric analysis showing proportions of CD8a, CD4, CD11b, CD335, F4/80, CD11c, and CD45R-positive cells and results of the assay for NK cell activity, in the peripheral blood of each group (n=4, respectively). Bar, standard deviation; *, p<0.05; **, p<0.01 (t-test).