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Abstract Book

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Radiation Protection

RADIOPROTECTION AND IMMUNE-ACTIVITY IN B-GLUCAN BY ENTEROCCOUS FACALIS

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Keywords : Radioprotection, β-glucan, immune-activity, Enteroccous Facalis

Purpose : In this study, we reviewed an immunological enhancement effect, radiation protection effect and anticancer action for β-glucan which was quality of natural product.
Methods : We divided an experimental group into control group, β-glucan treated group and 2Gy irradiation group and β-glucan + 2Gy irradiation group in total four groups. We used an SOD activity detection kit as an antioxidation experiment and tested it. We performed CD4/CD8 analysis by flow cytometry as analysis of T lymphocyte. In addition, we examined activity of natural killer cell.
Result : The measurement of number of leukocytes revealed increase of leukocytes of a β-glucan treated group in comparison with control group. In addition, a radiation protection effect was seen in β-glucan+2Gy irradiation group after irradiation with lymphocyte counts. In the SOD-like active measurement, a rise was seen in a β-glucan treated group. In CD4, CD8 and CD16 measurement, remarkable increase of a β-glucan treated group was seen for control group. A killer cell and increase of suppressor T cell are thought about in β-glucan in this study.
Conclusion : Therefore, it is thought that there is anticancer action by a β-glucan intake by activation of a factor about attack to cancer cell. Immune therapy will attract attention in treatment for cancer in future. Therefore, we think that we must do a search of the target which is specific for cancer in treatment for cancer and basic researches of immune therapy from the genetic side.

Radioprotection and immune-activity in β-glucan by *Enteroccous Facalis (EF 2001)*

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Introduction

Entrococcus Faecalis (EF2001) in the intestine

↓

biological response modifier (BRM)

tumor necrosis factor (TNF)

In this story, we examined the radiation protection effect of EF2001.

And we also assessed the effect of EF2001 to the natural killer cells activity of the spleen cells.

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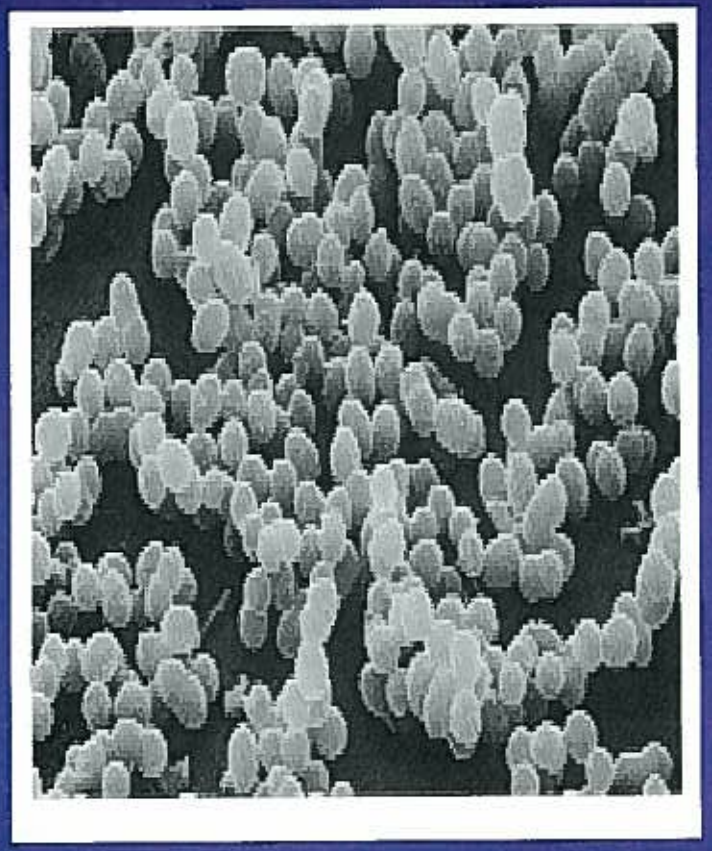

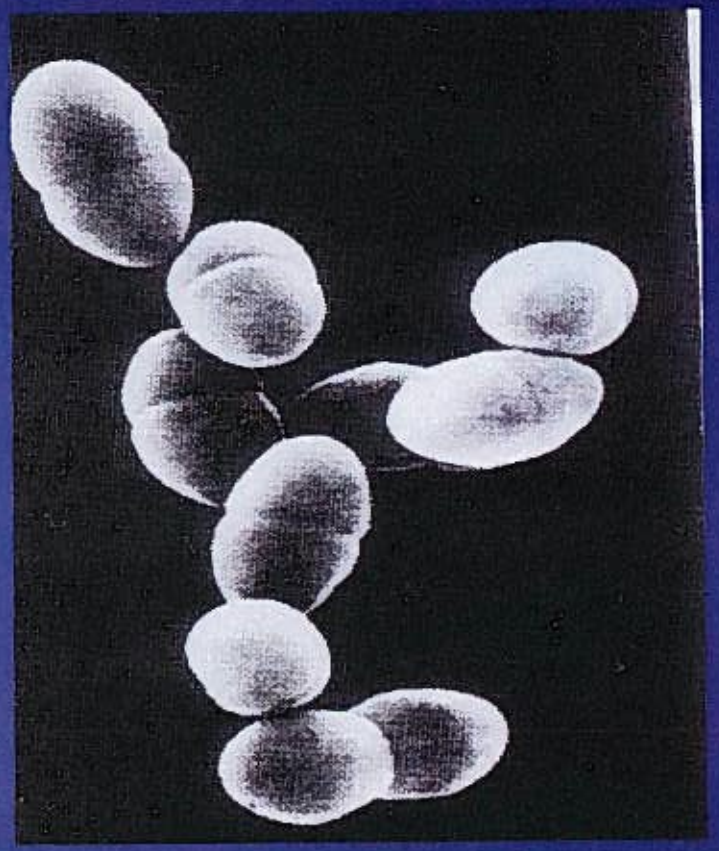

Enterococcus Faecalis under microscope

(left) × 12000, (right) × 12900

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Materials and Methods 1

1. Radioprotection effects

- Seven-weeks-old male C3H mice
- 12mg/Kg-400mg/Kg of heat-killed EF2001 were injected interpretational each for 2 weeks every other day
- Blood cell and Embryos; 2Gy-8Gy of whole body irradiation (Philips co. 225kV)
- Change of body weight Survival after irradiation
- Sections of the large and small intestines with a microscope

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Materials and Methods 2

•Experiment animal :ICR mice, Mating method : 3 hours (AM 9:00 to 12:00).

•The method of the radiation irradiation : X-ray irradiation : The radiation is irradiated after 2Gy, the fertilized eight days.

•Leukocyte : It draws blood in the sutra time target until 30 days.

* Experiment group: Control group; EF medication group (Sham control); 2Gy group, EF medication + 2Gy group

*The method of the EF 2001 medication:

The spare breeding (1 week) from 2 weeks

•Effect of EF2001 on the tumor growth in mice inoculated with SSC-7 carcinoma cells.

•Groups of ten mice each were subjected to each treatment. Results represent means ± S.D.

* Statistically significant ($P<0.05$) from the control group.

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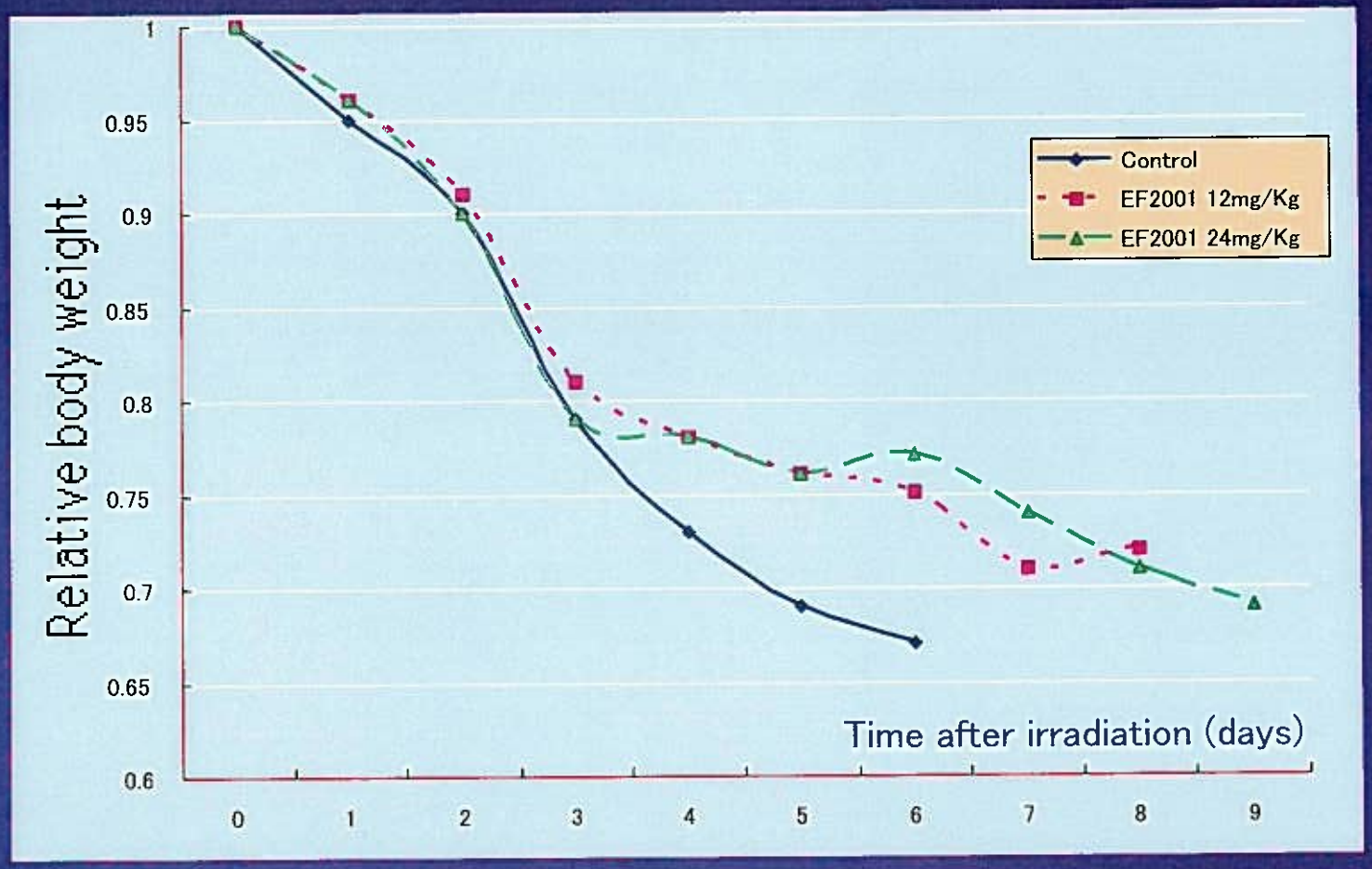

Change of body weight, the body weight loss was inhibited after injection of EF2001.

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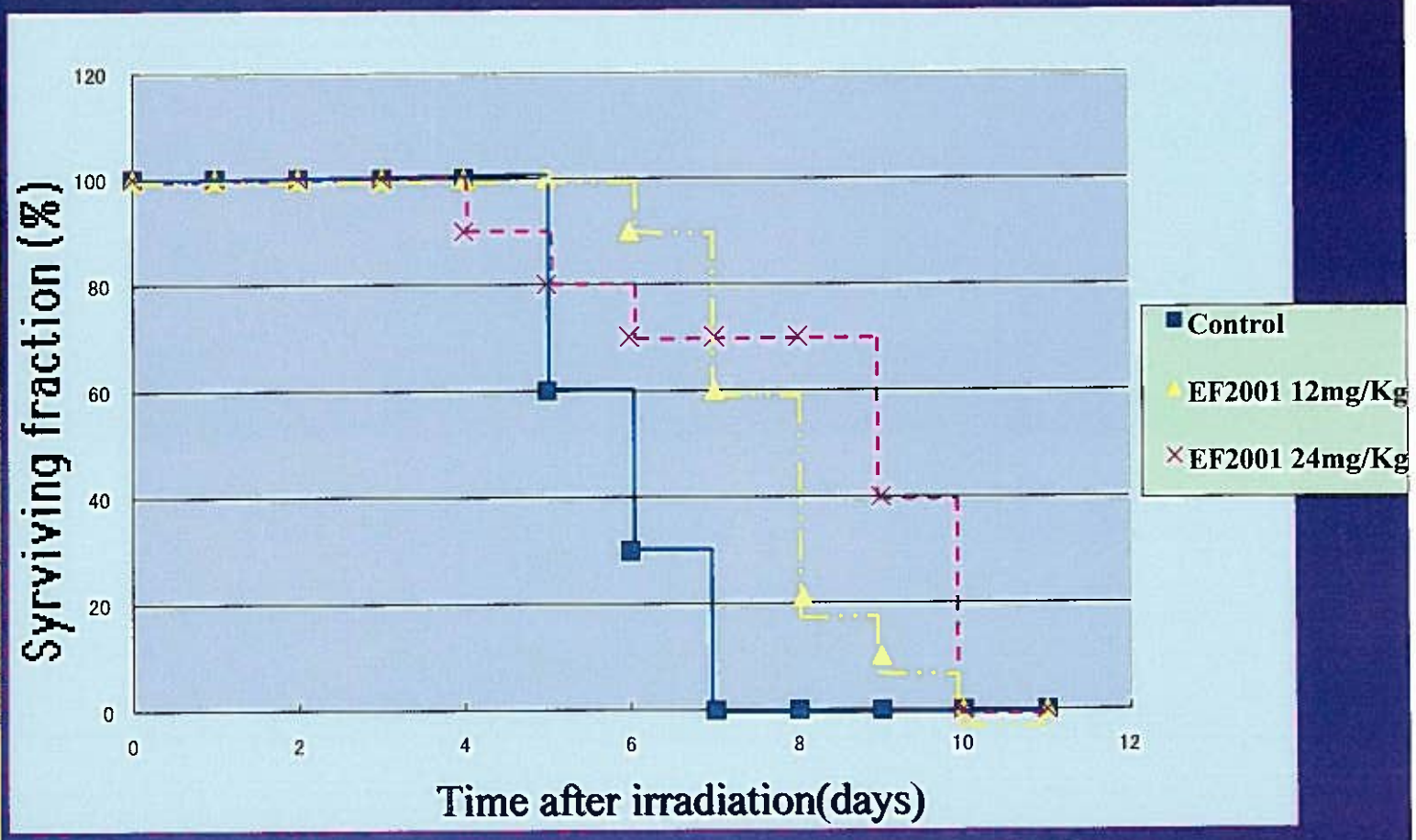

Survival after irradiation
Surviving fraction was increased after administration of EF2001.

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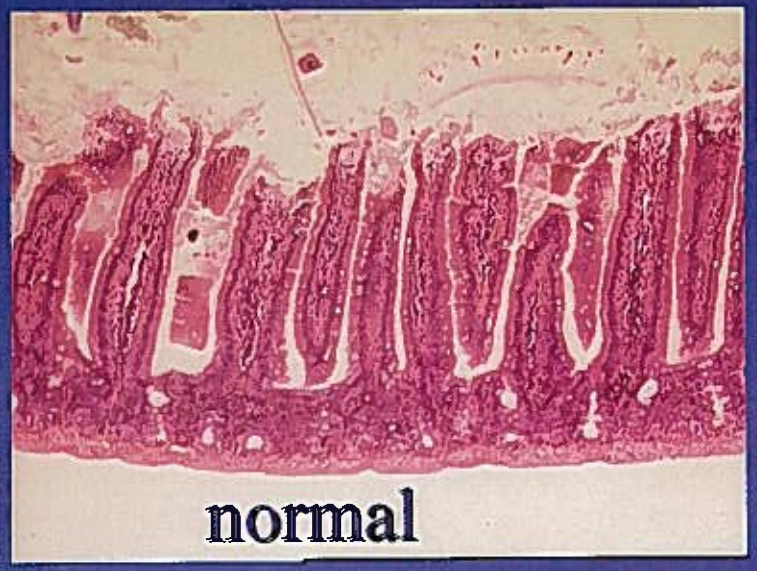
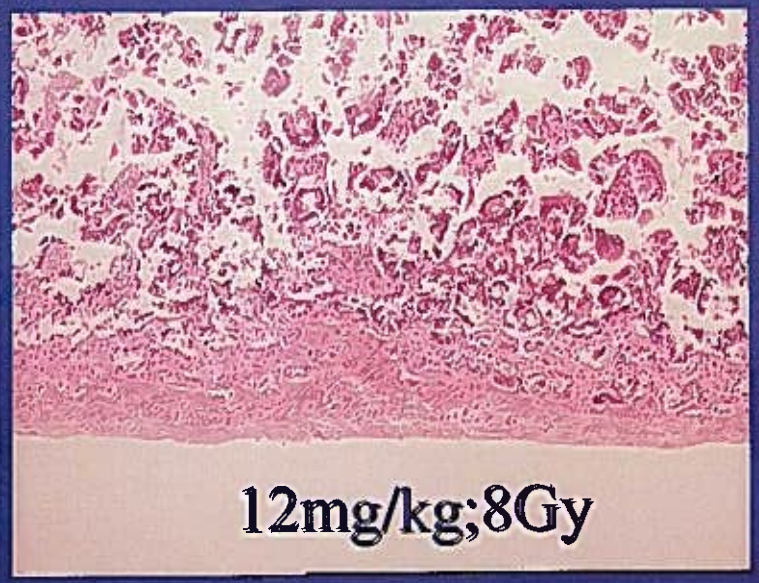
Small intestines with a microscope





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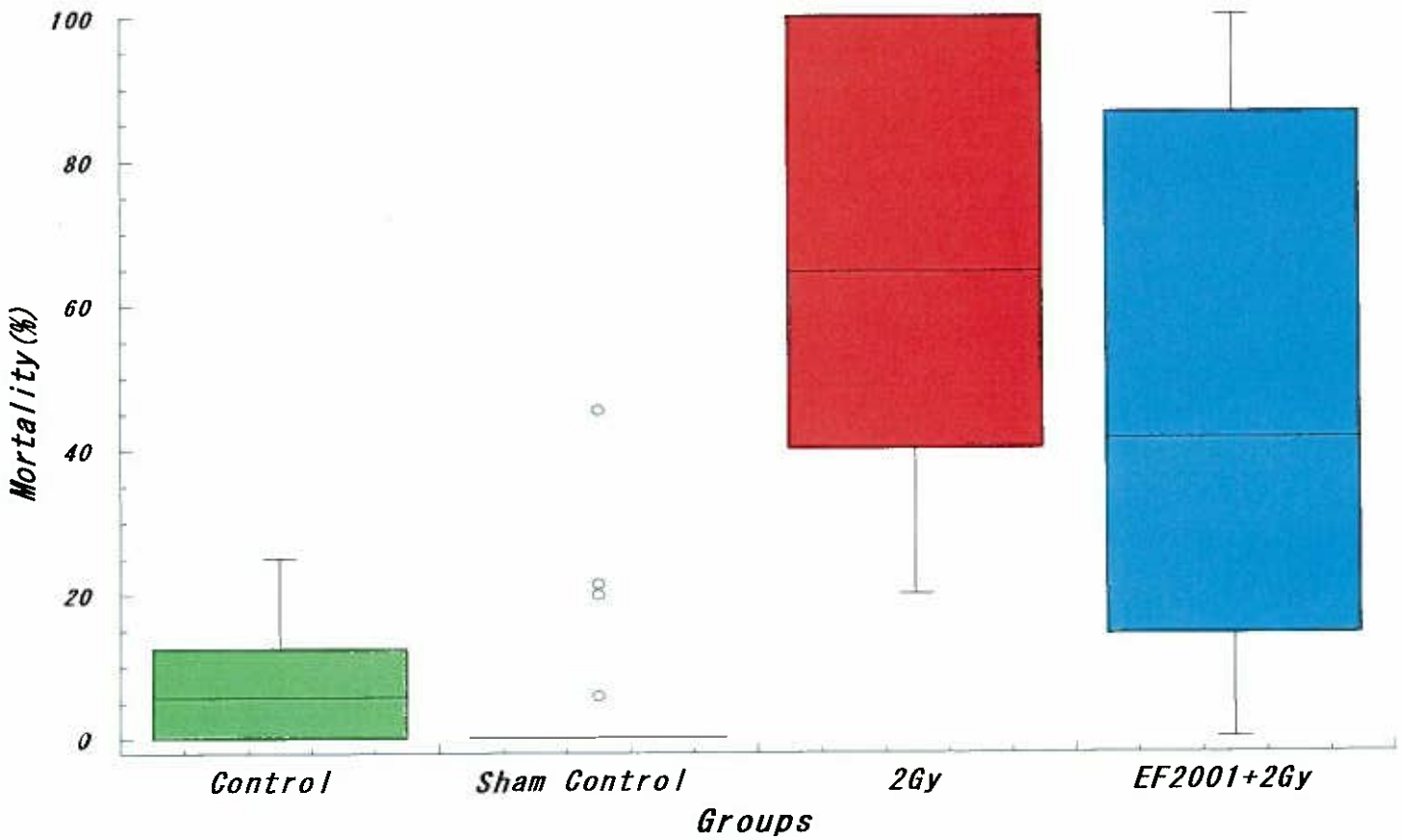

Embryonic death of the ICR mice irradiated at organogenesis period.The 2Gy group and EF2001 plus 2Gy group was detected with statistical significant difference($p<0.001$) from the control and sham control groups by Wilcoxon test.

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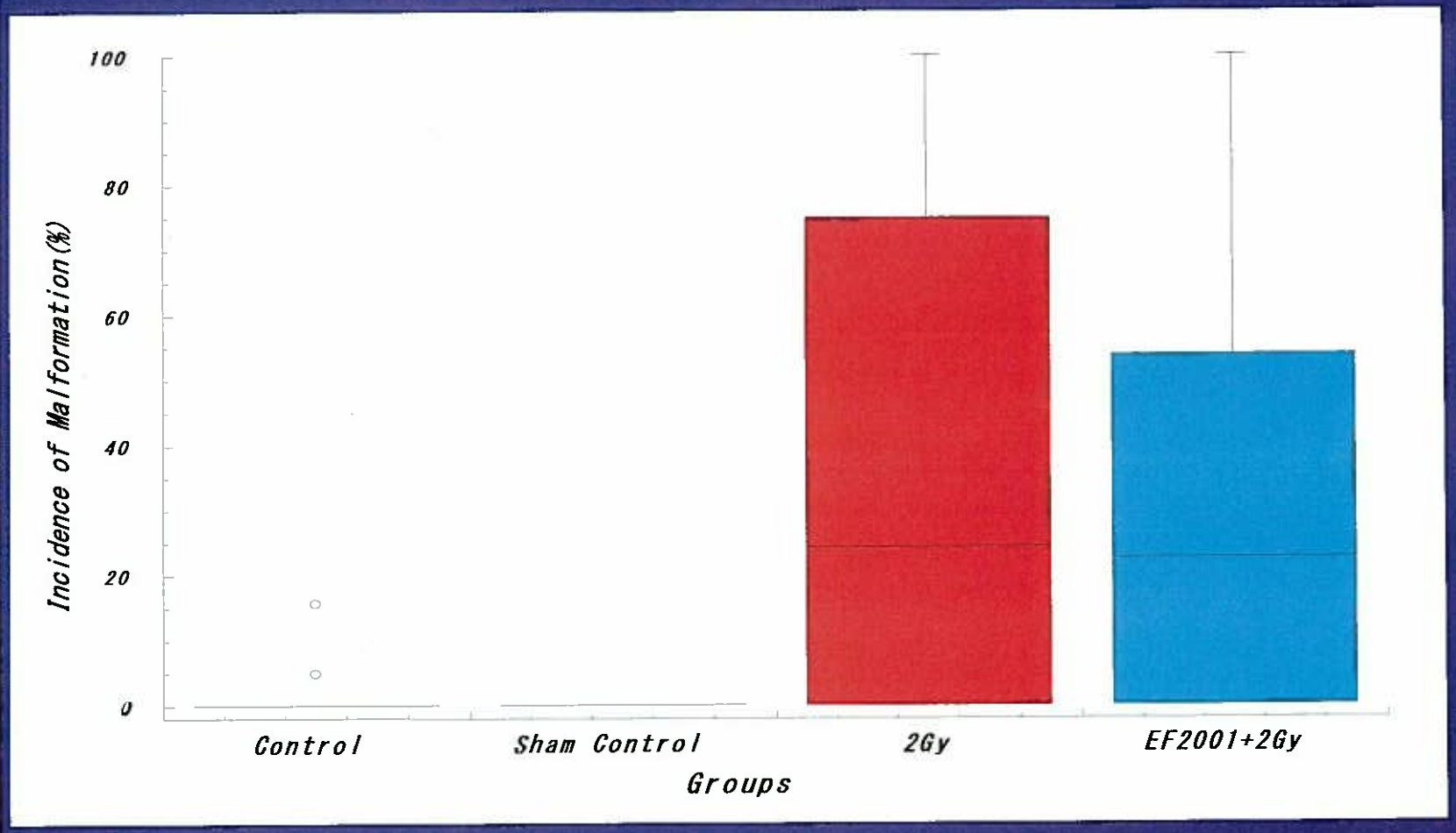

Malformation of the ICR mice irradiated at organogenesis period.The 2Gy group and EF2001 plus 2Gy group was detected with statistical significant difference($p<0.05$) from the control and sham control groups by Wilcoxon test.

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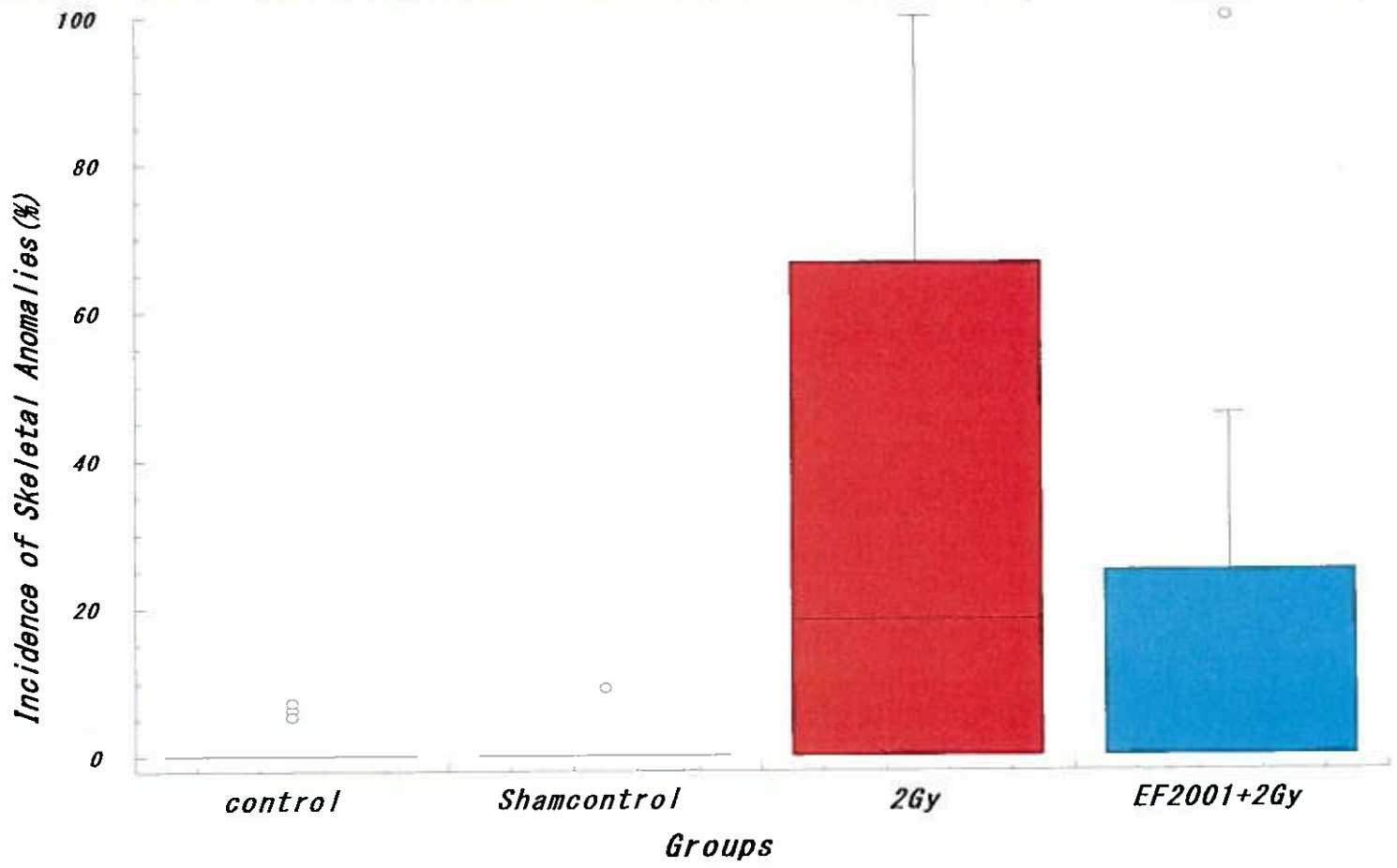

Skeletal malformation of the ICR mice irradiated at organogenesis period.The 2Gy group and EF2001 plus 2Gy group was detected with statistical significant difference($p<0.01$) from the control and sham control groups by Wilcoxon test.

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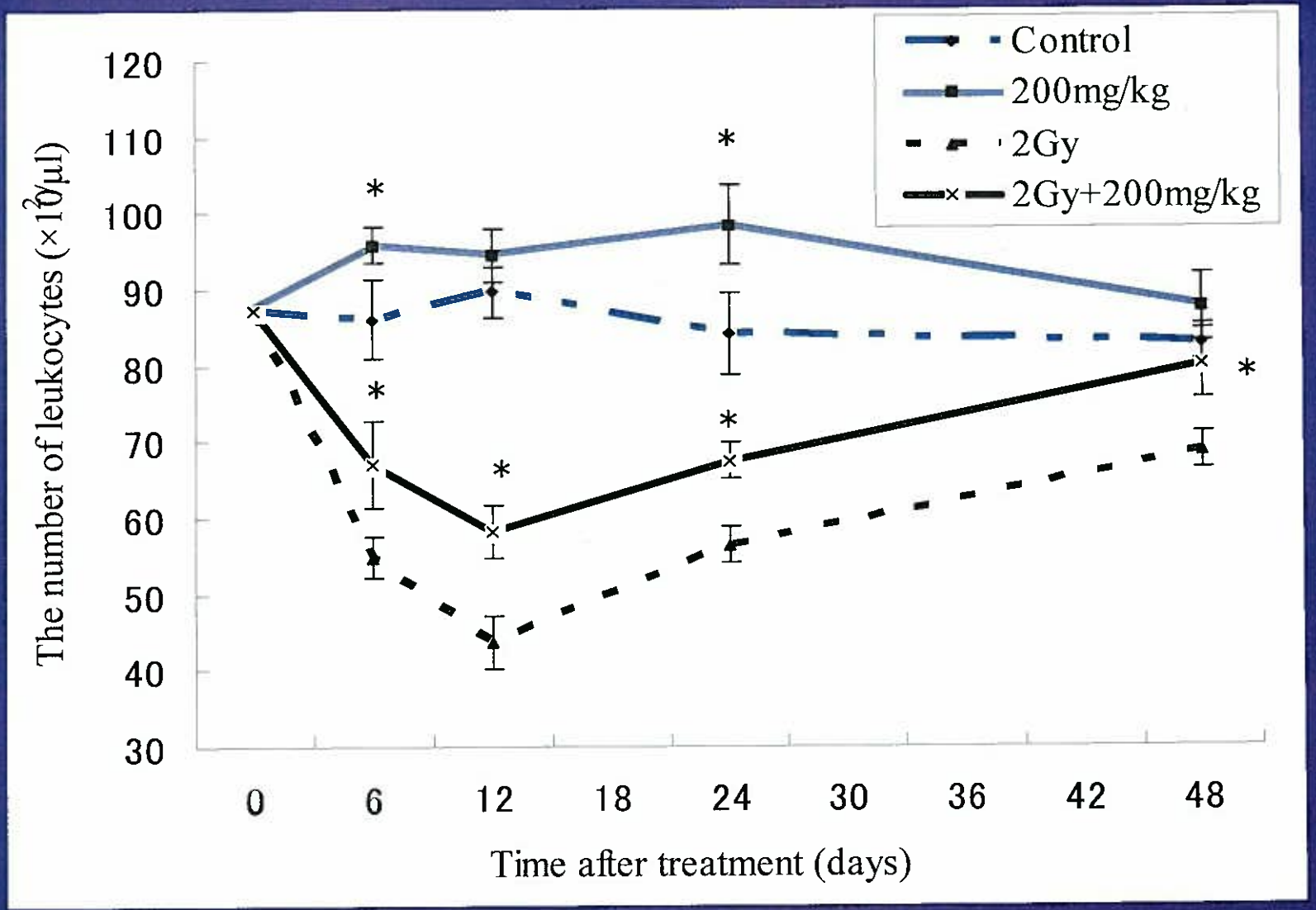

Leukocyte counts on different days after irradiation in mice of different groups. The number of leukocyte was calculated from the pre-irradiation values taken as 100%. The bars represent standard deviation. * Statistically significant ($P < 0.05$) from the control group.

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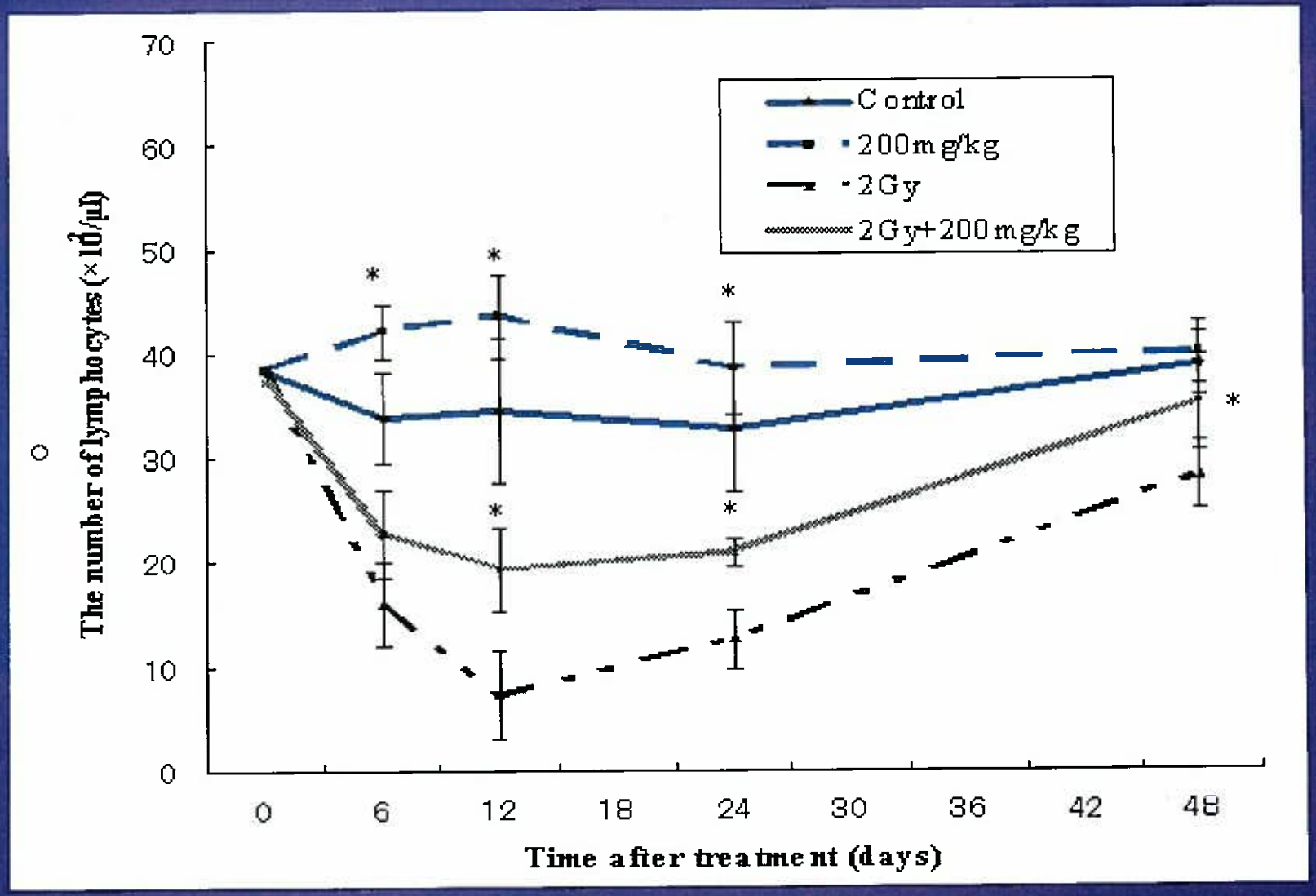

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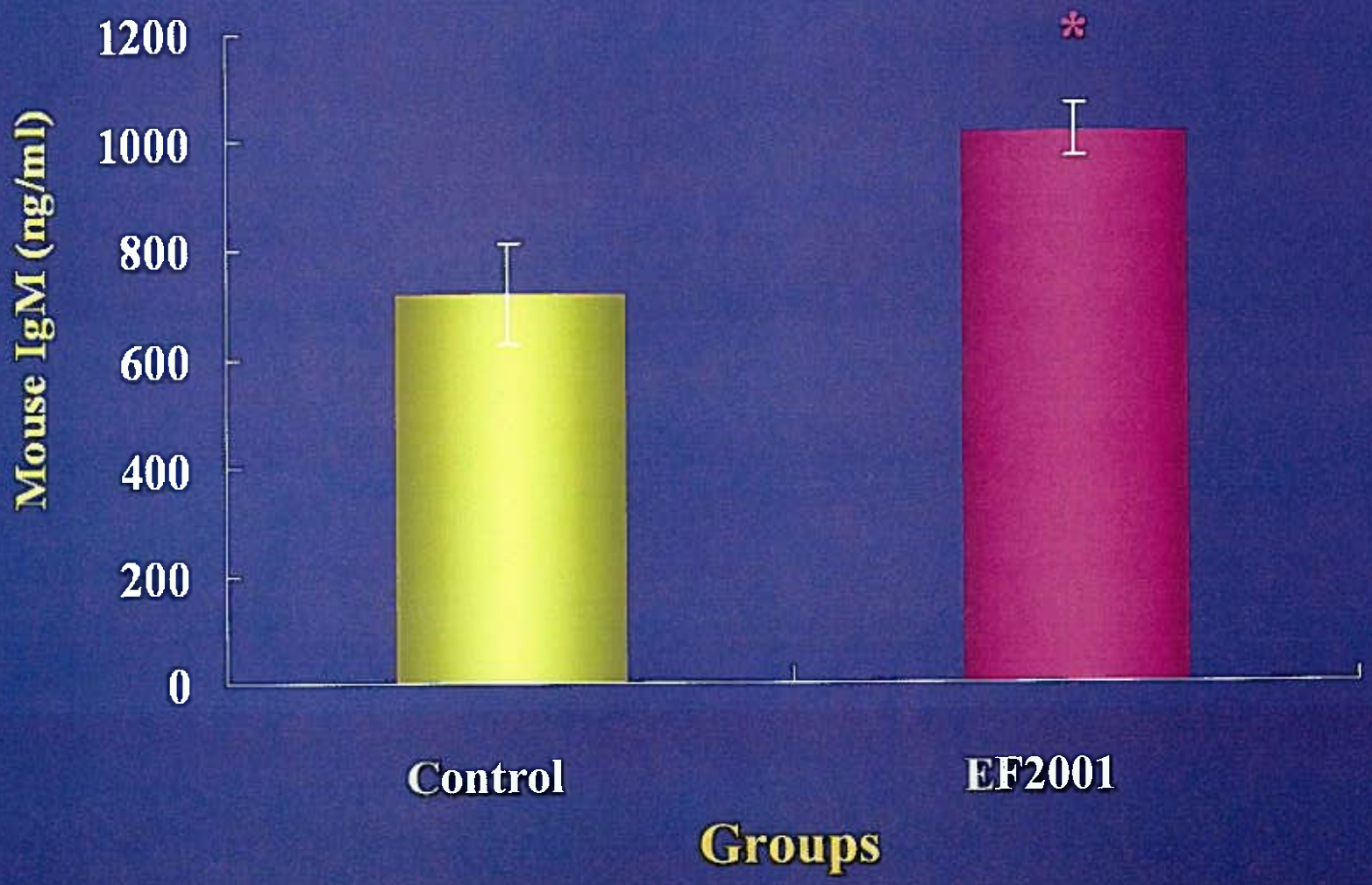

C3H mice of IgM in the blood. Each histogram represents the mean value ± SE for 10 mice IgM(M) significantly different *p<0.05 control vs. EF 2001.

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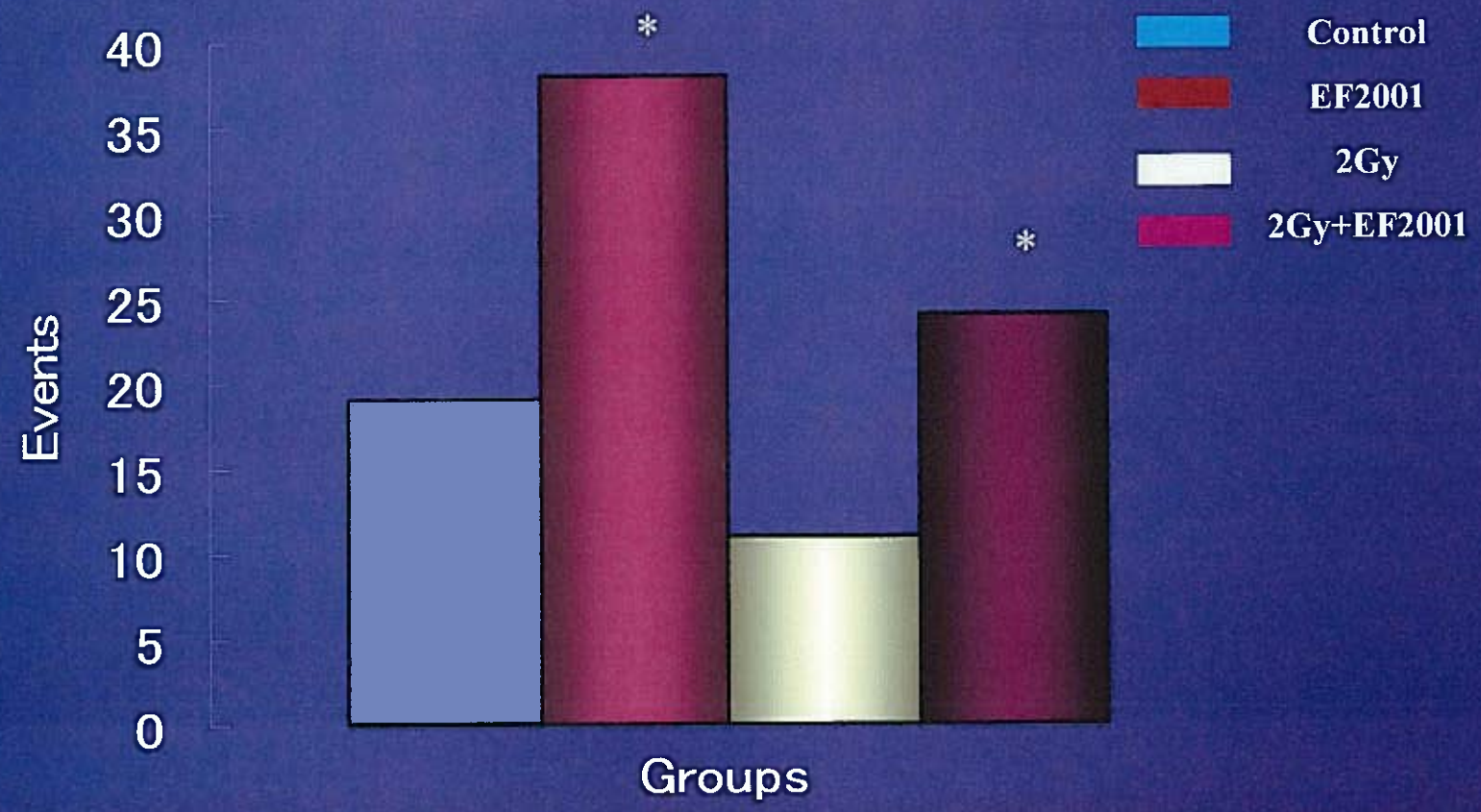

The activation of the CD4. Significantly different *p<0.05, Control vs. Samples, 2Gy vs. 2Gy+Samples

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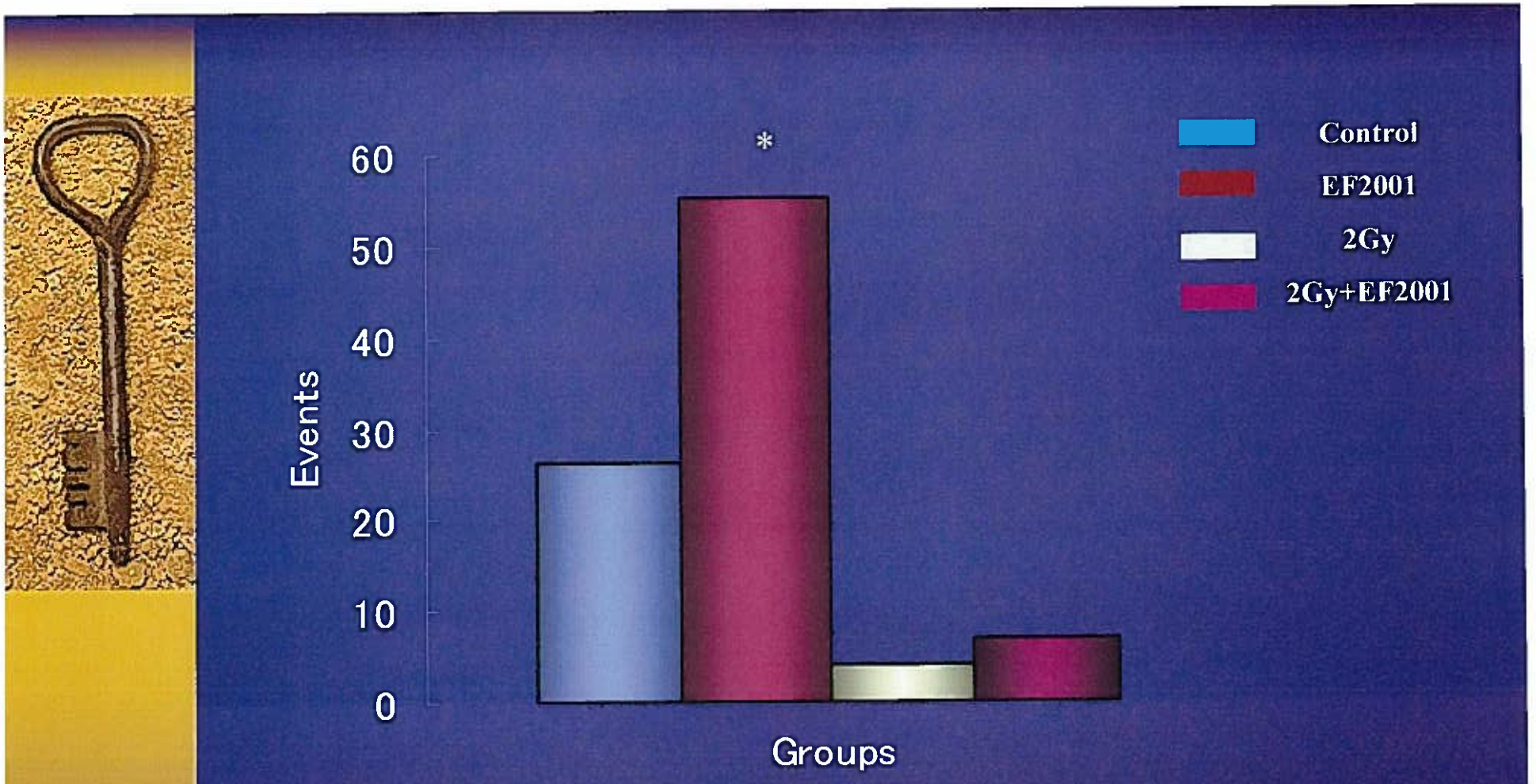

The activation of the CD8. Significantly different *p<0.05, Control vs. Samples, 2Gy vs. 2Gy+Samples

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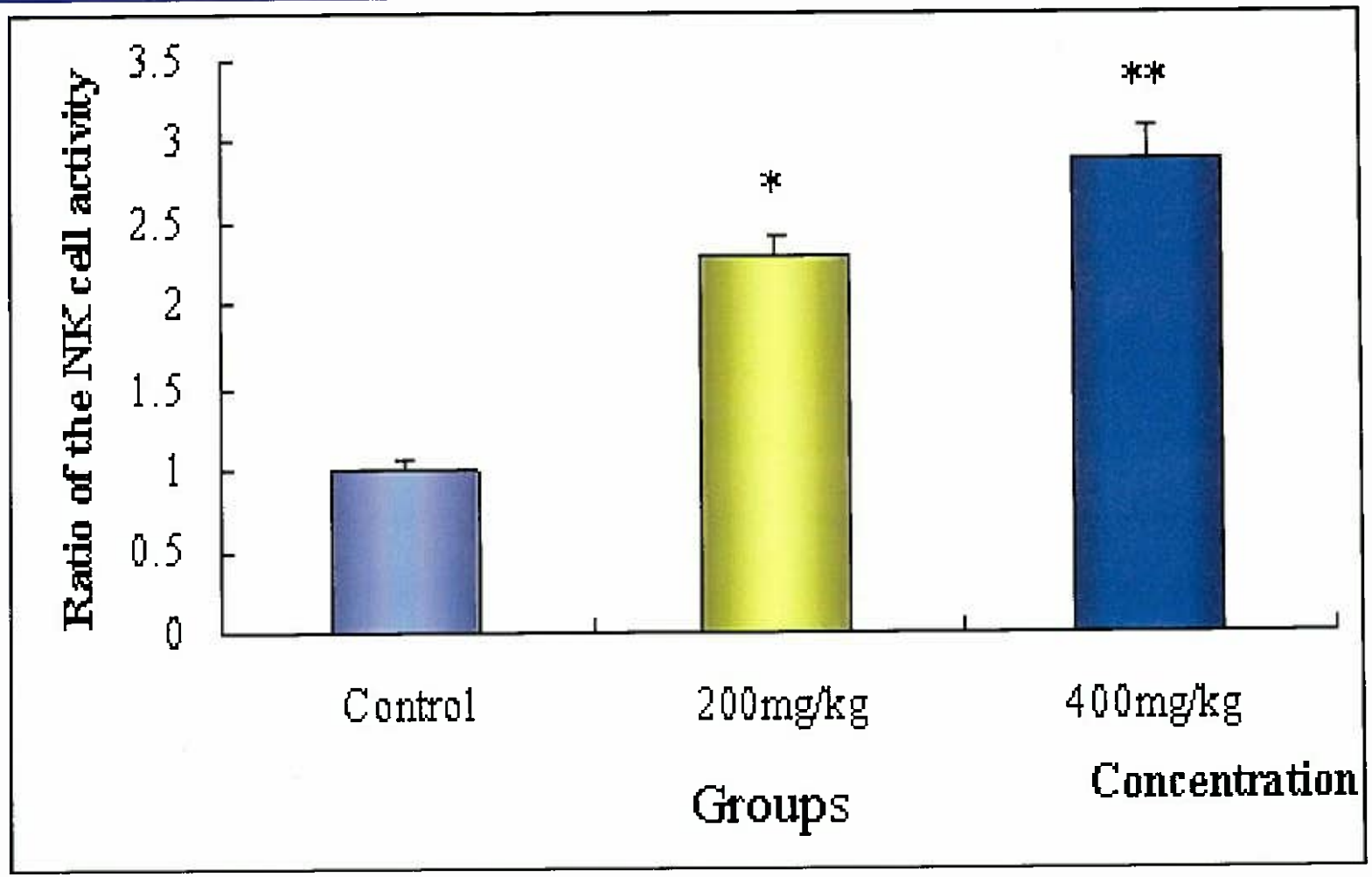

Repeated dose effect of EF 2001 on the NK activity in mice. Groups of ten mice each were subjected to each treatment. Results represent means ± S.D. * Statistically significant ($P < 0.05$) from the control group.

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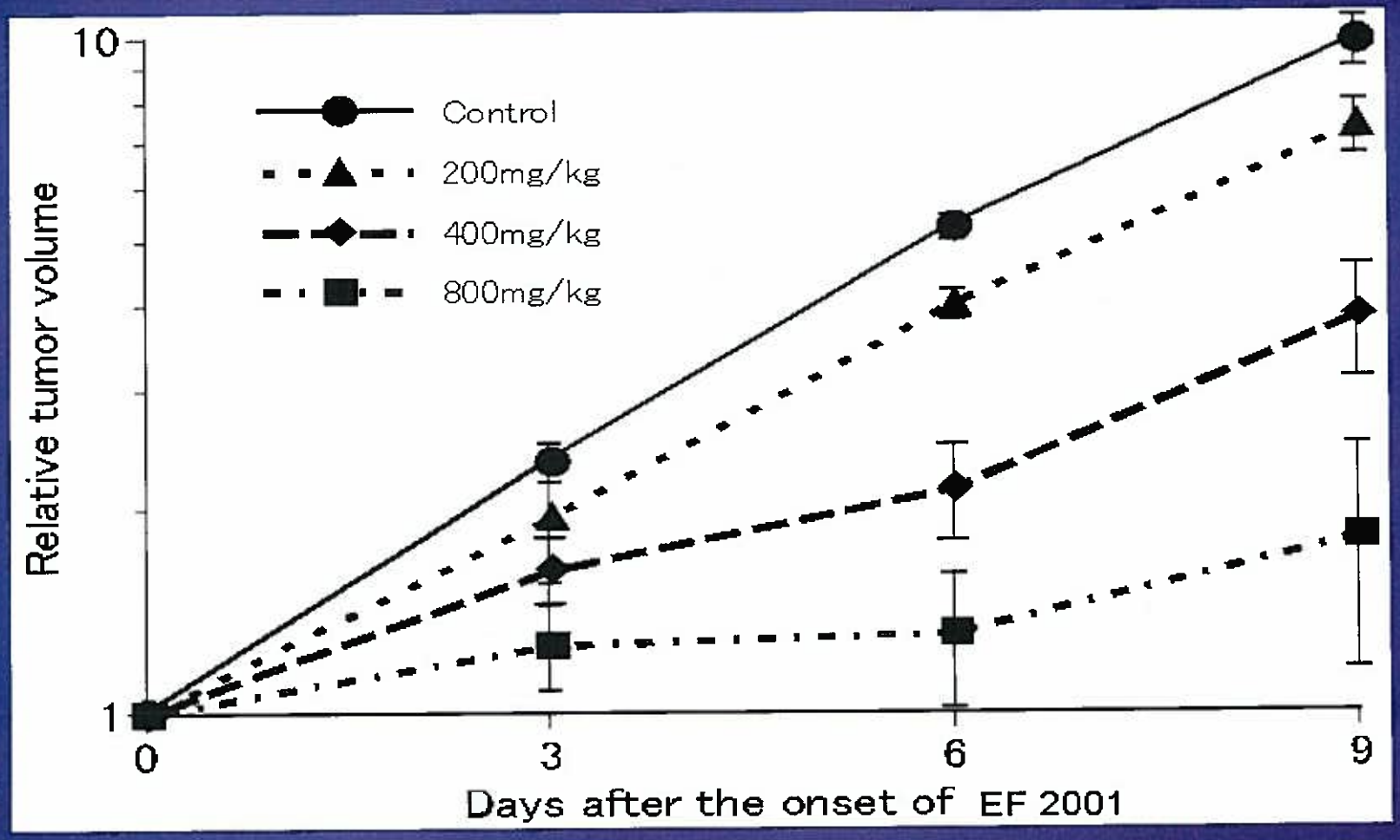

Effect of EF2001 on the tumor growth in mice inoculated with SSC-7 carcinoma cells. Groups of ten mice each were subjected to each treatment. Results represent means±S.D. * Statistically significant ($P<0.05$) from the control group.

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Conclusion 1

1. Body weight loss was smaller in mice injection EF2001, as compared with control group after 3 days. No apparent difference was found between two groups injected EF2001.
2. There was tendency to prolong the survival in the groups injected EF2001.
3. In the large intestine ,mucous damage was protected in both groups.The tendency that a damage was few included an one of EF2001 24mg group in the small intestine.
4. Activities of NK cells were enhanced with both groups.
5. Anti-cancer effects : EF 2001 administration group: positive
6. Radiation protection effect: EF 2001 administration group: precision
7. Immune activity: EF 2001 administration group: positive

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Conclusion 2

- Fetal effects: Compared with the 2Gy group in the embryonic death, malformation, skeletal malformation and the effect on radioprotection that an EF 2001+ 2Gy group was clear was admitted.
- A change in the number of the leukocytes : Increase in the lymphocyte was recognized as the leukocyte specially in comparison with the 2Gy irradiation group in an EF 2001 groups.
- Rise in the number of the lymphocytes by the EF2001 medication.
- The reinforce of the immunity function due to the activation of NK-cell.
- BRM (Biological Response Modifier) : the confirmation of the immunity activity material ⇒ existence.

⇓

- EF 2001 have radioprotection

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Internal mechanism

β -1,6-D Glucan

Internal absorption

Hematopoietic stem-cell

Natural immunity

Granulocytes

One kind

Neutrophil

Monocyte

Tissue

Macrophage

Activation

NK cell

Mastocyte
Dendritic-cells
RBC
Platelet
NKT cell

Phagocytosis

Lysosome

Digestion / Sterilization / Resolution of substance

Immune reaction

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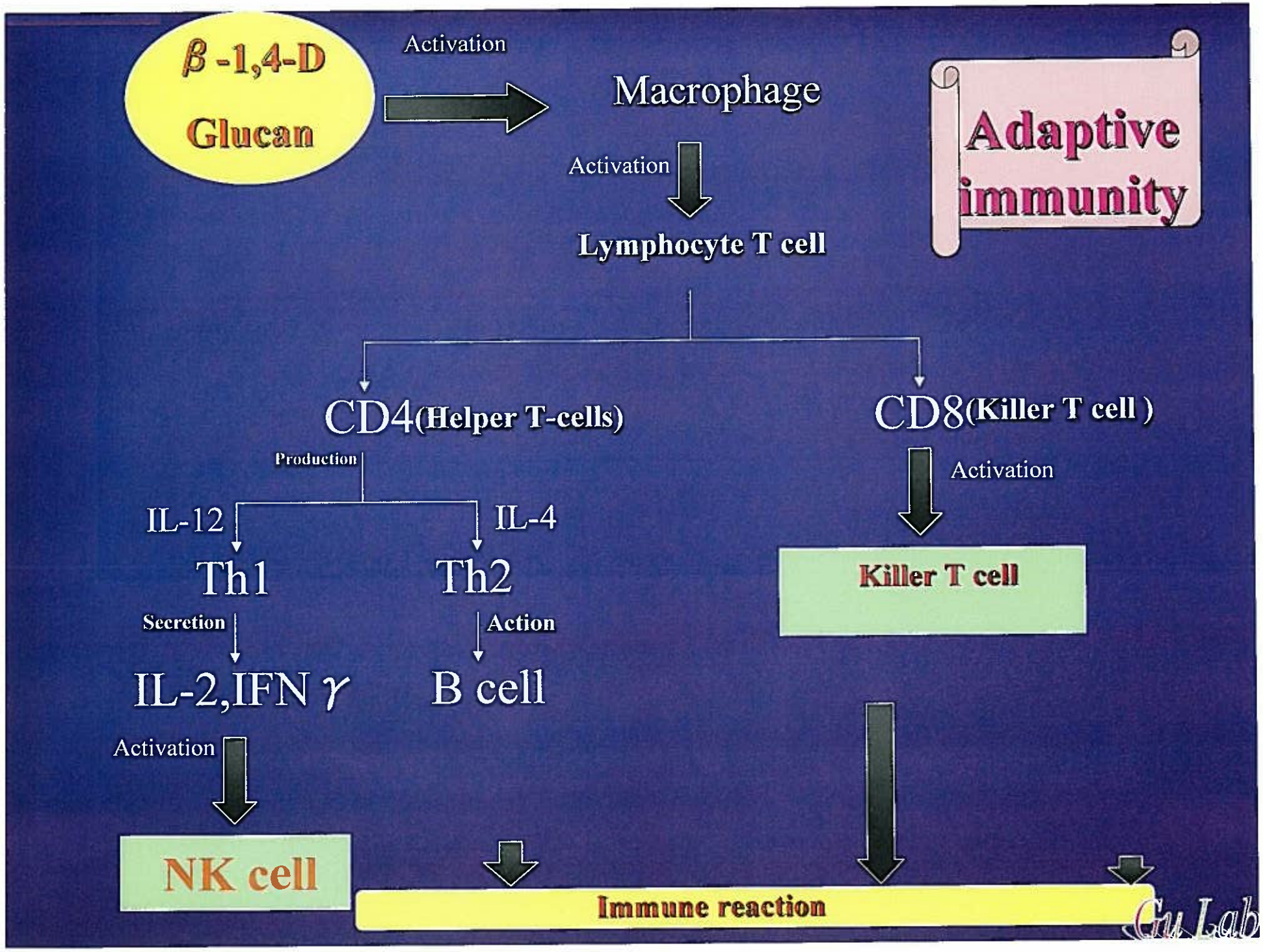
β -1,4-D Glucan
Activation
Macrophage
Activation
Lymphocyte T cell
Adaptive immunity
CD4(Helper T-cells)
CD8(Killer T cell)
Production
IL-12
IL-4
Th1
Th2
Secretion
Action
IL-2,IFN γ
B cell
Activation
Activation
Killer T cell
NK cell
Immune reaction
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