

THE EFFECT OF THERAPEUTIC IRRADIATION ON THE IMMUNE CELLS OF THE BONE MARROW IN THE LONG TERM AFTER TREATMENT OF HODGKIN'S LYMPHOMA

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Introduction

Bone marrow is now believed to perform the functions of the primary and secondary organ of the immune system. Irradiation is known to significantly reduce the number of cells in irradiated organs, tissues and bone marrow. However, at present, the influence of the program of radical gamma therapy on the immune cells of the bone marrow in the long term after treatment of Hodgkin's lymphoma has not been studied enough.

The objective of research

Total number of myelocariocytes and types of immunocompetent cells was evaluated in the bone marrow of patients with continuous long-term remission after radiotherapy for Hodgkin's disease.

Material and methods Twenty five Hodgkin's disease patients were examined in 13-25-year remission achieved by the program of radical gamma therapy at dose 40 Gy. Total number of myelocariocytes and types of immunocompetent cells was evaluated in the bone marrow in that group of patients. It was estimated that about 25-30% of bone marrow was exposed to radiation. Status of sternum (irradiated) and iliac (unirradiated) bone marrow was evaluated. Total cellularity, lymphocyte pool, population and subpopulation composition of immunocompetent cells was studied in the match biopsy specimens of marrow (breastbone and iliac bone). The bone marrow of 7 patients with lymphadenitis was evaluated as a control close to normal.

Immunophenotyping was performed with flow cytofluorimetry (FACScan) by Simulset programme using monoclonal antibodies of Leu series (Becton Dickinson) and double fluorescent staining – PE, FITC (Simulset IMK Plus and Acute Leukemia kits): CD45/CD14, CD3/CD4, CD3/CD19, CD4/CD8, CD16CD56/CD8, CD38/CD8.

Statistical analysis

The group data were compared using the nonparametric Mann-Whitney test and the parametric student t-test using the Statistica 8.0 software package (StatSoft, Inc., USA.)

Results The mean number of myelocariocytes in unirradiated iliac bone marrow was $41.7 \pm 6.4 \times 10^9$ cell/l, i.e. near low of the normal level; in irradiated breastbone was only 17.8 ± 3.0 cell/l (Fig 1).

The numbers of lymphocytes were $4.0 \pm 0.67 \times 10^9$ cell/l and $8.6 \pm 1.2 \times 10^9$ cell/l for irradiated and unirradiated marrow, respectively. There were all types of immunocompetent cells found in the bone marrow: T-, B-, NK-cells. Their levels were higher in unirradiated iliac bone than in irradiated breastbone (Fig 2). Content of total count myelokaryocytes, of progenitor cells (CD38+), T-cells (CD3+), T-helpers (CD4+), T-killers (CD8+), NK-cells (CD16+CD56+) in the intact bone marrow was similar to those in group reactive lymphadenitis, while the number of B-cells in group of lymphadenitis was much higher.

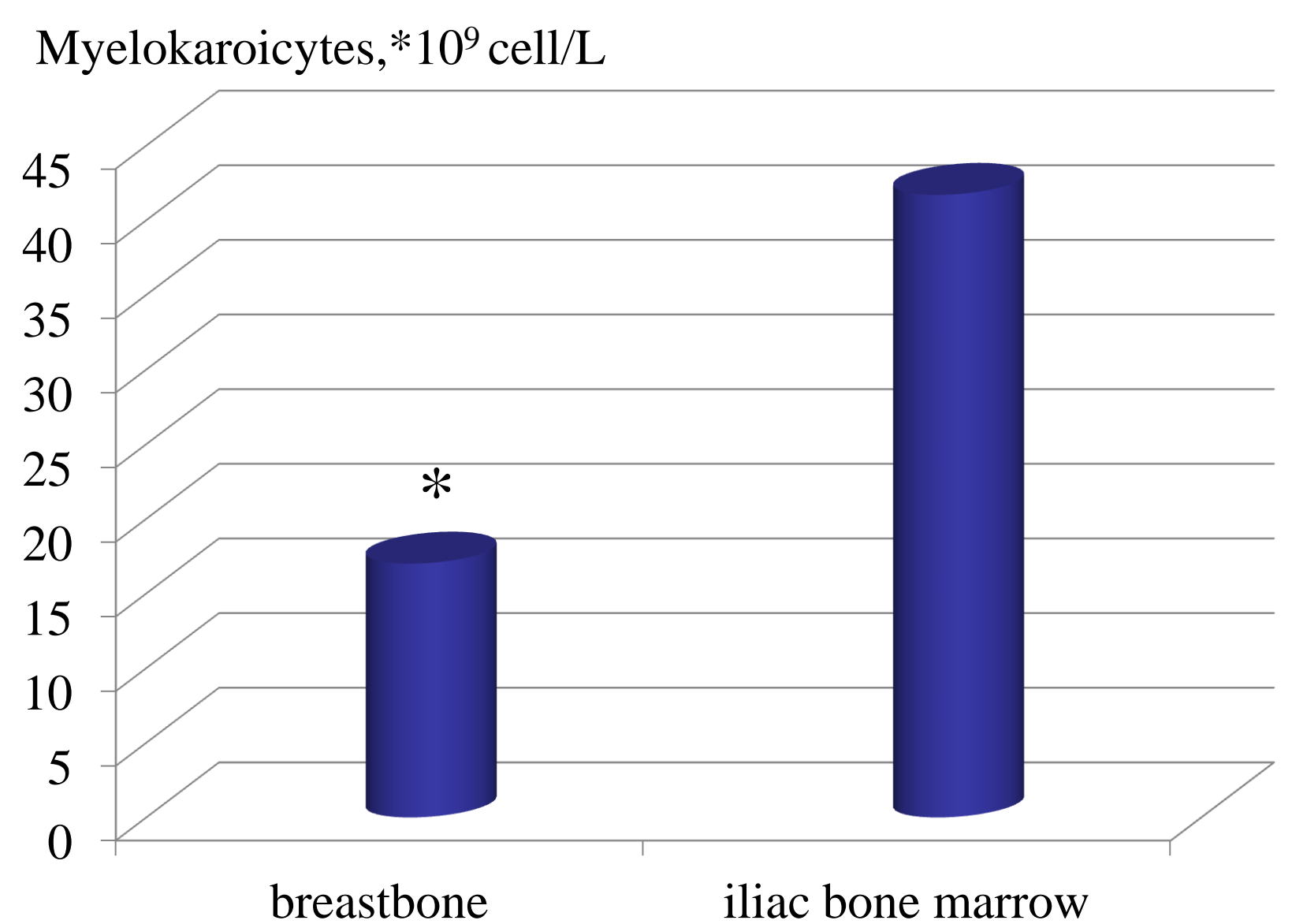


Fig.1. Myelokaryocytes in irradiated (breast bone) and non-irradiated (iliac bone) marrow.

*- Differences are statistically significant, $p < 0.05$.

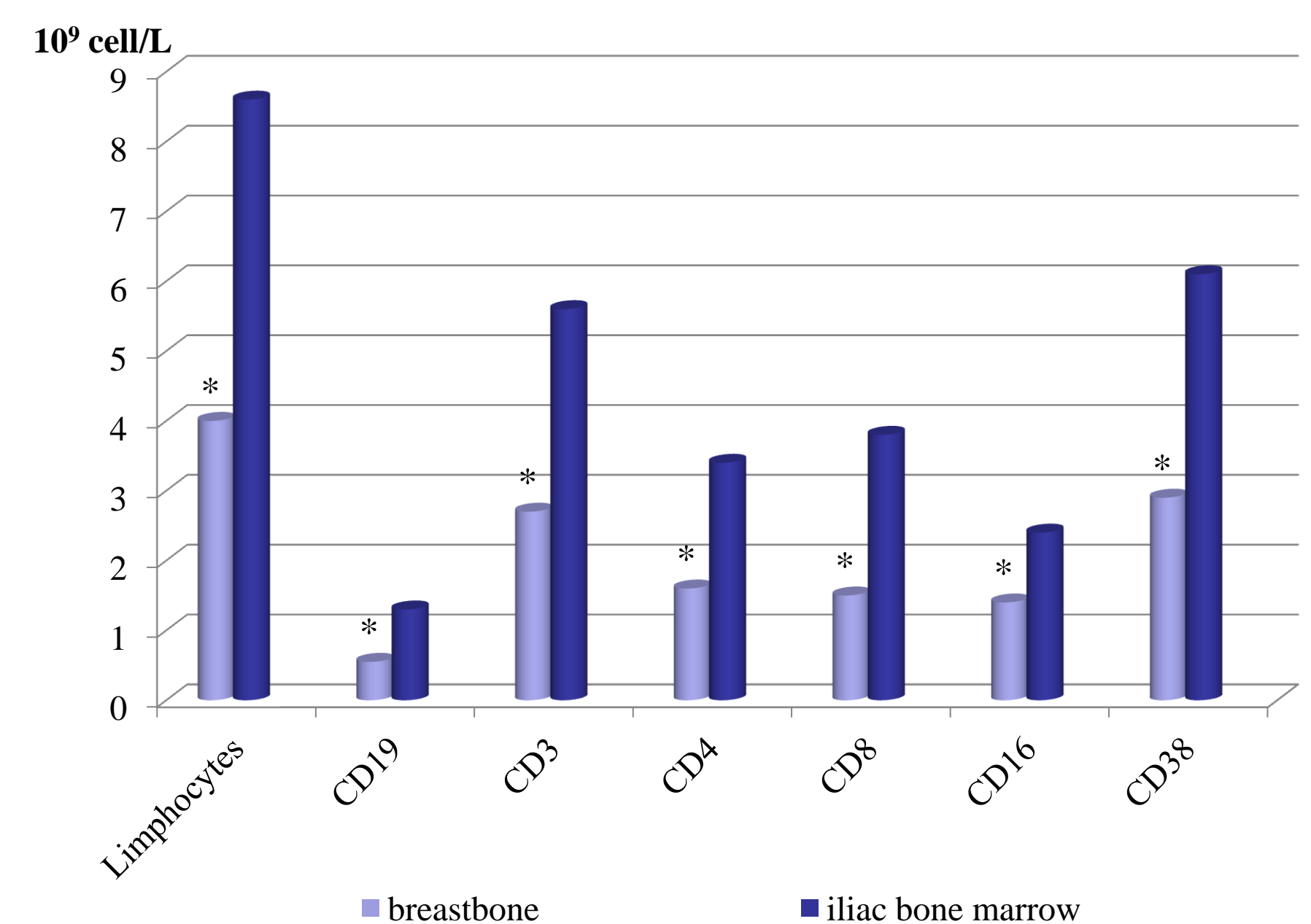


Fig.2. Lymphocyte subpopulations in irradiated (breast bone) and non-irradiated (iliac bone) marrow

*- Differences are statistically significant, $p < 0.05$

Conclusion Thus, the bone marrow of patients with Hodgkin's disease in long-term continuous remission that was achieved by radical gamma-therapy showed hypoplasia of bone marrow, especially in the irradiated areas. In the unirradiated bone marrow the impairment was less pronounced.



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