

CORRECTION OF IMMUNE SYSTEM CELLS BY THE HERBAL PREPARATION GULZOR BALM IN IRRADIATED ANIMALS WITH DIFFERENT ACETYLATION TYPES

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Abstract

Secondary immunodeficiency (SID) represents a dysfunction of the immune system that develops during the late postnatal period or in adulthood. It is characterized by impaired differentiation, proliferation, and adaptation of immune cells and is not associated with genetic defects. Irreversible SID may develop as a result of HIV infection, exposure to high doses of ionizing radiation, toxic effects on the hematopoietic system, lymphoproliferative and other malignant disorders, or severe bacterial, viral, and fungal infections such as tuberculosis and systemic mycoses.

Objective

This study aimed to investigate the number of nucleated immune cells in animals with different acetylation phenotypes and to evaluate the corrective potential of the herbal preparation Gulzor Balm in irradiated animals.

Materials and Methods

White outbred mice were used in the experiments. The acetylation phenotype was determined according to the method of L.N. Bulavskaya. Following phenotype identification, the animals were exposed to a sublethal dose of ionizing radiation (5 Gy). Five days after irradiation, the mice were immunized with sheep erythrocytes at a dose of 2×10^8 /mL. Five days later, the number of nucleated cells was quantified in both central and peripheral immune organs. Gulzor Balm was administered intraperitoneally once, at a dose of 0.25 mL/kg, on the day of immunization. For comparative analysis, a separate group received Immunomodulin at a dose of 0.01 mL/kg.

Results

In the control group of slow acetylators (SA), the number of nucleated bone marrow cells (NBMC) was $169.4 \pm 2.2 \times 10^6$ /mL. Exposure to 5 Gy resulted in a significant 1.9-fold decrease in NBMC. Administration of Gulzor Balm (0.25 mL/kg) to irradiated SA animals increased NBMC 1.6-fold, whereas Immunomodulin (0.01 mL/kg) enhanced it by 1.2-fold. In the control group of fast acetylators (FA), NBMC amounted to $119.8 \pm 1.6 \times 10^6$ /mL. X-ray exposure significantly reduced NBMC 2.5-fold. Single intraperitoneal administration of Gulzor Balm restored NBMC levels in FA animals

with radiation-induced SID, while Immunomodulin increased them 1.4-fold. In intact SA animals, the number of nucleated thymic cells (NBCT) was $148.8 \pm 2.8 \times 10^6/\text{mL}$. Irradiation reduced NBCT 3.2-fold compared with the control. Gulzor Balm administration significantly increased NBCT 2.7-fold (up to $128.8 \pm 2.0 \times 10^6/\text{mL}$). Immunomodulin administration increased NBCT 1.7-fold in irradiated SA animals. In the FA control group, NBCT was $121.4 \pm 1.8 \times 10^6/\text{mL}$. Irradiation with 5 Gy led to a 2.2-fold decrease in NBCT. Single administration of Gulzor Balm (0.25 mL/kg) completely restored this parameter. Comparable results were observed following Immunomodulin administration in FA animals with SID. In the control SA group, the number of nucleated cells in mesenteric lymph nodes (NBMLN) was $88.4 \pm 1.4 \times 10^6/\text{mL}$. In irradiated SA animals, this indicator decreased 3.1-fold. Intraperitoneal administration of Gulzor Balm increased NBMLN 2.4-fold, while Immunomodulin increased it 1.7-fold. In the FA control group, NBMLN was $68.8 \pm 1.1 \times 10^6/\text{mL}$. After irradiation, this parameter significantly decreased 1.9-fold. Administration of Gulzor Balm restored the immune response to sheep erythrocytes, whereas Immunomodulin increased NBMLN 1.3-fold in irradiated FA animals.

Conclusions

1. The immunostimulatory effect of Gulzor Balm promotes the redistribution of immune cells within lymphoid organs, facilitating an effective immune response to antigenic stimulation. This effect depends on the acetylation phenotype under radiation-induced secondary immunodeficiency.
2. The herbal preparation Gulzor Balm exhibits a differential modulatory influence on various components of the immune system.