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Ameliorating Effects of Bone Marrow Transplantation and Zinc Supplementation on Physiological and Immunological Changes in Gamma-Irradiated Rats

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Purpose: The present study was carried out to determine the prophylactic impact of zinc sulphate administration to irradiated rats treated with bone marrow transplantation (BMT) as indicated by the hematological and immunologic response as well as oxidative stress.

Material and methods: Rats were injected orally with zinc sulphate, 10 mg/ Kg body wt, daily for 2 weeks before whole body 5Gy gamma irradiation and intravenous injection of bone marrow cells, one hour post irradiation.

Results: The results revealed a significant decrease in red blood cells (RBC), white blood cells (WBC), glutathione (GSH) and zinc superoxide dismutase (Zn /SOD), splenocyte count as well as bone marrow lymphocyte count and viability of irradiated rats. Regarding immunological data: tumor necrosis factor alpha (TNF- α) and interleukin 2 (IL-2) recorded a significant decrease while interleukin 6 (IL-6) and lipid peroxidation product (MDA) in the serum and spleen were conversely elevated. Zn supplementation before irradiation and BMT showed significant decrease of serum and tissue MDA compared to the irradiated group. Lymphocytes, bone marrow viability percentage, splenocytes percentage, IL-2, IL-6 and GSH were significantly elevated compared to irradiated group.

Conclusion: Protection with Zn, enforcing significant innate response, could trigger and augment adaptive immune response by BMT which suggests its use to protect against radiation hazards.

Key words: BMT; gamma irradiation; zinc sulphate; immunologic response.

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