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# Arabinoxylan rice bran (MGN-3/Biobran) provides protection against whole-body γ-irradiation in mice via restoration of hematopoietic tissues

Mamdooh GHONEUM[1,*], Nariman K. BADR EL-DIN[2], Salma M. ABDEL FATTAH[3] and Lucilene TOLENTINO[4]

[1]Department of Otolaryngology, Charles Drew University of Medicine and Science, Los Angeles, California 90059, USA
[2]Department of Zoology, Faculty of Science, University of Mansoura, Mansoura 35516, Egypt
[3]Drug and Radiation Research, National Center for Radiation and Technology, Cairo, Egypt
[4]Department of Pathology, Charles Drew University of Medicine and Science, Los Angeles, California 90059, USA
*Corresponding author. Charles Drew University of Medicine and Science, Department of Otolaryngology, 1621 East 120th Street, Los Angeles, California 90059, USA. Tel: +1-323-563-5953; Fax: +1-310-474-6724; Email: mghoneum@ucla.edu

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The aim of the current study is to examine the protective effect of MGN-3 on overall maintenance of hematopoietic tissue after γ-irradiation. MGN-3 is an arabinoxylan from rice bran that has been shown to be a powerful antioxidant and immune modulator. Swiss albino mice were treated with MGN-3 prior to irradiation and continued to receive MGN-3 for 1 or 4 weeks. Results were compared with mice that received radiation (5 Gy γ rays) only, MGN-3 (40 mg/kg) only and control mice (receiving neither radiation nor MGN-3). At 1 and 4 weeks post-irradiation, different hematological, histopathological and biochemical parameters were examined. Mice exposed to irradiation alone showed significant depression in their complete blood count (CBC) except for neutrophilia. Additionally, histopathological studies showed hypocellularity of their bone marrow, as well as a remarkable decrease in splenic weight/relative size and in number of megakaryocytes. In contrast, pre-treatment with MGN-3 resulted in protection against irradiation-induced damage to the CBC parameters associated with complete bone marrow cellularity, as well as protection of the aforementioned splenic changes. Furthermore, MGN-3 exerted antioxidative activity in whole-body irradiated mice, and provided protection from irradiation-induced loss of body and organ weight. In conclusion, MGN-3 has the potential to protect progenitor cells in the bone marrow, which suggests the possible use of MGN-3/Biobran as an adjuvant treatment to counteract the severe adverse side effects associated with radiation therapy.

**Keywords:** MGN-3; Biobran; radiation; hematopoeitic cells

## INTRODUCTION

Ionizing radiation has a diversity of beneficial uses in medicine including radiotherapy as an important treatment modality for cancer, radiographs for screening, diagnosis and staging of diseases and malignancies. However, effective use of ionizing radiation is compromised by the side effects that result from radiation-induced damage to normal tissue [1]. Vulnerability of exposure to ionizing radiation is of great concern to patients and medical personnel in the occupational setting (radiotherapy technicians, dental assistants, and research personnel). In addition, environmental contamination from accidents like the Ukraine Chernobyl disaster of 26 April 1986, and Fukushima radiation releases in Japan on 11 March 2011, can cause widespread health concerns. Ionizing radiation can cause a series of deleterious side-effects, including oxidative stress [2] and oxidative damage to cellular macromolecules [3–5], which lead to the demise of hematopoietic tissues [6, 7]. The bone marrow and spleen are important in maintaining the peripheral blood cell pool and proper functioning of the immune system. Thus, radiation damage to these vital