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# Cardiotoxicity Associated with Radiation Therapy: The Role of Bone Marrow Mesenchymal Cells in Improvement of Heart Function

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**Abstract :** Background: The therapeutic options for patients with cancer now include increasingly complex combinations of medications, radiation therapy (RT), and surgical intervention. Many of these treatments have important potential adverse cardiac effects and are likely to have significant effects on patient outcomes. Cell therapy appears to be promising for the treatment of chronic and degenerative diseases, including cardiomyopathy induced by RT, as the current therapeutic options are insufficient. Aims: To evaluate the potential of bone marrow mesenchymal cells (BMMCs) in radioinduced cardiac damage Methods: Female Wistar rats, 3 months old (Ethics Committee 054/14), were divided into 2 groups, non-treated irradiated group (IR n=15) and irradiated and BMMC treated (IRT n=10). Echocardiography was performed to evaluate heart function. After euthanasia, 3 months post treatment; the left ventricle was removed and prepared for RT-qPCR (VEGF and Pro Collagen I) and histological (picrosirius) analysis. Results: In both groups, 45 days after irradiation, ejection fraction (EF) was in the normal range for these animals (> 70%). However, the BMMC treated group had EF (83.1%±2.6) while the non-treated IR group showed a significant reduction (76.1%±2.6) in relation to the treated group. In addition, we observed an increase in VEGF gene expression and a decrease in Pro Collagen I in IRT when compared to IR group. We also observed by histology that the collagen deposition was reduced in IRT (10.26%±0.83) when compared to IR group (25.29%±0.96). Conclusions: Treatment with BMMCs was able to prevent ejection fraction reduction and collagen deposition in irradiated animals. The increase of VEGF and the decrease of pro collagen I gene expression might explain, at least in part, the cell therapy benefits. All authors disclose no financial or personal relationships with individuals or organizations that could be perceived to bias their work. Sources of funding: FAPERJ, CAPES, CNPq, MCT.

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