Human Mesenchymal Stem cell favour healing of

cutaneous radiation syndrome

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Abstract

Localized irradiation at high exposure could induce severe radiation burns characterized by the occurrence of unpredictable successive inflammatory waves leading to the extension in surface and depth of necrotic processes. The medical management of these severe radiations burns remains today a challenging issue unresolved by the classical therapeutical approach derived from the management of thermal or electrical burns. It has been suggested that cellular therapy with Mesenchymal Stem Cells (MSC) could be used to repair numerous injured tissues. We have studied the potential use of human MSC (hMSC) in order to limit radiation-induced skin lesions.
Immunodeficient NOD/SCID mice were locally irradiated to the leg (30 Gy, dose rate 2.7 Gy/mn) using a ^{60}Co source in order to induce a severe skin lesion. Cultured bone marrow hMSC were delivered intravenously to the mice before lesion establishment (24h after irradiation). The irradiated skin samples were studied for the presence of the human cells, the severity of the lesions and the healing process. Macroscopic analysis and histology results showed that the lesions were evolving to a less severe degree of radiation dermatitis following hMSC transplant when compared to irradiated non-transplanted controls. A faster healing was observed when compared to untreated mouse. Immunohistology and PCR analysis provided evidence that the human cells were found in the irradiated area. These results suggest a possible use of hMSC for the treatment of the early phase of the cutaneous radiation syndrome.
In the framework of one radiological accident where a victim had been overexposed to Iridium gammagraphy radioactive source we used innovative therapeutic strategy combining dosimetry-guided surgery lesion excision and injection of MSC. After excision of apparent healthy tissues, autologuous expanded MSC were injected locally. The clinical evolution was remarkable without recurrence of radiation inflammatory waves.
These results demonstrate the hMSC efficiency on the evolution of radio-induced lesion. The understanding of healing mechanisms of by hMSC in animal model is under investigation. These results will be helpful to generalize this innovative therapy to the treatment of radiotherapy complications.