

## The Effect of Mesenchymal Stem Cells on Full Thickness Skin Wound Healing in Albino Rats

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**Abstract :** Introduction: Wound healing involves the interaction of multiple biological processes among different types of cells, intercellular matrix and specific signaling factors producing enhancement of cell proliferation of the epidermis over dermal granulation tissue. Several studies investigated multiple strategies to promote wound healing and to minimize infection and fluid losses. However, burn crisis, and its related morbidity and mortality are still elevated. The aim of the present study was to examine the effects of mesenchymal stem cells (MSCs) in accelerating wound healing and to compare the most efficient route of administration of MSCs, either intradermal or systemic injection, with focusing on the mechanisms producing epidermal and dermal cell regeneration. Material and methods: Forty-two adult male Sprague Dawley albino rats were divided into three equal groups (fourteen rats in each group): control group (group I); full thickness surgical skin wound model, Group II: Wound treated with systemic injection of MSCs and Group III: Wound treated with intradermal injection of MSCs. The healing ulcer was examined on day 2, 6, 10 and 15 for gross morphological evaluation and on day 10 and 15 for fluorescent, histological and immunohistochemical studies. Results: The wounds of the control group did not reach complete closure up to the end of the experiment. In MSCs treated groups, better and faster healing of wounds were detected more than the control group. Moreover, the intradermal route of administration of stem cells increased the rate of healing of the wounds more than the systemic injection. In addition, the wounds were found completely healed by the end of the fifteenth day of the experiment in all rats of the group injected intradermally. Microscopically, the wound areas of group III were hardly distinguished from the adjacent normal skin with complete regeneration of all skin layers; epidermis, dermis, hypodermis and underlying muscle layer. Fully regenerated hair follicles and sebaceous glands in the dermis of the healed areas surrounded by different arrangement of collagen fibers with a significant increase in their area percent were recorded in this group more than in other groups. Conclusion: MSCs accelerate the healing process of wound closure. The route of administration of MSCs has a great influence on wound healing as intradermal injection of MSCs was more effective in enhancement of wound healing than systemic injection.

**Keywords :** intradermal, mesenchymal stem cells, morphology, skin wound, systemic injection

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