

The Healing Effect of Unrestricted Somatic Stem Cells Loaded in Collagen-Modified Nanofibrous PHBV Scaffold on Full-Thickness Skin Defects

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Abstract : Unrestricted somatic stem cells (USSCs) loaded in nanofibrous PHBV scaffold can be used for skin regeneration when grafted into full-thickness skin defects of rats. Nanofibrous PHBV scaffolds were designed using electrospinning method and then, modified with the immobilized collagen via the plasma method. Afterward, the scaffolds were evaluated using scanning electron microscopy, physical and mechanical assays. In this study; nanofibrous PHBV scaffolds loaded with and without USSCs were grafted into the skin defects. The wounds were subsequently investigated at 21 days after grafting. Results of mechanical and physical analyses showed good resilience and compliance to movement as a skin graft. In animal models; all study groups excluding the control group exhibited the most pronounced effect on wound closure, with the statistically significant improvement in wound healing being seen on post-operative Day 21. Histological and immunostaining examinations of healed wounds from all groups, especially the groups treated with stem cells, showed a thin epidermis plus recovered skin appendages in the dermal layer. Thus, the graft of collagen-coated nanofibrous PHBV scaffold loaded with USSC showed better results during the healing process of skin defects in rat model.

Keywords : collagen, nanofibrous PHBV scaffold, unrestricted somatic stem cells, wound healing.

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