Bioactive Peptide amphiphilic gels enhance burn wound healing: in vitro and in vivo studies

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INTRODUCTION: More than 2.5 million Americans suffer burn injuries annually. Many methods have been used to manage burn injuries including skin grafts, various dressings, and a variety of systemic and topical agents. Despite this, burn wounds continue to be a major health problem. Our previous report showed that peptide amphiphilic (PA) gels promote cell proliferation and have great potential in regenerative medicine for rapid repair of peripheral nerve. In this study we hypothesized that the PA gels are capable of accelerating the wound healing in the burn injury.

MATERIALS AND METHODS: The thermal damaged fibroblasts and human umbilical vein endothelial cells (HUVECs) models were artificially manufactured, then seeded onto the various PA gels. The cell proliferation was assessed via WST-1 assay at different time points. To determine the in vivo effects, the burn wounds of rats were treated with RGDS PA gel or non-treatment. The wound closure was observed every other day, and skin samples were harvested each week for histologic and immunohistochemical analysis.

RESULTS: The cell proliferation in both E2-NH2-RGDS PA and E3-NH2-RGDS PA were each significantly higher than that in backbone-PA gel and collagen gel. The E3-NH2-RGDS-PA gel significantly enhanced re-epithelialization during the burn wound healing process between day 7 and day 21.

CONCLUSION: The application of PA gels accelerates the recovery of deep partial thickness burn wounds by stimulation fibroblasts and epithelial cells proliferation and promoting wound closure. We believe that this novel biomaterial represents new therapeutic strategies to challenges we currently face in treating clinical burn diseases.

REFERENCES:

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