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Platelet-rich plasma gel promotes differentiation and regeneration during equine wound healing

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Abstract

Nonhealing wounds of the lower equine limb represent a challenging model. The platelet is a natural source of a myriad of growth factors and cytokines that promote wound healing. This study evaluates the potential of platelet derived factors to enhance wound healing in the lower equine limb. Platelets were isolated from horse blood and activated with thrombin, a process known to induce growth factor release. This produced a platelet gel composed of platelet-rich plasma (PRP). To test this all-natural wound healant, 2.5-cm² full thickness cutaneous wounds were created below the knee and hock of a thoroughbred horse. Wounds were treated with PRP gel or left untreated. Sequential wound biopsies collected at Days 7, 36, and 79 postwounding permitted comparison of the temporal expression of differentiation markers and wound repair. To test the hypothesis that wounds treated with PRP gel exhibit more rapid epithelial differentiation and enhanced organization of dermal collagen compared to controls, tissues were stained for cytokeratin 10, a suprabasal differentiation marker, and the reestablishment of collagen was evaluated by trichrome staining. PRP gel-treated wounds at Day 7 expressed intense cytokeratin 10 staining near the wound junction in suprabasal epidermal layers, while staining in control tissues was less intense and restricted to apical epidermal layers distal to the wound junction. By Day 79, the staining was equal in both groups. However, PRP gel-treated wounds at Day 79 contained abundant, dense collagen bundles oriented parallel to each other and to the overlying epithelium, whereas control tissues contained fewer collagen fibers that were oriented randomly. Thus, treatment of wounds with PRP gel induced accelerated epithelial differentiation and produced tissue with organized, interlocking collagen bundles. This study reveals that this novel all-natural wound healant induced wound repair in injuries previously deemed untreatable.

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