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Improved burn wound healing using a bioactive peptide

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Antimicrobial peptides (AMPs) are good candidates to treat burn wounds, a major cause of morbidity, impaired life quality and resources consumption in developed countries. We took advantage of a commercially available hydrogel, Carbopol, a vehicle for topical administration that maintains a moist environment within the wound site. We hypothesized that the incorporation of LLKKK18 conjugated to dextrin would improve the healing process in rat burns. Whereas the hydrogel improves healing, LLKKK18 released from the dextrin conjugates further accelerates wound closure, and simultaneously improving the quality of healing. Indeed, the release of LLKKK18 reduces oxidative stress and inflammation (low neutrophil and macrophage infiltration and pro-inflammatory cytokines levels). Importantly, it induced a faster resolution of the inflammatory stage through early M2 macrophage recruitment. In addition, LLKKK18 stimulates angiogenesis (increased VEGF and microvessel development in vivo), potentially contributing to more effective transport of nutrients and cytokines. Moreover, collagen staining evaluated by Masson's Trichrome was visually much more intense after treatment with LLKKK18, suggesting higher collagen deposition.

Overall, we generated an effective, safe and inexpensive formulation that maintains a moist environment in the wound, easy to apply and remove, and with potential to prevent infection due to the presence of an antimicrobial peptide. These findings propel us to further study this LLKKK18-containing formulation, setting the foundations towards a potential therapeutic approach for burn wound treatment.

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