

Biomedical applications of human cathelicidin

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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. Tuberculosis (TB), a disease caused by the human pathogen *Mycobacterium tuberculosis*, represents the second world's deadliest infectious disease, affecting around 9 million people worldwide in 2013. Of those, about 1.1 million died from the disease. The potential of cathelicin, a human AMP, in the treatment of mycobacteriosis and wound regeneration was assessed in pre-clinical trials.

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 (FDA-approved) 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, LLKKK18 improves the quality of the healing tissue, by promoting proper collagen deposition. These findings suggest that LLKKK18 holds great potential as a therapeutic approach for burn treatment.

Cathelicidin was encapsulated in hyaluronic acid nanogels and administered in the mice deep lung for the treatment of mycobacteriosis. The results obtained will be discussed.