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A NOVEL HYDROGEL OF POLOXAMER 407-CHITOSAN-HYALURONIC ACID AS POSSIBLE WOUND HEALING IN SKIN AND MUCOSA

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Introduction

The use of hydrogels in the treatment of wound healing is becoming an increasingly routine. Hydrogels are materials that protect wound healing, avoiding and/or controlling infection, and providing moisture for the irregular wound environment. Poloxamer 407 (P407), chitosan (CH) and hyaluronic acid (HA) are biomaterials investigated to promote wound repair. P407 has thermoreversible properties and promotes wound contraction (1). CH presents inherent analgesic, hemostatic and microbial effects (2). HA, interacts directly with cells through its cell surface receptors resulting in fibroblast proliferation and protein synthesis (3).

Objective

The aim of this work was to develop and characterize a hydrogel (HG) prepared from a physical mixture of P407, CH and AH for the treatment of skin and mucosal wounds.

Materials and methods

1. PREPARATION OF HYDROGEL

0.5% CTS was dispersed in 0.5% acetic acid. 0.2% HA solution was added to the previous solution. The final HG was made by adding P407 (18 %) using the cold method with continuous stirring for 24 h.

2. PHYSICOCHEMICAL CHARACTERIZATION

- Swelling test
- Microbiological studies
- *In vivo* studies

Results

The swelling behavior in wound healing could help to absorb exudates and provides mechanical resiliency to the delivery system at the biological site of action (4). Our results showed (Figure 1) high swelling rates, being the best value at pH = 5.5. The HG provides an important improvement on antimicrobial properties and showed similar activity to reference (Table 1). The wound healing in animals treated with HG was similar to Silvederma® (Figure 2).

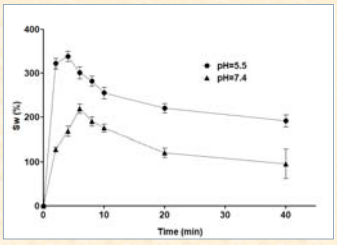

Figure 1. Swelling behavior (%) of hydrogel at pH 5.5 (32 ± 0.5 °C), and pH 7.4 (37 ± 0.5 °C)

	Halos of inhibition (mm)	
Microorganism	Reference	Hydrogel
Acinetobacter baumanii ATCC 19606	7	8
Escherichia coli ATCC 25922	7	0
Staphylococcus aureus ATCC 29213	7	9

Table 1. Halos of inhibition produced against different microorganisms

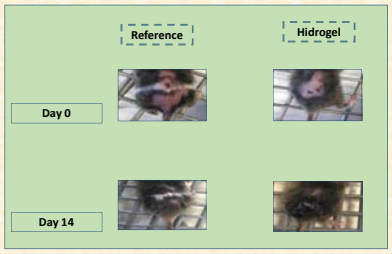

Figure 2. Representative photographs of wound healing evolution in animals for 14 days.

Conclusion

The HG exhibited important antimicrobial and biological effects. Thus this hydrogel could be proposed as a suitable vehicle for new therapies for wound healing and infections on skin and mucosa.

References

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