

Tiger 17 functionalized onto PVA and CA dressings accelerate clotting time and reduce microbial burden

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INTRODUCTION

Typically, acute wound healing is a well-organized process that evolves/ends in a predictable amount of time. Chronic wounds result from gradual tissue degradation, and are characterized by defective cell matrix, high bacteria counts, prolonged inflammation and moisture imbalance¹. Treatment of chronic wounds requires expensive and individualized therapies: mechanical debridement to remove necrotic tissue, topical administration of antibiotics/anti-inflammatory agents, dressings to provide moisture/manage exudates, and drugs to promote tissue regeneration². Antimicrobial dressings, that combine dressing and antiseptics/antibiotics in one formulation, have been suggested as potential strategies to treat chronic wounds³. However, the rising of antibiotic-resistant infection agents has turned these systems obsolete, revealing antimicrobial-peptides (AMPs) as viable alternatives. AMPs aside from displaying a broad spectrum of activity against pathogens, act rapidly at multiple sites within microbial cells, reducing their propensity to develop resistance⁴.

In this work, poly(vinyl alcohol) (PVA) and cellulose-acetate (CA), all well-established polymers in biomedicine, were prepared in the form of films and functionalized with Tiger17 (c[WCKPKPKPRCH-NH₂]). Tiger17 is a little explore AMP endowed with immunoregulatory abilities with great potential for wound healing. Its antimicrobial features are unknown.

METHODS

PVA and CA films were produced by phase inversion. PVA was prepared at 10w/v% in dH₂O, autoclaved at 120°C for 20min, and combined with glutaraldehyde. CA films were prepared at 10w/v% in acetone at RT. All traces of acetone were eliminated by periodic exchange of dH₂O bath. Commercial woven-swabs were used as control. Tiger17 was prepared at 10-40µg/mL in pure water and functionalized using dopamine as binding agent or combined with the polymer ("all-in-one" approach). AMP functionalization was confirmed using sulfo-SDTB. SEM, ATR-FTIR, DMA and contact-angle techniques were used for characterization purposes. Tiger17 physiological stability was evaluated in presence of proteolytic enzymes. Tiger17 antimicrobial performance was tested against *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Escherichia coli*. Its hemocompatibility and clotting-time was determined using human platelets and by following the loss of movement of re-calcified plasma, respectively.

RESULTS AND DISCUSSION

Tiger17 presence on PVA and CA films was confirmed. Films were very hydrophilic, possessed an interconnected-porous structure and were stable to enzymatic degradation. Preliminary testing revealed Tiger17 functionalized films to reduce bacterial presence compared to control, and to accelerate clotting time. Biological testing are still ongoing.

REFERENCES

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