FABRICATION OF HEMOSTATIC WOUND DRESSING USING CHITOSAN-PRP COMPOSITE MEMBRANE

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INTRODUCTION

Chitosan, a versatile and biocompatible polysaccharide derived from chitin, and Platelet-Rich Plasma (PRP), a biological component teeming with growth factors and cytokines, converge in this groundbreaking composite membrane.

MATERIALS AND METHOD

The resultant chitosan solution was filtered through a whatman No. 3 filter paper then vacuum filtration to remove any un-dissolved particles.Chitosan (2%, w/v) loaded with PRP in acetic acid was freeze-dried,and cross-linked with 5% (w/v) tripolyphosphate and freeze dried again to produce a sponge-like matrix. Chitosan sheets were prepared and dressed on created wounds.

RESULTS AND DISCUSSION

Lysozyme slowly hydrolyzes the chitosan membrane and produces chito-oligomers that stimulate correct deposition, assembly and orientation of collagen fibrils in extracellular matrix components. Moreover, it has been indicated that chitosan membrane stimulates the migration of inflammatory cells and promotes cellular organization

CONCLUSION

The high leukocyte concentration of PRP has an added antimicrobial effect.In addition to its effectiveness for patients with chronic non-healing wounds, it has also been used as an antiangiogenic agent and as a carrier for growth factors.

KEYWORDS
Hemostat, wound, dressing, chitosan, PRP

INTRODUCTION

Wound care, an amalgamation of science and compassion, continually seeks innovative solutions to alleviate the suffering associated with injuries and promote optimal healing. In the evolving landscape of healthcare, the spotlight has increasingly turned towards the development of advanced wound dressings with hemostatic capabilities – crucial in managing wounds with bleeding complications. This article delves into the intricate realm of fabricating hemostatic wound dressings, with a keen focus on the potential transformative impact of Chitosan-PRP composite membrane.

Chitosan, a versatile and biocompatible polysaccharide derived from chitin, and Platelet-Rich Plasma (PRP), a biological component teeming with growth factors and cytokines, converge in this groundbreaking composite membrane. Beyond the conventional role of halting blood flow, this membrane presents a multifaceted approach to wound healing. Our exploration will navigate through the nuanced process of fabricating Chitosan-PRP composite membrane, unraveling the scientific intricacies that underscore its efficacy.

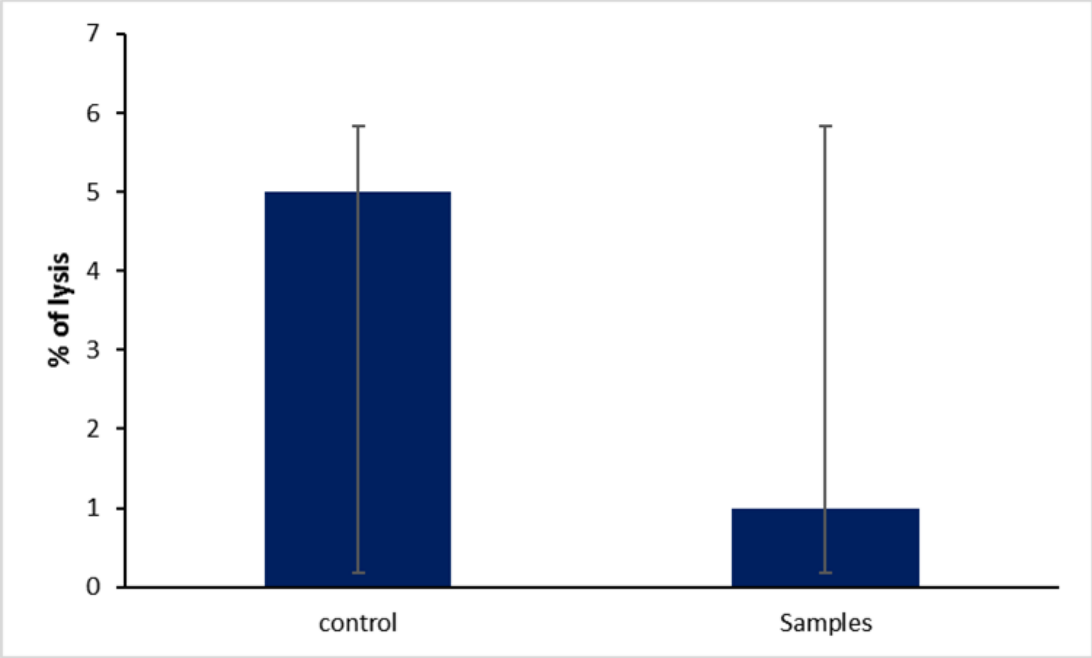
As we delve deeper, it becomes evident that the Chitosan-PRP composite membrane is not merely a hemostatic agent but a therapeutic modality fostering a holistic approach to wound management. Its capabilities extend beyond hemostasis, encompassing tissue regeneration and infection risk mitigation. This article aims to illuminate the profound implications of this composite membrane, spotlighting its potential to revolutionize how we perceive and treat diverse wounds – from the routine to the most complex.

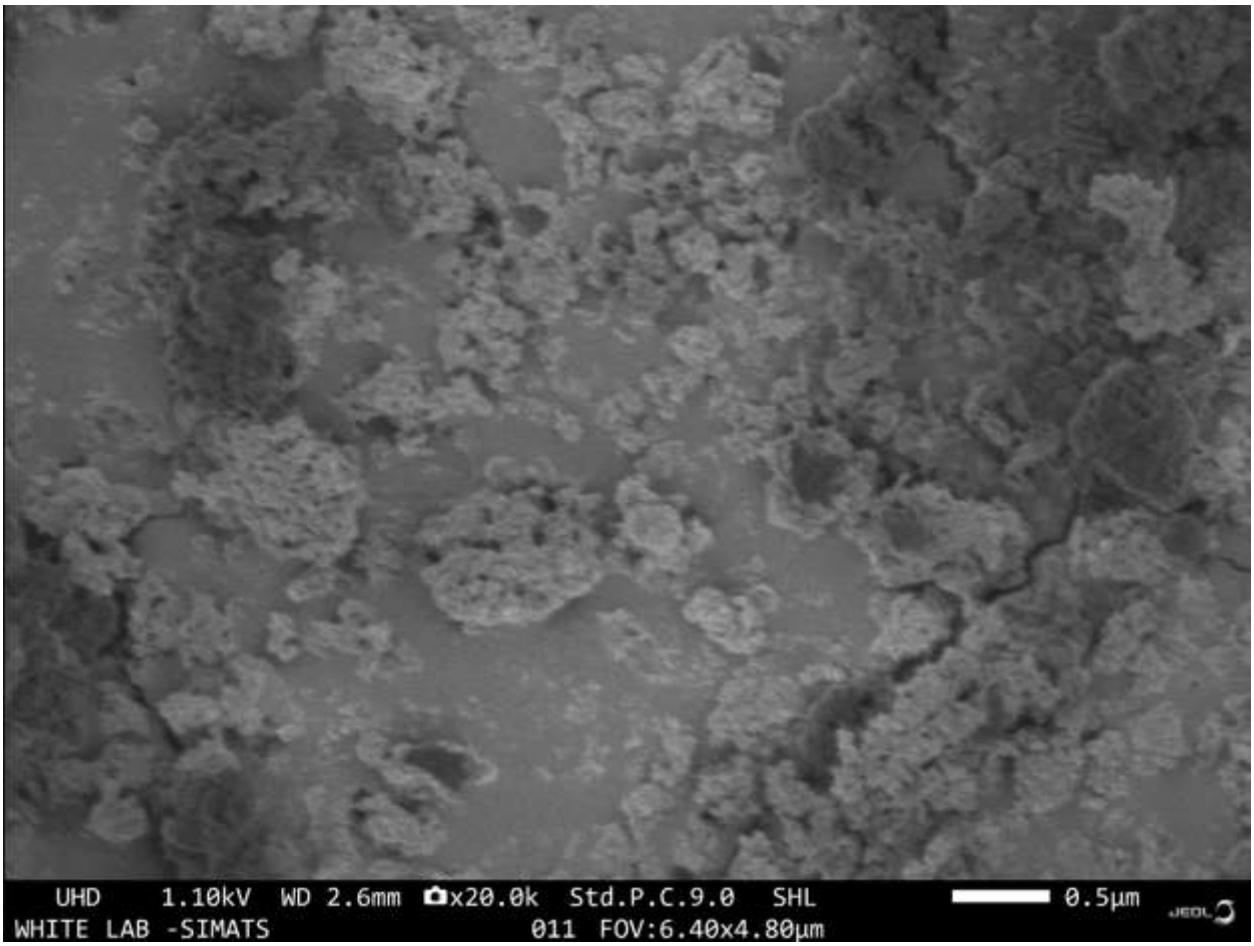
This journey invites readers to contemplate the synergy between biomaterial science and wound care, examining how this innovative approach may redefine our strategies in the intricate tapestry of healthcare. Join us in unraveling the promises and possibilities as we explore the fascinating intersections of Chitosan-PRP composite membrane in the dynamic landscape of wound healing.

MATERIALS AND METHOD

Chitosan solution was prepared by dissolving medium in an aqueous solution (1% v/v) of glacial acetic acid (Merck, Darmstadt, Germany) to a concentration of 2% (w/v) while stirring on a magnetic stirrer-hot plate. The solution was stirred with low heat (at 50oC) for 3hour. The resultant chitosan solution was filtered through a whatman No. 3 filter paper then vacuum filtration to remove any un-dissolved particles.Chitosan (2%, w/v) loaded with PRP in acetic acid was freeze-dried,and cross-linked with 5% (w/v) tripolyphosphate and freeze dried again to produce a sponge-like matrix. Chitosan sheets were prepared and dressed on created wounds.

RESULTS

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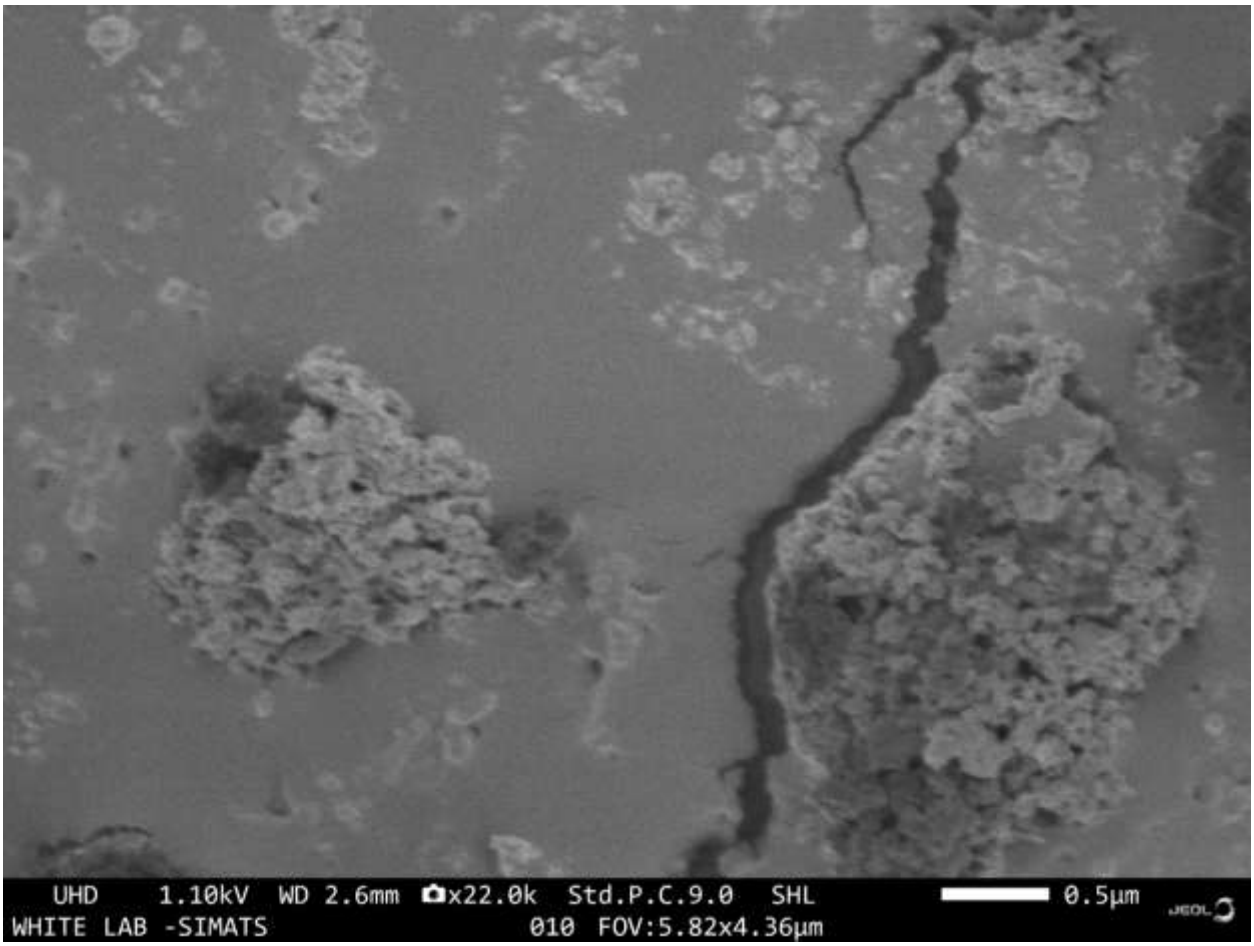
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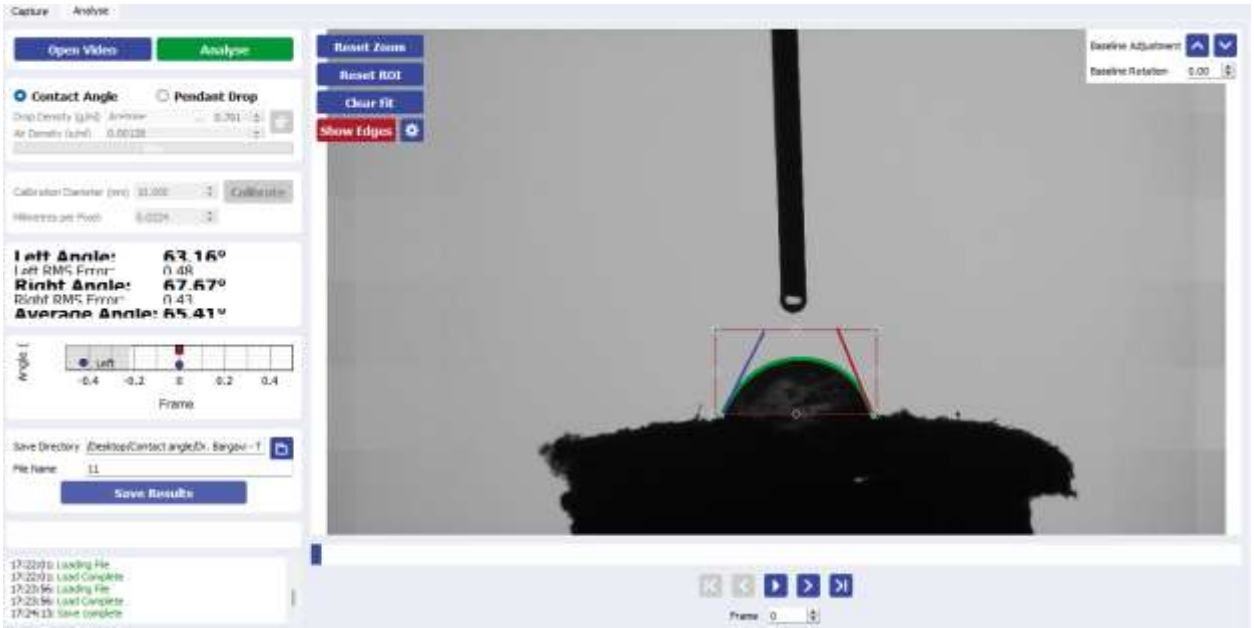
JEOL


Capture
Analyse
Open Video
Analyse
Contact Angle
Pendant Drop
Left Angle: 63.16°
Right Angle: 67.67°
Average Angle: 65.41°
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File Name
Save Results
Reset Zoom
Reset ROI
Clear Fit
Show Edges
Baseline Adjustment
Baseline Rotation

DISCUSSION

Chitosan and its oligomers are well known for their interesting biological properties, which have led to various applications. Lysozyme slowly hydrolyzes the chitosan membrane and produces chito-oligomers that stimulate correct deposition, assembly and orientation of collagen fibrils in extracellular matrix components. Moreover, it has been indicated that chitosan membrane stimulates the migration of inflammatory cells and promotes cellular organization

PRP functions as a fibrin tissue adhesive with hemostatic and tissue sealing properties and provides an immediate surgical hemostatic agent that is biocompatible, safe, and effective. It accelerates endothelial, epithelial, and epidermal regeneration, stimulates angiogenesis, enhances collagen synthesis, promotes soft tissue healing, decreases dermal scarring, enhances the hemostatic response to injury, and reverses the inhibition of wound healing caused by glucocorticoids. The high leukocyte concentration of PRP has an added antimicrobial effect.In addition to its effectiveness for patients with chronic non-healing wounds, it has also been used as an antiangiogenic agent and as a carrier for growth factors

CONCLUSION

The high leukocyte concentration of PRP has an added antimicrobial effect.In addition to its effectiveness for patients with chronic non-healing wounds, it has also been used as an antiangiogenic agent and as a carrier for growth factors. Moreover, it has been indicated that chitosan membrane stimulates the migration of inflammatory cells and promotes cellular organization.

ORAL PATHOLOGY	Our team has extensive knowledge and research experience that has translate into high quality publications (Princeton et al. 2020),(Mathew et al. 2020),(Sridharan et al. 2019),(R et al. 2020),(Antony et al. 2021),(Sarode et al. 2021),(Hannah R et al. 2021),(Chandrasekar et al. 2020),(Subramanyam et al. 2018),(Jeevanandan and Thomas 2018),(Ponnulakshmi et al. 2019),(Sundaram et al. 2019),(Alsawalha et al. 2019),(Yu et al. 2020),(Shree et al. 2019),(Zafar et al. 2020),(Karunagaran et al. 2019),(Sarode et al. 2021),(Raj Preeth et al. 2021),(Prithiviraj et al. 2020)

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