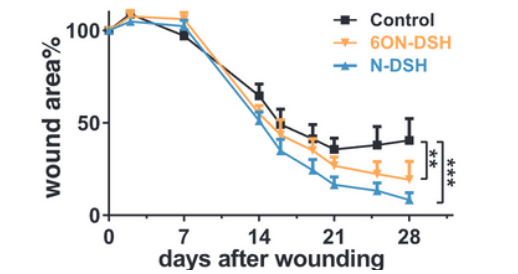
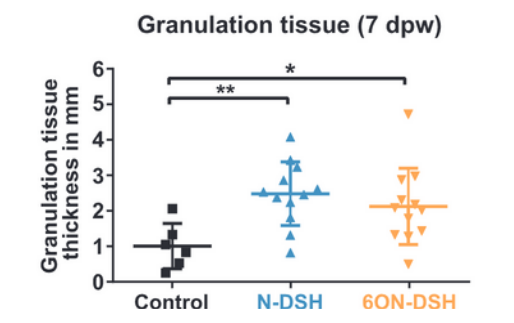
CHEMOKINE-CAPTURING WOUND CONTACT LAYER RESCUES DERMAL HEALING

Lucas Schirmer, Passant Atallah, Uwe Freudenberg, and Carsten Werner.

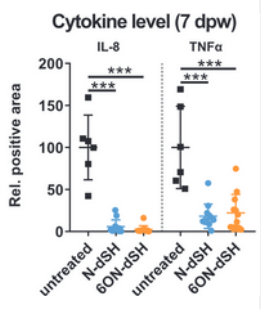
RESULTS



Characterization of chronic wound closure. After 14 days, wounds treated with either type of starPEG-GAG hydrogel-based WCL composite dressing showed a greater reduction in wound area than those treated with Adaptic WCL.



Quantification of the granulation tissue thickness shows the thickness was increased twofold in the starPEG-GAG hydrogel-based WCL composite dressing groups compared to the Adaptic WCL control group.



Wounds treated with starPEG-GAG hydrogel-based WCL composite dressings showed a significant decrease in TNFα and IL-8 levels compared to the control.

OBJECTIVES

Excessive inflammation often impedes chronic wound healing. This study aimed to develop a textile-starPEG-GAG composite wound contact layer (WCL) to selectively sequester pro-inflammatory chemokines. By varying the charge densities of the starPEG-GAG hydrogel, its affinity for wound biomolecular signals was tailored.

PRECLINICAL MODEL

Diabetic Wound Healing Pig Model: Diabetes was induced using streptozotocin and verified by blood glucose level measurements. Full-thickness skin wounds were inflicted in six different locations on the pig's back and treated with the standard of care Adaptic or a hydrogel-based dressing. Surgical wounds and injection sites were inspected and evaluated both clinically and histologically.

CONCLUSIONS

The starPEG-GAG hydrogel-based WCL composite dressings selectively bound inflammatory chemokines, modulating the wound's signaling environment to reduce inflammation and promote a more pro-regenerative state. In the porcine chronic wound model, treatment with either starPEG-N-DSH or 6ON-DSH hydrogel-based WCL composite dressings led to rapid resolution of inflammation, facilitating vascularized tissue formation and complete wound closure within 28 days. By dampening excessive inflammatory signals without affecting pro-regenerative growth factors, the starPEG-GAG hydrogel-based WCL treatment promoted healing, with increased granulation tissue formation, angiogenesis, and connective tissue deposition.

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