



Use of Surgical Epibole for Modeling Chronic Unresolved-inflammation and Granulation in Murine Wounds

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Background

The nature of murine healing makes it poorly suited to the study of chronic wounds. Murine wounds contract, epithelialize, and ultimately heal rapidly with limited appearance of injury.



Research toward improved recalcitrant wound care is limited by inadequate granulation healing in small animal chronic wound models. We have previously demonstrated that tissue-edge infolding to mimic epibole architecture mitigates contracture, restricts epithelialization, and prolongs wound opening. Here we demonstrate that murine epibolous wounds generate an environment of sustained inflammatory infiltration and proliferative granulation.

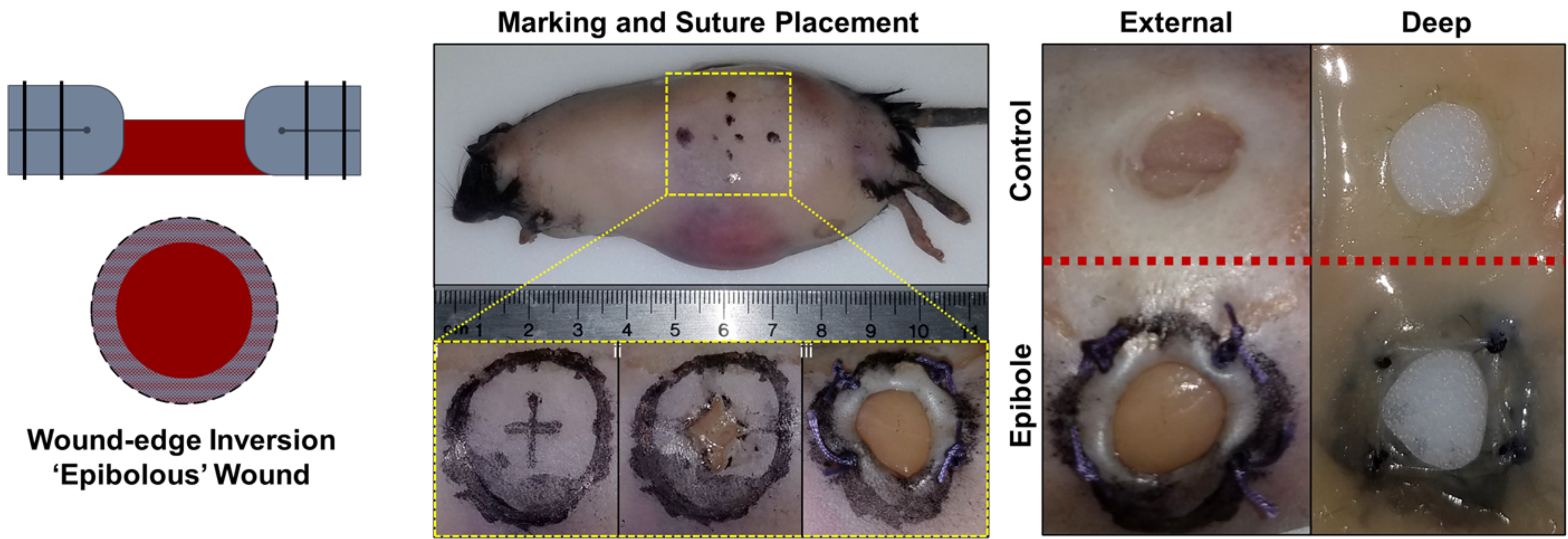
References

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Galiano, R.D., et al., Quantitative and reproducible murine model of excisional wound healing. *Wound Repair Regen*, 2004. 12(4): p. 485-92.

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Methodology



C57BL/6J control (wt/wt) and diabetic (db/db) mice received bilateral wounds, each stratified as untreated control or chronic model. Wounds were maintained for 14-days until all control wounds had closed and/or epithelialized and were harvested for flow cytometry.

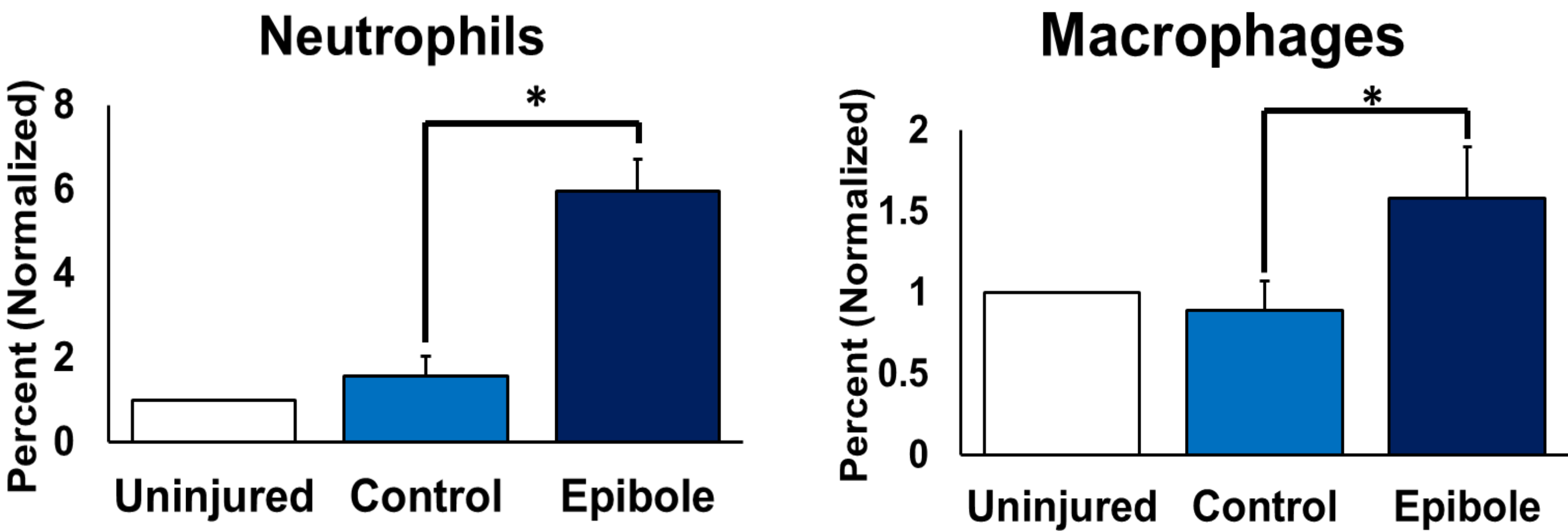
Conclusion

- Wound-edge inversion mimicking epibole significantly delayed wound closure and prolonged inflammation, transitioning murine healing to a more human- relevant granulation pattern.
- Progression towards more patient-applicable wounds in our small animal models further enhances our ability to more reliably evaluate therapeutic options in the pre-clinical space.

Future Directions

- Influence Wound Healing
- Influence Wound Infection
- Biofilms
- Innate Immunologic Contributions to Healing
- Toll-Like Receptors
- Thymosin α 1:TLR 2/4/9 Agonist

Results



The epibolous wound maintained prolonged neutrophil-dominant inflammatory infiltrate with simultaneous enrichment of macrophage/monocyte populations ($p < 0.05$). Further, epibolous wounds demonstrated reduced frequency of epithelialization as defined by pan-keratin signaling. In epibolous wounds without epithelialization strong alpha-smooth-muscle actin signal was noted.

