

P36. Differences In Subcutaneous Thickness and Location Affecting Wound Healing In the Swine Model

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Introduction

- The use of animal models plays a significant role in facilitating medical breakthroughs, especially pigs with their similarities in skin structure and composition to humans.
- In wound studies on swine, thickness of skin plays a role in healing due to the amount of tissue that needs to be regenerated as well as the differences in location of the wounds.
- After performing several wound surgeries on the swine, a noticeable thickness difference was noted between the cranial and caudal wounds despite the same landmark being used (the fascial plane).
- Here we highlight the difference of recognizing anatomical landmark differences in skin difference in placing skin wounds and measuring healing parameters.

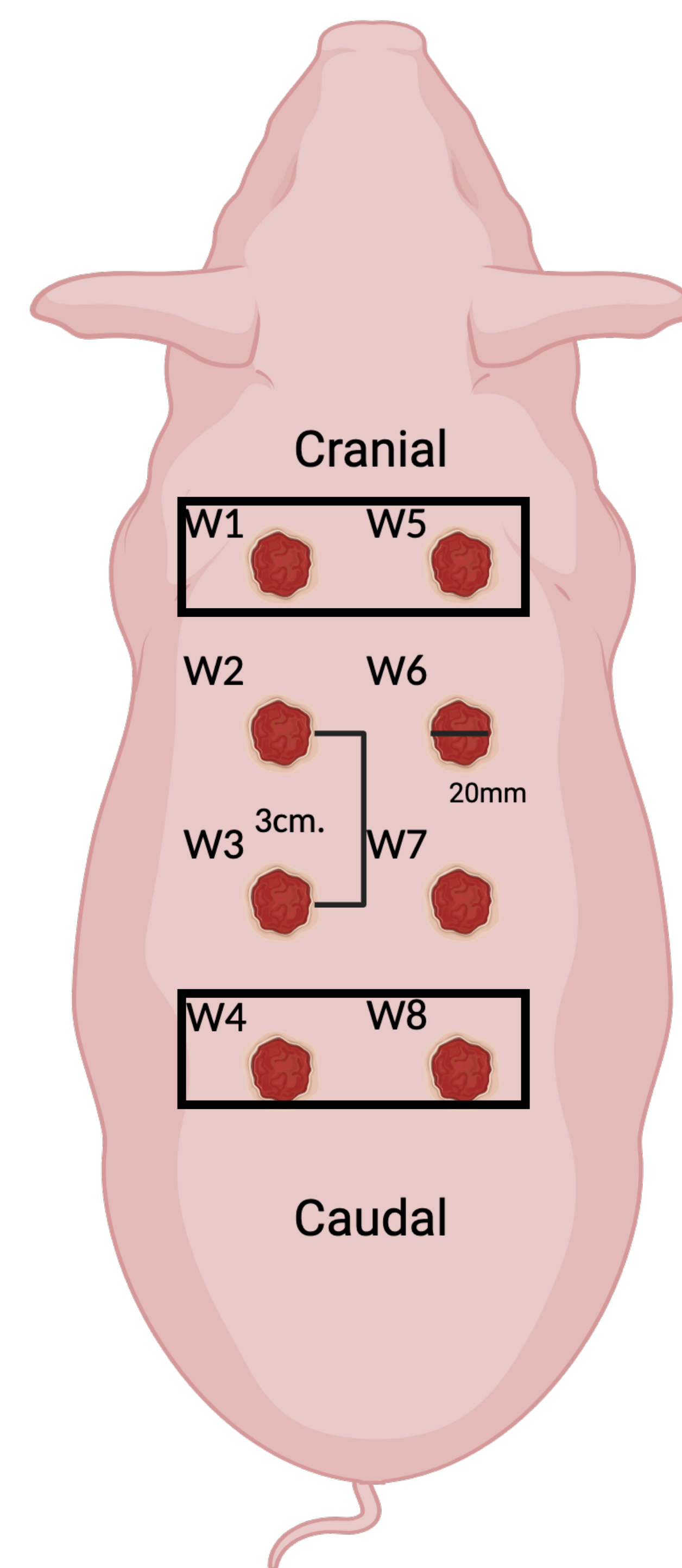


Figure 1. Swine Wounding Map. Map representing wound identification and anatomical location on a Yorkshire pig. 8 full-thickness wounds (20mm in diameter for 3.14cm² size wounds) were created along the dorsal region of the pig.

Materials and Methods

- Animals:** Female pigs (*Sus scrofa domesticus*, 27-40 Kg) from a Yorkshire/Landrace-cross breed from UC Davis Swine Research Center.
- Wounding surgery, measurements, and treatments:** Eight full-thickness standard of care wounds harvested and preserved in 4% PFA for histological analysis and imaging.
- Measurement and analysis:** H&E stained wound sections were imaged and measured using BZ-II Imaging software on a Keyence BioRevo microscope. The percent of wound re-epithelialization was calculated by measuring the length of new epithelial tissue that extended from the original wound edge.

Results

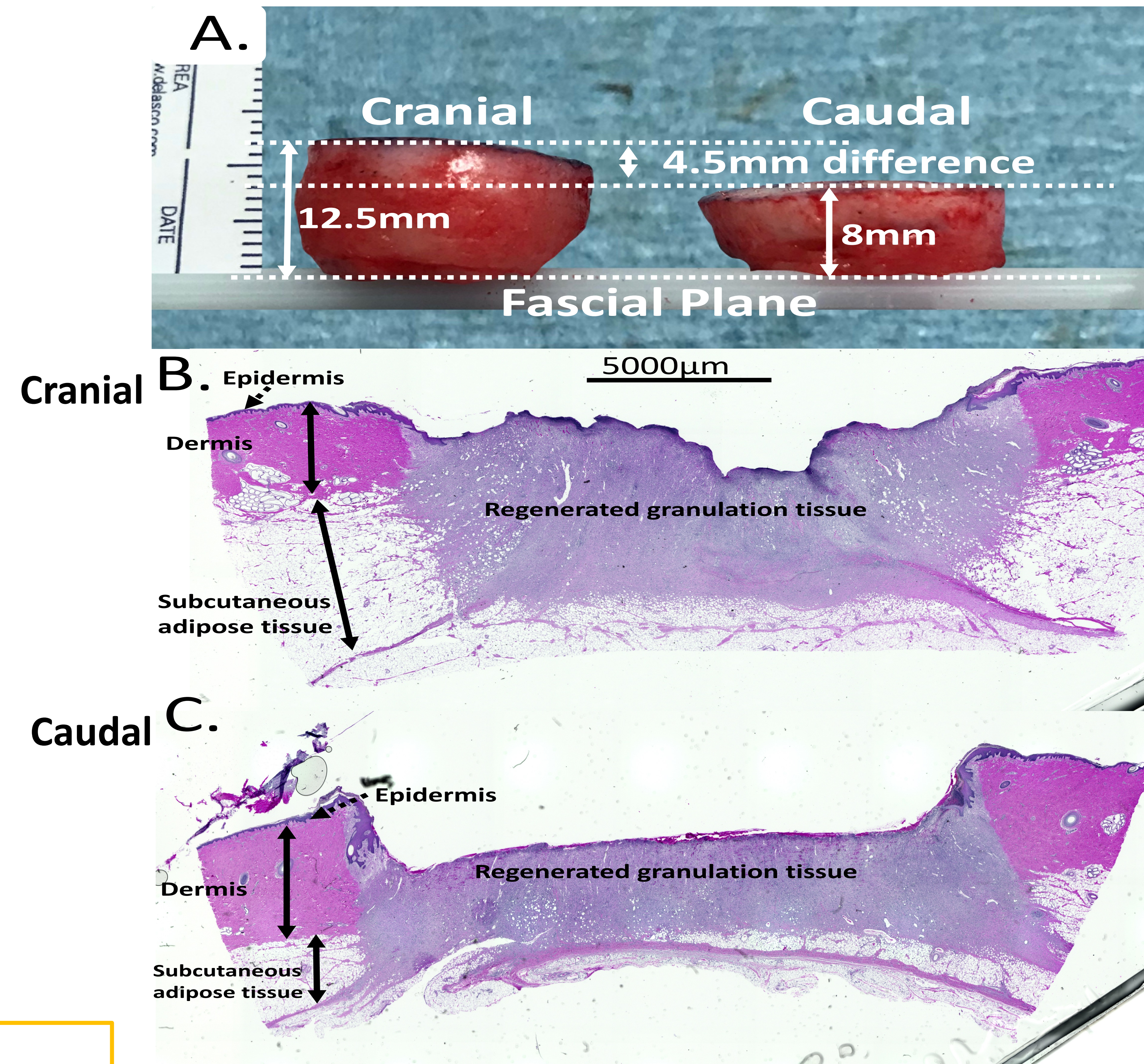


Figure 2. Cranial and caudal wounds exhibit gross and histological differences in wound depth. (A) Representative excised tissue from pig dorsum (down to anatomical landmark of fascia) from cranial and caudal locations. (B) Hematoxylin and eosin-stained sections of a wound excised on day 7, from cranial location and caudal location in (C).

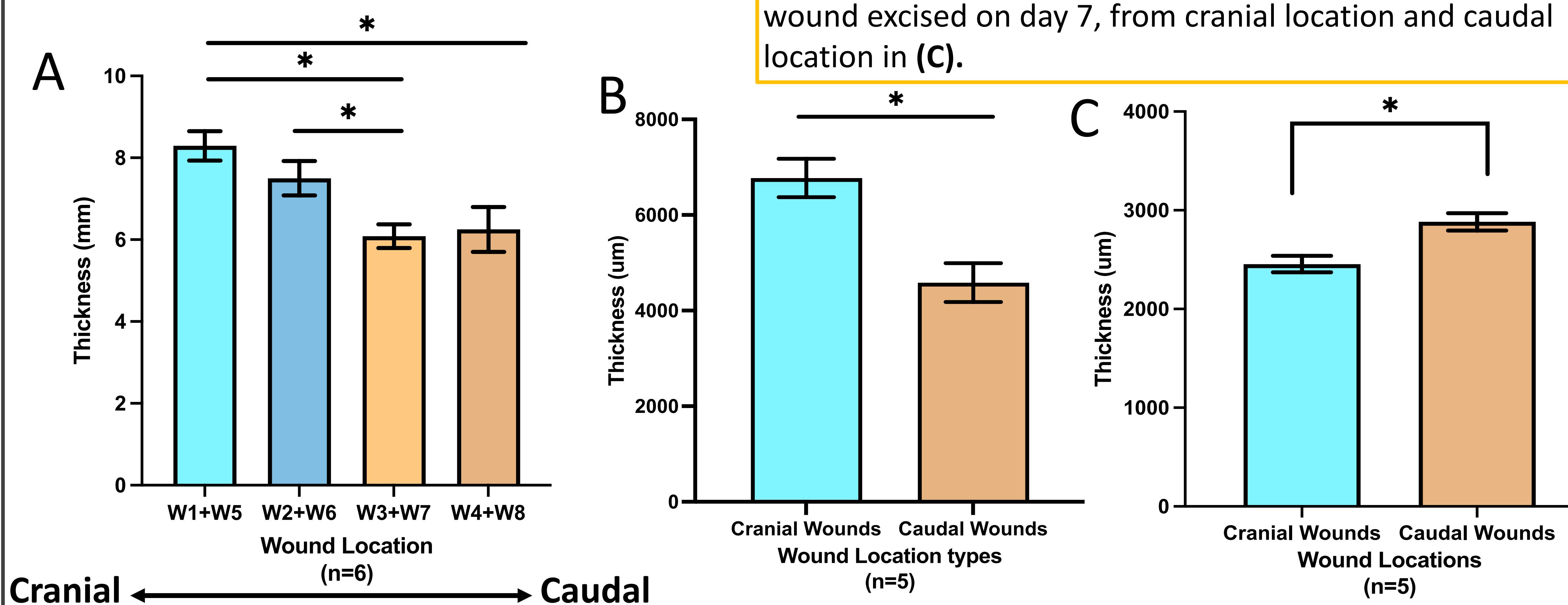


Figure 3. Cranial and caudal wounds exhibit differences in dermal and adipose regions (A) Thickness of excised tissue removed down to fascial layer, immediately post excision (n=8 wounds from 6 pigs). Cranial wounds (W1, W5) compared to the caudal wound (W4, W8) demonstrate statistically significant different wound depths (*P<0.05). (B & C) On Day 3 post-wounding, both adipose layer in (B) and dermis in (C) demonstrates statistically difference in thickness between cranial wounds and caudal regions (n=4 wounds/group from 5 pigs, *P<0.05).

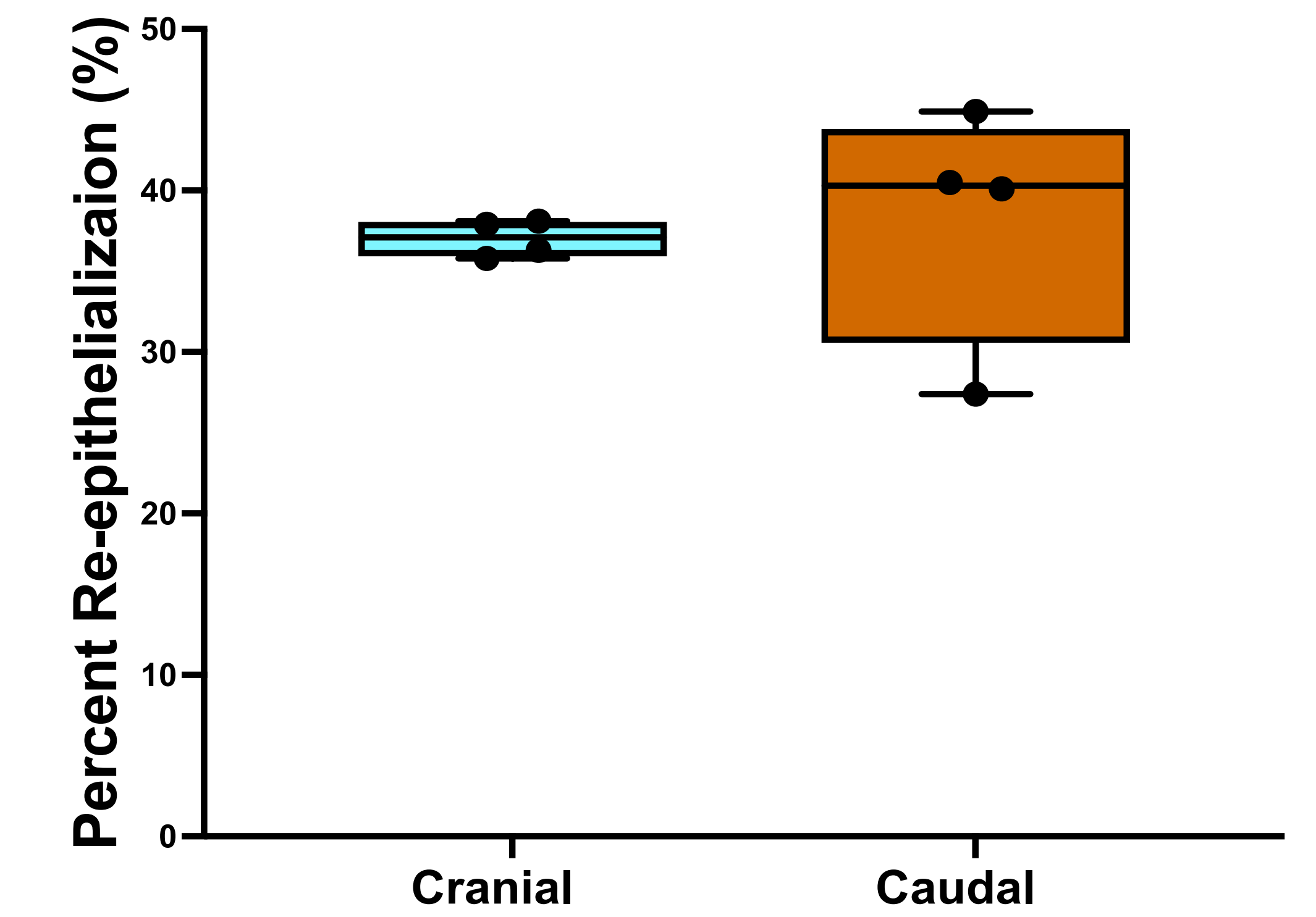


Figure 4. Percent re-epithelialization of cranial and caudal wounds Day 10 post-wounding percent of wound re-epithelialization. A trend of higher healing rate of caudal wounds compared to cranial wounds is observed. (n= 4 paired wounds/group from 4 pigs, not statistically significant)

Conclusion

- A 2mm thickness increase was discovered between cranial and caudal wounds, along with a difference as well in the adipose tissue layer. Dermis thickness was 400um higher in caudal wounds than cranial. No difference in epidermis
- Despite having increased wound depths, a trend is noted where cranial wounds heal at a slower rate than caudal wounds. Due to adipose dysfunction in wounds with large fat deposits, such as cranial wounds, healing rate is lowered (Kaur, et al, PMID:33251224). Additional research is suggested.

Acknowledgements

We would like to thank the following UC Davis staff who supported this study: Dr. William Ferrier, Linda Talken, Amy Lesneski, Kirstie Schulman, and Victoria Hammitt for performing and assisting the wounding surgery and tissue collection. We would also like to thank DARPA for funding our research.

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