





Representative images of CD31 immunostained 4-month biopsies;

treatment alone after 4 months post-burn, *p<0.05 No significant differences in vascularity were measured prior to 4 months. Data

scale bar = 200µm. Topical CS treatment significantly reduced dermal HTS vascularity compared to both STSG and CS vehicle

are presented as mean vascular density IOD ± SD.

Topical Mast Cell Stabilizer Cromolyn Sodium Reduces Post-burn Hypertrophic Scars in the Female Red Duroc Pig Jayson W. Jay¹, Raima Siddiqui², Shaefali Rodgers², Anesh Prasai¹, Amina El Ayadi¹

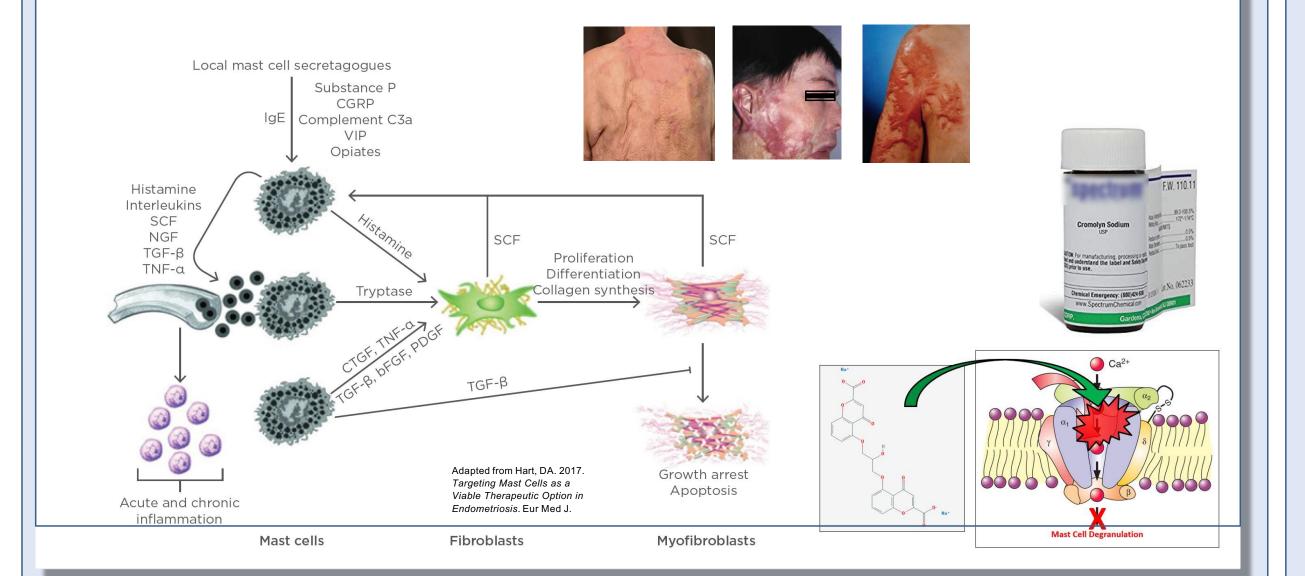
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BACKGROUND

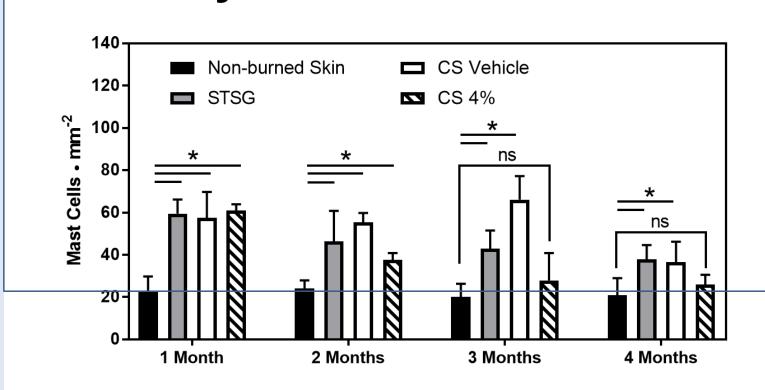
Painful, motion-limiting **hypertrophic scars** (**HTS**) form subsequent to protracted wound healing in patients with severe full-thickness burns and pose difficult treatment challenges. Newer evidence points to **mast cells** (**MC**) as important regulators of intricate signaling cascades during the initiation and progression of post-burn scars. Previous investigations have demonstrated increased mast cell densities in burn wounds and during the formation of HTS.^{1,2} Mast cells release a wide array of mitogenic cytokines and potent proteases that contribute directly to myofibroblast differentiation and excessive proliferation in burn wounds; further prolonging fibrotic pathology.³ **Cromolyn sodium** (**CS**) is an FDA-approved mast cell stabilizer known to inhibit degranulation and has been successfully used to relieve detrimental symptoms associated with mast cell activation. Here, we show that CS may be an effective conjunctive therapy to prevent pathological fibrosis following severe burn injury.



RESULTS

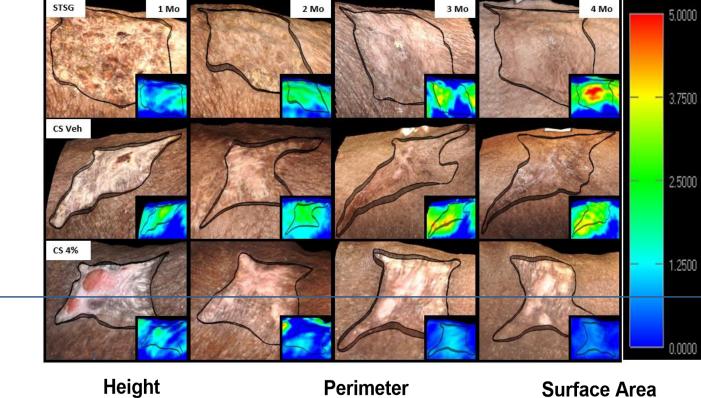
STSG + CS Veh

Cromolyn Sodium Reduces HTS Mast Cell Density

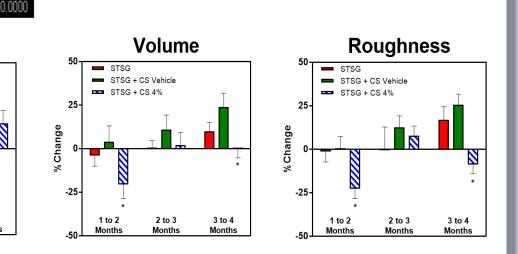


In toluidine blue stained tissues, mast cell density decreases in HTS with CS treatment to statistically similar densities found in non-burned skin. Mast cell numbers remained elevated in STSG or CS Vehicle treated wounds over 4 months. *p<0.05, data is presented as mean number of mast cells · mm⁻² ± SD

Post-burn HTS Morphology is Improved with Topical CS

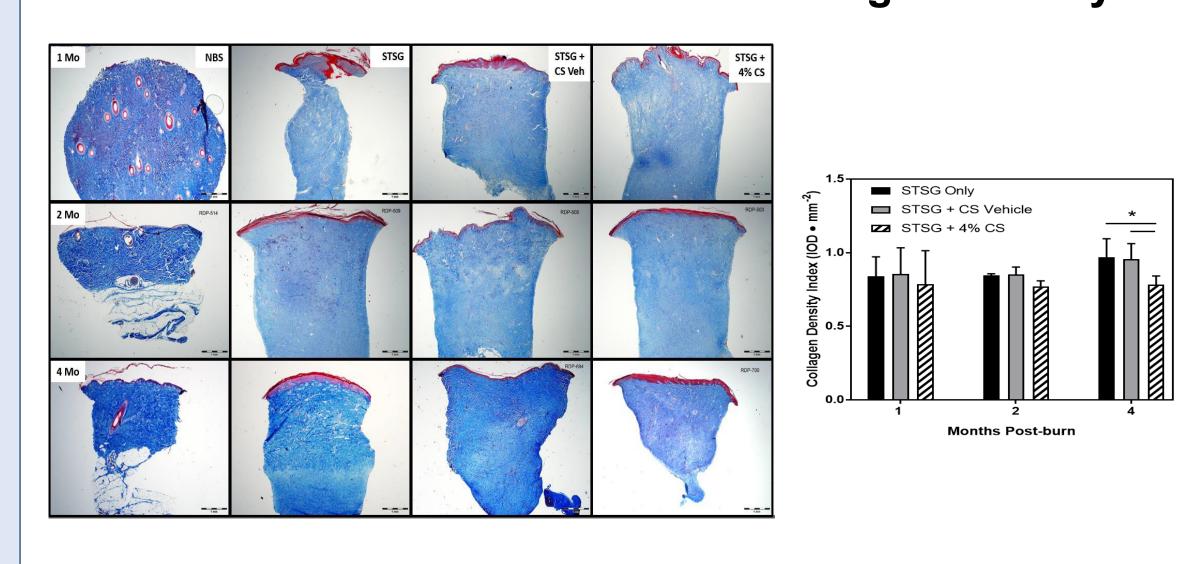


3-Dimensional topographical analysis (LifeViz-II, Quantificare) shows decreased scar height (inset images) over time in CS-treated HTS compared to STSG or CS vehicle only treated scars after 4 months; scale = 0 (blue) – 5 mm (red), quantified as percent change. *p≤0.05, data are presented as mean % percent change ± SD.



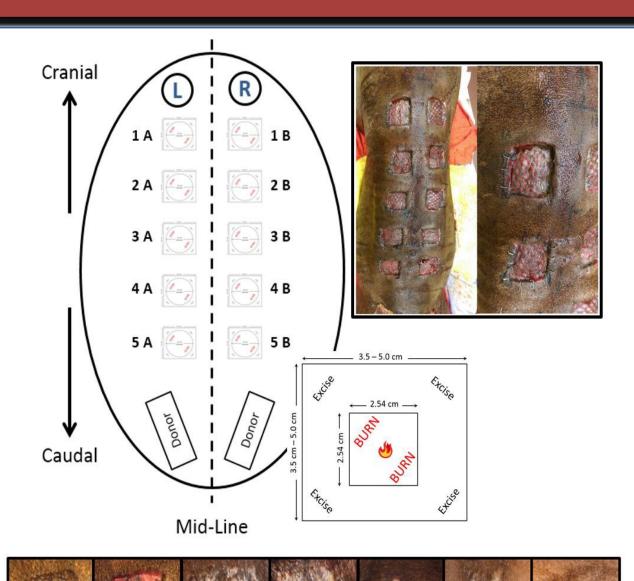
CS Treatment Reduces Dermal Collagen Density

HTS Vascularity is Diminished Following CS Treatment



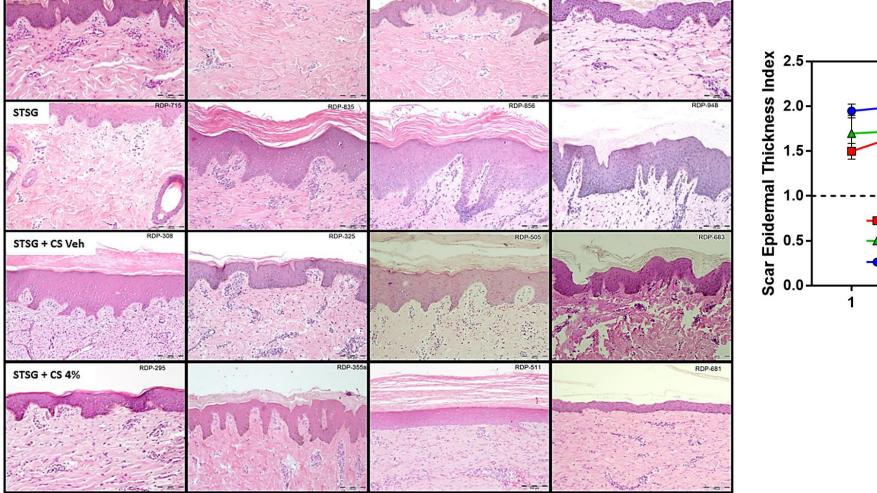
Dermal collagen density (right): Collagen density was assessed by integrated optical density of trichrome stained skin and scar biopsies. Topical CS treatment reduced collagen density in post-burn HTS after 4-months compared to STSG alone or vehicle.

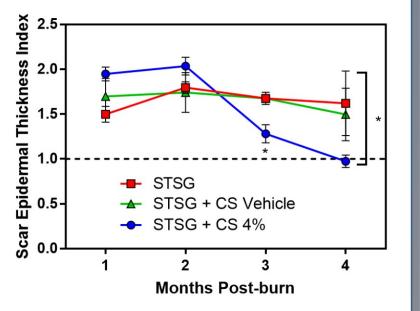
METHODS



- ➤ Female Red Duroc Pigs
- >> Full-thickness contact burn⁴
- ➤ Excision 24hr post-burn
- ➤ 1:4 split-thickness autograft (STSG)
- >> HTS progression confirmed
- Biweekly treatment after closure
- 4% Cromolyn Sodium
- Vehicle: Hydrocerin cream
- ➤ Analyses
- 3D Wound Healing and HTS
- MC and Fibrotic histology
- Fibrotic signaling proteomics

Topical Cromolyn Reduces HTS Epidermal Hyperplasia





Epidermal Thickness Index (ETI, left): Mean epidermal height was normalized to non-burned skin epidermis at each time point to yield ETI. An ETI = 1 is the equivalent thickness of non-burned skin. CS treatment significantly reduced ETI over 4 months.

CONCLUSION

- Cromolyn sodium improves post-burn wound healing by reducing mast cell density and reduces subsequent collagen deposition in the healing wound.
- Mast cell stabilization with topical cromolyn sodium reduces HTS pathophysiology and may provide beneficial adjuvant anti-scarring therapy following a severe burn.

References & Acknowledgements

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· We would like to thank Heather Powell (The Ohio State University), Ye Wang, Robert Cox, Sam Jacob, Hal Hawkins, and William Wheeler for their contributions to this work.

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 This study was conducted with the support of the Institute for Translational Sciences at the University of Texas Medical Branch, supported in part by a Clinical and Translational Science Award (UI 1TR000071).
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 This research was supported by SHC grants 71000, 71001, 70900, 84080, 71009 and the National Institutes of Health NIGMS grants, R01 GM112936-01, R01 GM056687-14, T32 GM008256, P50 GM60338, and NIDILRR 90DP0043-01-00