**Introduction**

Burn injuries can be caused by exposure to a wide variety of sources including heat, electricity, radiation, chemical agents, and friction. Split thickness skin grafts are currently the gold standard, which are associated with donor site morbidity and may be impossible in cases where there is no available donor skin. The paucity of donor sites in patients with burns involving large total body surface areas highlights the need for better acellular dermal matrix (ADM) products that can achieve early and complete coverage while retaining normal skin function. A variety of ADMs have been tested on burn wounds resulting in limited success due to poor integration and insufficient revascularization of the product (1-4).

**Objective/Hypothesis**

**Objective:** Conduct a side by side comparison of ADMs sourced from two different animals in a precinical porcine deep partial-thickness (DPT) burn model.

**Hypothesis:** We hypothesize the omega-3 rich fish skin dermis will integrate, re-vascularize, and lead to better wound healing outcomes than fetal bovine dermis.

**Methods**

![Diagram of methods]

- **Day -1**: Tattoo and burn
- **Day 0**: Excise necrotic tissue and apply treatments (Primatrix® or Kerecis™)
- **Day 7**: Biopsy and apply 2nd treatment of Kerecis™
- **Day 14**: Biopsy, NIM, rebandage
- **Day 21**: Biopsy, NIM, rebandage
- **Day 28**: Biopsy, NIM, rebandage
- **Day 45**: Biopsy, NIM, euthanize
- **Day 60**: Biopsy, NIM, euthanize

**Figure 1 Pig schematic and timeline**

Twenty-four 5x5 cm DPT burn wounds were created on the dorsum of anesthetized Yorkshire pigs. The schematic indicates the timeline and methods utilized throughout the study. NIM = non-invasive measurements to include digital and laser speckle imaging. TransEpidermal Water Loss (TEWL), and hydration readings.

**Figure 2 Representative digital images**

Digital images were captured of all wounds during the 60 day study.

- **D0 (Kerecis) - D7 (Kerecis)**
- **D0 (Primatrix)**
- **Normal Skin**

**Figure 3 Skin barrier function measurements**

A) TransEpidermal Water Loss (TEWL) measures the barrier properties of the epidermal layer of skin. Three measurements were obtained for each wound at each time point and averaged. (# = p<0.05 normal vs. treatment groups).

B) The hydration measures the water content of the wounds. Five measurements were obtained for each wound at each time point and averaged. (*) = p<0.001 comparing treatments; # = p<0.001 normal vs. treatment groups; @ = p<0.001 normal vs. Primatrix®.

**Results**

![Graph of results]

**Figure 4: Wound closure and contraction**

A) Re-epithelialization was calculated by tracing the leading edge of the epidermis and comparing to total wound size. B) Wound contraction was calculated by tracing the tattoos, comparing to the initial wound size, and normalizing to the growth of each animal (* = p<0.05 comparing treatments).

**Figure 5: Laser Speckle Imaging**

A) Digital day 14 and laser speckle images (LSI) indicating higher perfusion (red) in the healing wounds. By day 60, the perfusion within the wound has returned to baseline levels indicated by the blue coloring.

**B) Quantitation of LSI measurements represented as a fold change above the normal perfusion around each wound (*) = p<0.05 comparing treatments; # = p<0.05 normal vs. other groups.**

**Conclusions**

- Kerecis™ treatment of DPT burn wounds resulted in faster re-epithelialization when compared to a commercial comparator (Primatrix®).
- No differences in TEWL measurements were detected between Kerecis™ and Primatrix®.
- Hydration levels of the Kerecis™ treatment correlate to re-epithelialization and return to normal skin levels by day 21.
- LSI indicated that Kerecis™ established a perfused wound bed faster (by day 21) than Primatrix®.
- Overall, the long term healing was similar for both products.

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**References**


**Statement**

Research was conducted in compliance with the Animal Welfare Act, the implementing Animal Welfare Regulations, and the principles of the Guide for the Care and Use of Laboratory Animals, National Research Council. The facility's Institutional Animal Care and Use Committee approved all research conducted in this study. The facility where this research was conducted is fully accredited by AAALAC International.