# Tipping the (pH) scale for achieving wound healing

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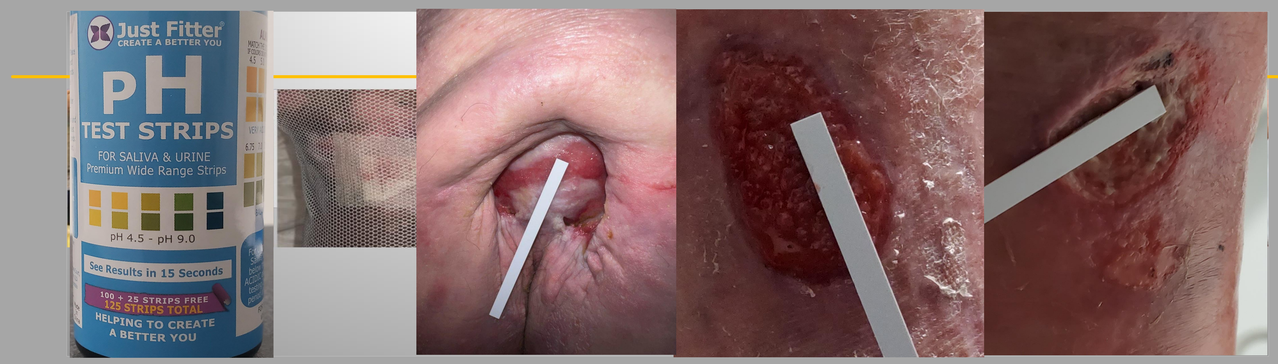
## INTRODUCTION

Introduction: Chronic wounds tend to have alkaline pH values due to persistent inflammation, which causes the breakdown of cellular and tissue components and spillage of alkaline substances into the environment. In turn, this favors the overgrowth of bacteria that also directly contribute to the alkalinization of the milieu, as these conditions are favorable to them. While acidification of the wound bed with substances such as honey, hypochlorous, or acetic acid has met with success, there are concerns that pH values can be lowered beyond physiological values, leading to wound breakdown and impaired healing. Here, we report our experience in using a novel poly-lactic acid (PLA) dermal matrix to promote healing and its effect on lowering the pH of chronic wounds without the addition of other acids.

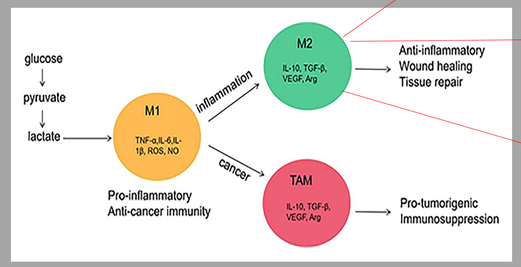



## OBJECTIVE

To explore application and strategy of SDRM synthetic skin substitute in wound bed temporization and restoration of wound bed acidification

LACTATE AS A SINALING MOLECULE

**SUPRA SDRM® COPOLYMER**
- POLYLACTIDE
- TRIMETHYLENE CARBONATE
- é-CAPROLACTONE




ANGIOGENESIS
VEGF
ENDOTHELIAL CELL MIGRATION

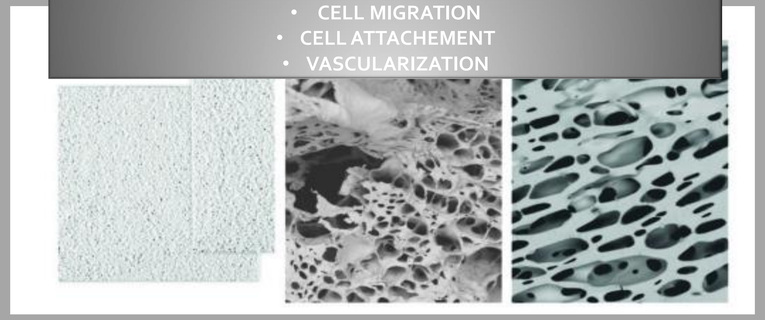
DERMIS FORMATION
COLLAGEN SYNTHESIS
FIBROBLAST MIGRATION

IINFLAMMATORY RESPONSE
SERUM TGF-b
SERUM TNF-ALPHA, IL6

## METHODS

A series of 5 patients with chronic wounds received weekly applications of PLA matrices until healing. These matrices contain 75% PLA, which degrades to lactate and lactic acid with a pKa value of 3.85. On every visit, the pH value of the wound bed was recorded using colorimetric indicator strips.

OPTIMIMAL COMBINATION OF SMALL AND LARGE PORES MITIGATE
- CELL MIGRATION
- CELL ATTACHEMENT
- VASCULARIZATION



NON- HEALING WOUND

ALKALINE pH

SUPRA SDRM CAUSES A BENEFICIAL PH SHIFT FOR NON HEALING WOUNDS WITH A HIGH PH

ACIDIC pH
- Reduces the activity of MMPs
- Unsuitable environment for pathogenic bacteria
- Improves tissue oxygenation

## RESULTS

The pH of the patient's wounds ranged from 7.5 to 9.0 before treatment. After the first 1 week of treatment, the pH values gradually decreased to 7.0-7.5 and remained stable around those values thereafter. The reduction in pH values were matched by significant reductions in the wound size, with the greatest improvement during the first weeks of treatment. All wound fully healed by 8 to 12 weeks without complications, including signs or symptoms suggestive of bacterial overgrowth or infection. Noteworthy, pH values never dropped below physiological parameters over the course of our observation.

## CONCLUSION

A wound's pH value is a good indicator of its healing phase and healing potential. Acidification of chronic wounds contributes to healing by promoting infection control, increase in the immune system antimicrobial activity, modulation of protease activity, increased oxygen availability to the tissue, and direct effects on progenitor cells. Beyond its effects as a CAMP, PLA matrices represent a novel way to acidify wound beds in a sustained manner without the risk of over acidifying the wound bed.

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# Novel outpatient treatment of wet- cement alkali burns with a polylactide- based synthetic matrix - the timing matters

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## INTRODUCTION

Alkali burns resulting from cement exposure have an insidious onset that demand a timely diagnosis and targeted treatment. Patients often have exposure for hours without feeling discomfort. The calcium hydroxide and hydroxyl ion proton acceptors produced from the cement – water mix is exothermic and caustic with a pH as high as 12.9. This can result in microscopic deep tissue injury and liquefactive necrosis that continues to cause injury despite initial removal of the insult. The treatment for wet cement burns differs greatly, and prompt recognition is necessary.

PBD #2 Initial presentation 2nd degree deep-partial burn. Ph = 10.5, culture negative. Excision and debridement with 48 hrs of continuous hypochlorous acid soaks

PBD#3 with pH+ 10

PBD #5 ph = 9, with 1st application #1 of- synthetic matrix

PBD #12- ph= 8 application #2

PBD #16 dermal epidermal migration

PBD #20 with full closure

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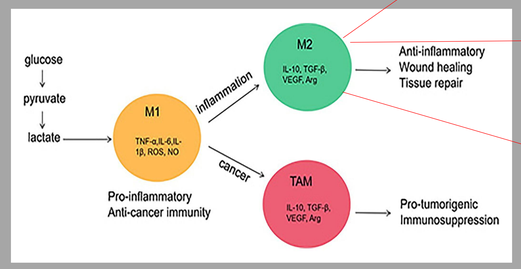


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## METHODS

We present a 29-year-old – male construction manager who presents post burn day 2 with a 0.5 percent TBSA deep- partial burn to the ventral right wrist. Our treatment algorithm included initial pH testing (wound pH 10.5), wound culture, thermal free- tissue excision and routine application of hypochlorous acid was the initial treatment for 48 hours. A ploylactide synthetic matrix graft was applied on post burn day 5 and 12 with a hypochlorous acid secondary dressing.

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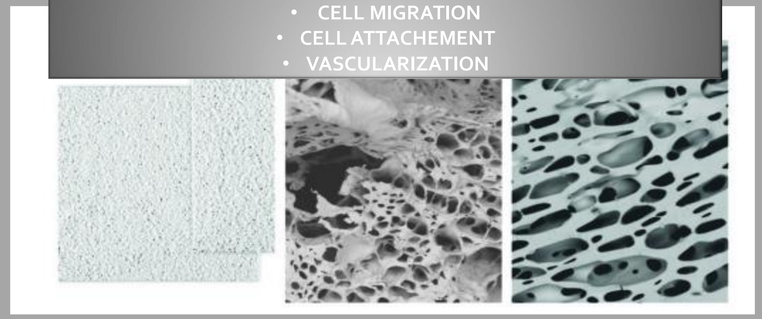

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## RESULTS

Peak wound pH change resulted on post-burn day 7 (pH=8) and 14 (pH=7.2). We observed a robust dermal appendage infiltration with minimal granulation response on post burn day 7 and full epidermal coverage by post burn day 16, a mature flat scar and a sequelae of post-burn dyspigmentation. The patient was placed in a silicone compression for 2 weeks with return to full function.

## CONCLUSION

Early recognition and treatment of alkali burns are imperative. Implementation of a relevant treatment algorithm coupled with the use of a polylactide synthetic wound matrix is an alternative option for treatment of deep partial alkali burns of modest TBSA in the outpatient setting and may result in short healing times and avoidance of autografting.

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