

# The Treatment of Partial Thickness Burns with a Bioelectric Dressing Following Cosmetic Laser Facial Resurfacing

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## BACKGROUND

Laser resurfacing procedures produce a partial thickness burn, resulting in unfavorable side effects including significant pain, erythema, swelling, exudate, eschar formation, peeling, and skin discoloration.<sup>[1]</sup> Less common, but more severe side effects include blistering, persistent thermal damage, scarring, altered skin pigmentation, and infections. Wound aftercare is essential to improve re-epithelialization and reduce the severity of side effects and persistent complications.<sup>[2]</sup> A growing body of research documents the efficacy of electrical stimulation in the management of partial and full-thickness wounds.<sup>[3],[4]</sup> A novel bioelectric, antimicrobial dressing\*\* that generates a sustained electrical microcurrent on the surface of the device has been observed to accelerate healing and decrease pain.

## METHODS

A controlled, randomized pilot study was conducted to determine the safety and efficacy of a bioelectrical wound dressing in the treatment of partial thickness burns after cosmetic laser facial resurfacing. The study was IRB approved. All participants were >18 years of age, non-pregnant, and scheduled to undergo laser facial resurfacing. Informed consent was obtained from all participants. An Erbium: Yag Laser was set at an energy level of 2940 NM to burn to a depth of 40 microns. The output was 45 W and pulse duration was 0.1 up to 50 ms. Thirty patients were randomized into two groups; the control group was treated with a topical petrolatum based skin ointment\* and dressings, and the study group was treated with a moistened bioelectric total contact face mask, covered with a neoprene mask. The dressings were changed every three days. Subjective pain levels (Visual Analog Scale), wound assessments, and use of pain medications were documented. Photos were taken to monitor and assess wound healing.



Bioelectric Dressing- DRY  
Inactive



Bioelectric Dressing- WET  
Activated

## RESULTS

The control group (n=9) healed in 9 days, whereas the study group (n=18) healed in 4 days, representing an accelerated healing of 55%. At 2 days post-procedure, patients treated with bioelectric wound care experienced decreased erythema and edema levels as compared to controls. Patients treated with a bioelectric dressing experienced a 74.1% reduction in pain levels as compared to the control group (8.2% reduction), and required no narcotics as compared to the control group (100% narcotic analgesic use). 22.2% of the study group utilized over the counter analgesics such as acetaminophen and ibuprofen for mild discomfort. No complications (including herpes outbreaks) were noted with the use of the bioelectric dressing.

### Participant 8

Burn Aftercare: Petrolatum-Based Ointment



Day 1  
Immediate Post-Resurfacing

Day 3

Day 5

0 min. Pain = 7  
30 min. Pain = 7  
24 hrs. Pain = 7

### Participant 23

Burn Aftercare: Bioelectric Wound Dressing



Day 1  
Immediate Post-Resurfacing

Day 2

Day 4

Pain = 0  
4 hrs.

Pain = 5  
30 min.

Pain = 10  
0 min.

TABLE 1: Erythema and Edema Assessment

Erythema	Score
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Edema	Score
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema	3
Severe edema (raised by more than 1mm and extending beyond wound)	4

## NARCOTICS USE AND PAIN ASSESSMENT

TABLE 2: Average Erythema and Edema

Follow-up	Group	Erythema	Edema
2 days post	Control (n=9)	2.3	2.7
	Bioelectric (n=18)	1.8	1.5

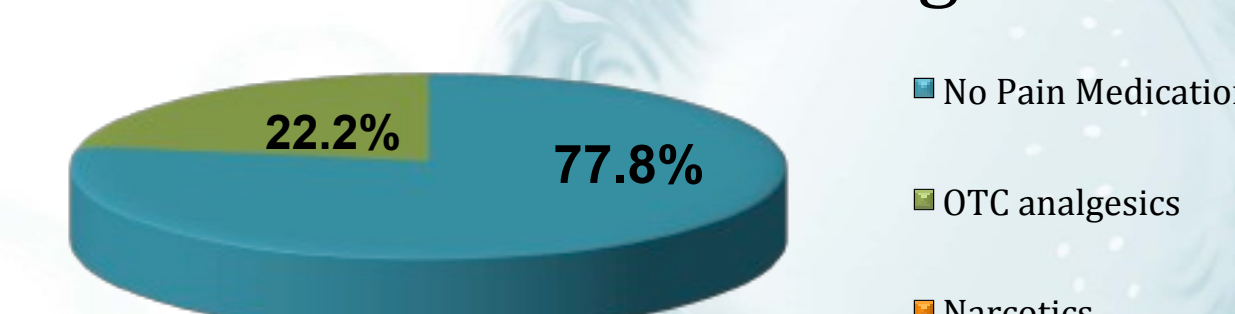
TABLE 3: Pain medications on day of laser procedure

	Control (N=9)	Bioelectric (N=18)
Narcotics	9	0
No Pain Medications	0	14
OTC Analgesics	0	4

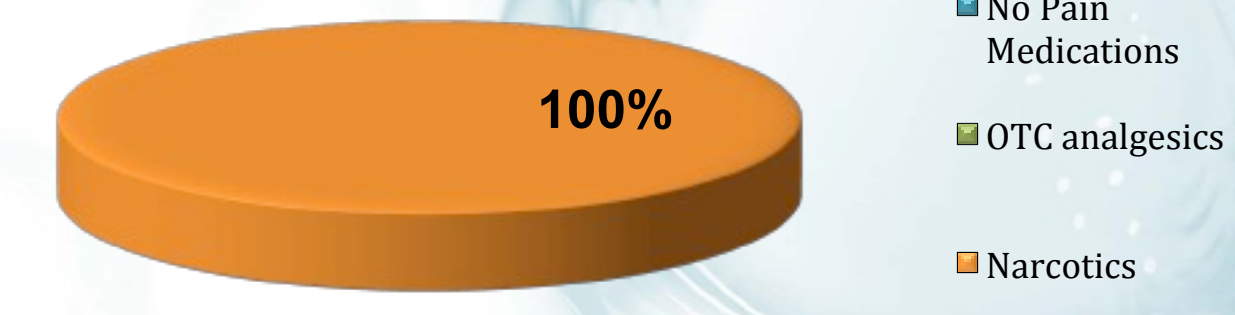
TABLE 4: Average VAS pain rating

Study Group	Time of Pain Rating		% Pain Reduction
	Immediate Post Procedure	Aftercare Applied	
Control (n=9)	8.5	7.8	8.20%
Bioelectric (n=18)	8.1	2.1	74.10%

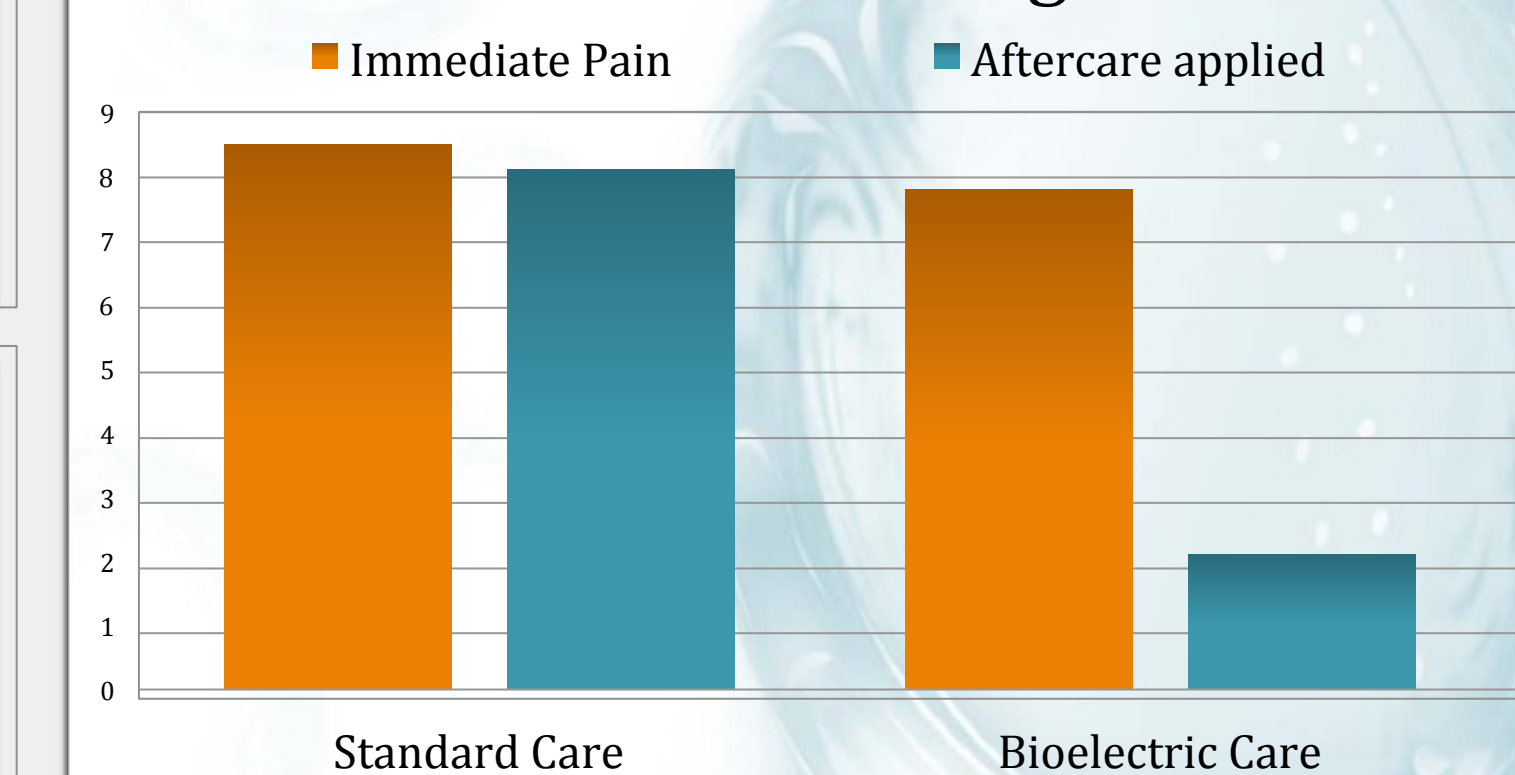
### Bioelectric Dressing



### Petrolatum-Based Cream



### Post-Resurfacing Pain



## CONCLUSIONS

It appears that the application of an antimicrobial, close-proximity electrically active wound dressing may be effective in accelerating healing of partial thickness burns, reducing burn-related pain, and reducing the need for narcotics.

## REFERENCES

- [1] American Society of Plastic Surgeons. Skin Rejuvenation and Resurfacing. [http://www.plasticsurgery.org/patients\\_consumers/procedures/SkinResurfacing.cfm#six](http://www.plasticsurgery.org/patients_consumers/procedures/SkinResurfacing.cfm#six); Internet.
- [2] Caruso DM, Foster KN, Blome-Eberwein SA, et al. Randomized Clinical Study of Hydrofiber Dressing with Silver or Silver Sulfadiazine in the Management of Partial-Thickness Burns. *Journal of Burn Care and Rehabilitation* 2007; 27:298-309.
- [3] Spadaro JA, Berger TJ, Barranco SD, Chapin SE, Becker RO. Antibacterial effects of silver electrodes with weak direct current. *Antimicrobial Agents in Chemotherapy* 1974; 6: 637-42.
- [4] Chu CS, McManus AT, Pruitt BA Jr, Mason AD Jr. Therapeutic effects of silver nylon dressings with weak direct currents on Pseudomonas aeruginosa burn wounds. *J Trauma*. 1988;28(10):1488-1492.

\*Aquaphor®, Beiersdorf AG, Hamburg, Germany  
\*\*Procellera™, Vomaris Innovations, Inc., Chandler, AZ