Use of a Microcurrent Generating Device in Wounds of Complex Etiologies
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BACKGROUND
Wound care strategies that expedite healing and reduce bioburden in stalled wounds that have failed traditional treatments are currently a subject of increased study. Electrical stimulation is known to enhance cell migration (1-2), and on a clinical scale, energy-based modalities have been shown to accelerate wound healing (3-4). An antimicrobial microcurrent-generating device (MCD) (a) has been observed to stimulate and expedite wound healing in acute and chronic wounds (5-6) and enhance the wound microenvironment through decreased interleukin-1 (7) and increased keratinocyte migration (8). The self-contained device is wireless, conformable and contains a matrix of batteries on a flexible surface. The device generates a sustained 2-10 micro Ampere of therapeutic low-level microcurrent at its surface in the presence of a conductive fluid.

METHODS
A case series was conducted to observe the effects of a microcurrent generating device on five patients with chronic wounds with complex etiologies of greater than 3 months duration that had failed to respond to standard of care and other advanced modalities. All wounds were treated once per week with a microcurrent generating device used as a primary contact layer and secured in place with standard secondary devices. Wound healing progression was assessed at follow-up visits in the clinic.

RESULTS
A marked improvement was observed following the application of the microcurrent generating device, with wound healing initiation in all cases. In Case 1, a pressure ulcer that had failed to respond to SOC for 439 days showed complete healing noted by 7-12-2013. In Case 2, a surgical dehiscence, the MCD was immediately applied post-dehiscence and complete epithelialization following the application of the MCD at 57 days. In Case 3, a refractory healing, ulcer that had failed to respond to SOC for 439 days resulted in complete re-epithelialization of the wound healing noted by 7-12-2013.

CONCLUSION
The presented cases demonstrate the versatility and utility of the MCD in the application of wounds of varying etiology and chronicity, and in patients with several comorbidities (4 of 5 with DM). The application of microcurrent generating devices in wounds failing all other methods may be a beneficial option in promoting wound healing initiation in chronic wounds, and may serve as an effective alternative to other costly advanced treatments and therapies.

REFERENCES

Case 1: PRESSURE ULCER
69 year old diabetic male with prior incisional pressure ulcer to right heel for 4 months. Patient referred to office by home health RN for second opinion. Patient was offered free rotational flap via plastic surgery, but declined. PMH: HN, DM, CAD, PAD. Previous amputation left foot, below knee. Initial wound measurements: 6.5 cm x 4.5 cm x 1.5 cm. Patient additionally diagnosed with calcaneum OM; Bone reaction and debridement performed on 2/22/13. Previous Tx: Dermat repair scaffold (b) NPWT, collagen based gel (c),collagenase (d), TBC 35 extracellular matrix (a). Wound healed around mid-March 2013. Wound measurements were approx 2.5 cm x 1.2 cm x 0.2 cm. MCD started 5-17-2013, with 6 weekly treatments and complete healing noted by 7-12-2013.

Case 2: SURGICAL DEHISCENCE
66 year old male patient with surgical dehiscence to right great toe following a 1st MNU replacement. Patient is diabetic, with obesity and hypertension. Started patient immediately on MCD post-dehiscence; followed for 11 weeks. First visit: 6-14-2013 Last visit: 9-19-2013 Number of MCD applications: 10

Case 3: TRAUMATIC INJURY
76 year old diabetic female with traumatic injury to left anterior leg. Wound non-progressive for 2 weeks with topical antibiotic therapies administered by home health RNs. Patient seen at request of PCP. Med Hx: DX, HTN, PAD. Abnormal Gait First Visit: 6-20-2013 Final Wound Closure: 7-1-2013

Case 5: DFU
56 y/o diabetic male with previous history of MRSA resulting in a partial hallux amputation with recurrent neuropathic plantar foot ulcer. PMH: EIDM, HTN
First visit: 5-22-2013 Final visit: 8-14-2013 Note: lost patient to follow-up due to insurance change from 7-8-2013 through 8-14-2013. Patient was given supply to change dressing at home. Patient came to office on 8-16 with resultant healed wound, and did not seek other treatment. MCD was changed out every 5 days.