

# Closure with Keratin: The Application of a Human Keratin Wound Matrix for the Treatment of Chronic, Non-Healing Diabetic Foot Wounds, a Small Patient Cohort

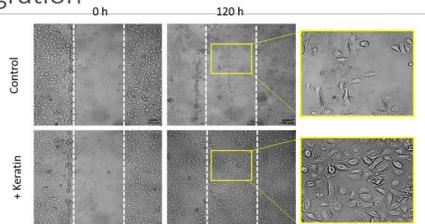
Jason M. Mendivil, DPM, PULSE Amputation Prevention Centers, Medical Director, Lorie C. Henderson, APRN, MSN, FNP, PULSE Amputation Prevention Centers, Research Coordinator, Victoria Lambert, RN, PULSE Amputation Prevention Centers, Clinic Coordinator, Orion Olivas, Pre-medical Student, Houston Baptist University, Mia Deanda, University of Texas at El Paso



## Introduction

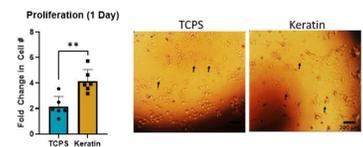
The use of keratin based dressings in the setting of difficult to heal wounds in patients with type II diabetes mellitus have shown to be effective in decreasing healing times, despite the small cohorts of patients in the literature. The use of these keratin dressings is a novel approach to facilitate wound closure in these limb-threatening ulcerations. The use of a keratin dressing facilitates wound closure by increasing keratinocyte proliferation and migration in a wound bed. The investigators attempt a retrospective analysis of five patients in an amputation prevention center. The patients have failed twenty weeks of standard of care treatment, including sharp debridement, offloading, glycemic control and infection control. A keratin wound matrix was applied on a weekly basis. Each patient was evaluated on a weekly basis and wound measurements were determined.

### Keratin Treatment Promotes Keratinocyte Migration

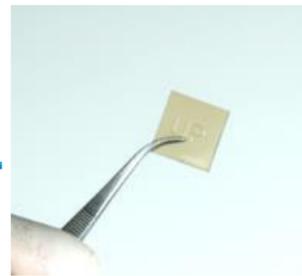


Addition of soluble keratin in vitro increases human keratinocyte migration in a scratch wound assay. Scale bar = 100 μm. Data on file.

### Keratinocyte Proliferation



Culture of human keratinocytes on keratin-coated surfaces increases proliferation and cell spreading, both markers of keratinocyte activation and motility. Data on file.



## Methods and Materials

The authors in this investigation provide their findings with the use of a human keratin wound matrix in a small cohort of five patients. The patients have type II diabetes mellitus, peripheral arterial disease and peripheral neuropathy. These patients present with a wound with less than 30% of wound closure at four weeks duration. All patients failed conventional wound therapy consisting of sharp debridement, local wound care and offloading. All patients present with a HBA1C of less than 9.0% within three months prior to treatment and a wound size greater than one square centimeter. TCPO2 values for all patients were greater than 60 mmHg with satisfactory perfusion.

## Results

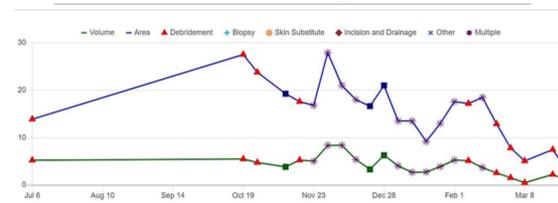
Prior to the initial application of the keratin dressing, the patients have had the wound for more than twenty weeks duration. The patients received consecutive, weekly applications of the human keratin wound matrix. Since initial application, the wound volume showed a decrease on a weekly basis. A total of five patients were evaluated. Pre-debridement volumes for each wound are recorded below. Pictures and selected clinical data extracted from the EMR are shown and summarized below:

### Case 1

83 year old female, peripheral arterial disease, type II diabetes mellitus, diabetic peripheral neuropathy, history of right foot transmetatarsal amputation, failed local wound care, sharp debridement, medical management, conservative treatment for more than five months duration prior to initial application of keratin wound matrix

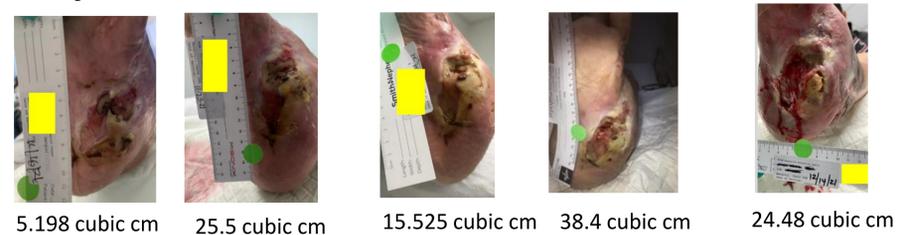


### Wound Area/Volume Progress



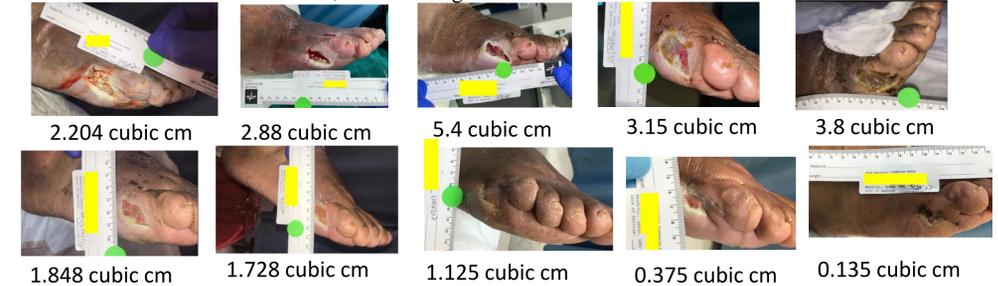
### Case 2

48 year old male, peripheral arterial disease, type II diabetes mellitus, peripheral neuropathy, end stage renal disease on hemodialysis, history of left foot 4<sup>th</sup> and 5<sup>th</sup> ray amputation, failed conservative treatment



### Case 3

54 year old male, type II diabetes mellitus, peripheral arterial disease, failed conservative treatment for more than five months duration, wound to right lateral foot

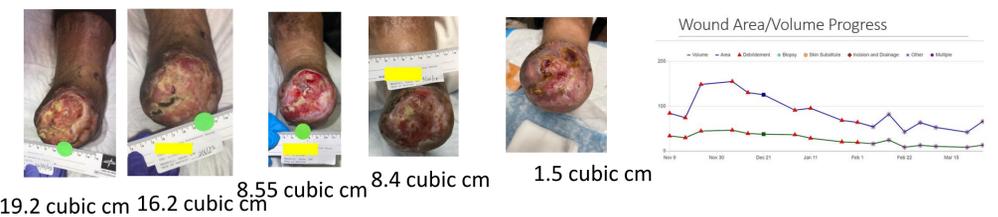


### Wound Area/Volume Progress

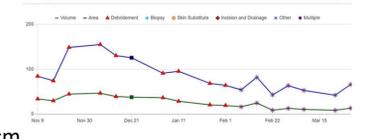


### Case 4

74 year old male, type II diabetes mellitus, peripheral arterial disease, history of right foot transmetatarsal amputation with failed plantar flap

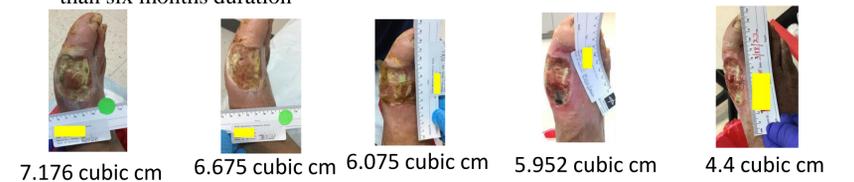


### Wound Area/Volume Progress



### Case 5

73 year old male, type II diabetes mellitus, peripheral arterial disease, history of open bypass to right lower extremity, more than five AFRO procedures, chronic wound to right medial foot for more than six months duration



## Discussion

The use of a human keratin wound matrix may have an advantageous wound healing effect by increasing keratinocyte proliferation to the wound base. The use of the novel treatment shows evidence of decreasing wound volume, especially in the setting of chronic diabetic foot wounds. Of the patients evaluated, there was a decrease in overall volume of the wound size after weekly applications.

## Contact

Jason M. Mendivil, DPM  
 PULSE Amputation Prevention Centers  
 Email: jasonmendivil@dpm@yahoo.com  
 Website: www.pulseamputationprevention.com  
 Phone: 915-309-0513