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Case Report

# Decellularized human dermis vs. standard care in two diabetic foot ulcers: A comparative case report

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## Abstract

**Objective:** To describe healing trajectories in two neuropathic diabetic foot ulcer cases—one treated with decellularized human dermis (DHD) and one with moist wound management (MWM).

**Methods:** After a two-week optimization period, two adults with long-standing diabetes and plantar ulcers were managed weekly for 12 weeks. Case 1 received a single 4 × 4 cm DHD graft combined with non-adherent dressings, and case 2 received gauze-based MWM alone. Wound area was quantified using digital planimetry.

**Results:** Case 1 achieved an 80% area reduction by week 4 and achieved full epithelialization at week 8. Case 2 showed a 7.8% area reduction by week 2, a transient 21.6% area increase between weeks 3 and 5, and reached 68.6% reduction by week 12 without closure. No adverse events occurred.

**Conclusion:** The results of our study suggest that DHD may accelerate closure compared with standard care. Due to the small sample size, randomized controlled studies with longer follow-up are essential.

**Level of Evidence V; Study Type: Case report.**

**Keywords:** Diabetic foot; Wound healing; Foot ulcer; Treatment outcome.

## Introduction

Diabetic foot ulcers account for up to 80% of diabetes-related amputations[1]. Decellularized human dermis (DHD) preserves extracellular-matrix architecture and angiogenic growth factors that support granulation tissue formation[2]. Cohort studies report faster closure with dermal matrices, but direct comparisons with moist wound management (MWM) remain scarce. Therefore, the objective of this case report is to describe the healing trajectories of two neuropathic ulcers—one managed with DHD and one with standard MWM.

## Case description

Case 1 was treated with DHD. A 61-year-old man with type 2 diabetes for 20 years (HbA1c 7.2%) presented with an eight-week plantar ulcer beneath the first metatarsal head. The wound measured 2.3 × 2.0 cm (area 4.6 cm$^2$; depth 0.3 cm) and was classified as Wagner grade 2 with a negative probe-to-bone test. Comorbidities included sensory neuropathy and controlled hypertension; ankle-brachial index was 0.85; serum albumin was 3.9 g/dL; and there was no renal impairment. After debridement and optimization, a single fenestrated 4 × 4 cm DHD graft was applied, covered with a non-adherent dressing, and off-loaded in an OSSUR CAM walker.

Case 2 was treated with MWM. A 67-year-old man with type 2 diabetes for 15 years (HbA1c 8.5%) presented with a 10-week plantar ulcer at the fifth metatarsal base measuring 2.8 × 2.2 cm (6.2 cm$^2$; depth 0.4 cm) and was classified as Wagner grade 2, probe-to-bone negative. Comorbidities included neuropathy, hypertension, and dyslipidemia; ankle-brachial index was 0.92; serum albumin was 3.4 g/dL. Following identical debridement, the wound was managed with gauze-based MWM and the same off-loading device. Baseline cultures were negative, and duplex scanning showed adequate pedal flow in both patients.

Study performed at Axentra Bio, Phoenix & Scottsdale, Arizona, USA.

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## Methods

Adults ≥ 18 years with neuropathic diabetic foot ulcers measuring 1-10 $cm^2$ in surface area, present for ≥ eight weeks, and unresponsive to standard hydrogel therapy, regular debridement, and off-loading were eligible. Additional enrolment criteria required an ankle-brachial index > 0.70 (or toe pressure > 40 mm Hg), no clinical infection, no critical limb ischemia, and no severe malnutrition or uncontrolled hyperglycemia.

Both patients completed a two-week optimization phase to stabilize glycemic control and perfusion status. After surgical debridement, case 1 received a single fenestrated 4 × 4 cm DHD graft plus non-adherent dressing, and case 2 received MWM with sterile gauze alone. Off-loading was identical (OSSUR CAM walker).

Wounds were photographed and measured weekly for 12 weeks using Silhouette digital planimetry (Aranz Medical). The primary outcome was the percentage reduction in ulcer surface area; secondary outcomes were time to complete epithelialization and the incidence of adverse events.

## Results

Weekly planimetry revealed distinct healing trajectories. Case 1 achieved a 46.7% area reduction by week 3, 80% by week 4, and complete epithelialization at week 8 (Figure 1). Case 2 showed a 7.8% reduction by week 2, a transient 21.6% area increase between weeks 3 and 5, and a 68.6% reduction by week 12 without closure (Figure 2). A side-by-side line graph summarizing the weekly percentage change is presented in Figure 3. These clinical results are consistent with findings presented in our institutional research poster, which documented an 80% surface area reduction by week four and complete closure by week eight using DHD therapy. The congruence between real-world outcomes and poster data reinforces the reproducibility and practical effectiveness of DHD in managing chronic diabetic foot ulcers.

## Discussion

### Comparison with the literature

Our findings align with Zelen et al.[5], who reported a median six-week closure with dermal matrices, but differ from Greaves et al.[4], who observed slower contraction under gauze.

### Mechanistic rationale

Decellularized human dermis supplies a collagen scaffold rich in basic fibroblast growth factor and vascular endothelial growth factor (VEGF), which may explain earlier granulation.

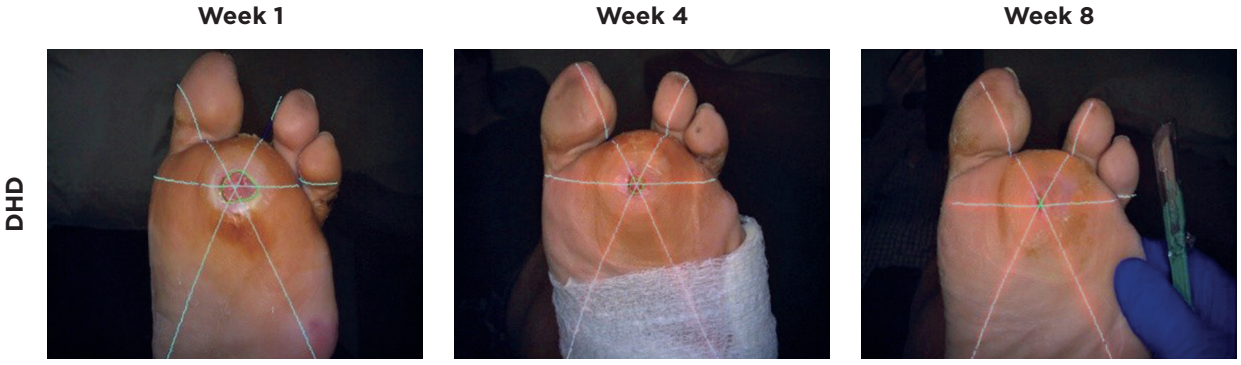


**Figure 1.** Sequential wound photographs, Case 1 (DHD): baseline (week 0), week 4 (80% reduction), and week 8 (closure).

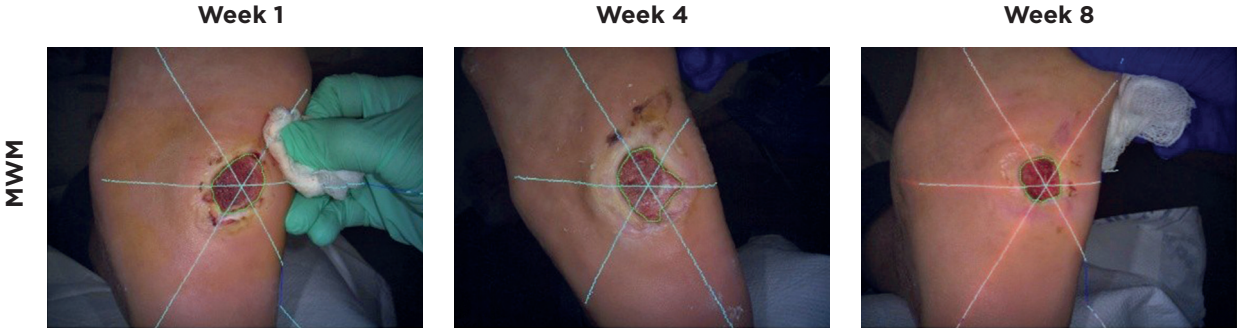


**Figure 2.** Sequential wound photographs, Case 2 (MWM): baseline, week 4 (area increase), and week 12 (68.6% reduction).

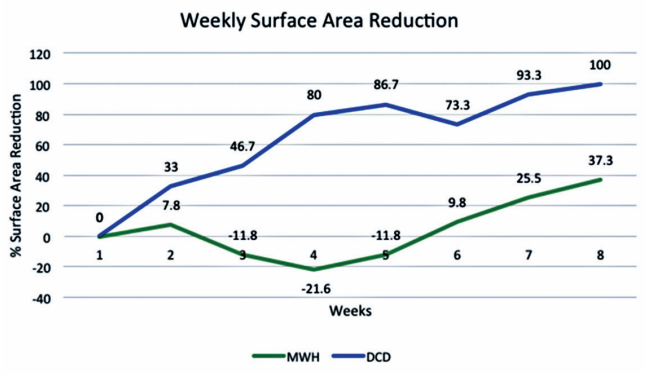


**Figure 3.** Line graph showing percentage wound-area reduction over 12 weeks for DHD vs. MWM treatments.

## Clinical context and mechanistic insight

Multiple studies support the clinical utility of acellular dermal matrix (ADM) grafts. A systematic review by Guo et al.[2] reported higher overall healing rates with ADM products, while a multicenter randomized trial by Zelen et al.[5] showed faster wound closure and improved cost-effectiveness compared with standard care. Biologically, DHD retains collagen I/III, laminin, and angiogenic cytokines such as VEGF and platelet-derived growth factor, properties that accelerate fibroblast migration, neovascularization, and keratinocyte re-epithelialization[3,4].

## Economic and digital considerations

Although a single DHD graft is more expensive than gauze, economic modelling by Zelen et al.[5] indicates overall cost savings through fewer clinic visits and shorter healing times. Digital planimetry (Silhouette) provided reproducible area measurements but requires staff training and controlled lighting; future work should assess its cost-utility across varied settings.

## Limitations

This study is inherently limited by its small sample size and observational design, which restricts generalizability. The absence of long-term follow-up data precludes assessment of recurrence rates or durability of closure. Although digital wound assessment tools such as Silhouette™ enhance measurement accuracy, their clinical utility may vary based on user proficiency and resource availability. These limitations underscore the need for larger, controlled studies to validate the observed outcomes.

## Conclusion

The synthesis of clinical data, mechanistic insights, economic evaluations, and advanced diagnostic technologies substantiates DHD's superiority over standard wound management for diabetic foot ulcers. The findings support the early adoption of DHD as a frontline modality in diabetic foot ulcers management, moving it from salvage to standard therapy. Its integration has the potential to reduce limb loss, lower hospital readmission rates, and alleviate the economic burden of chronic wounds. Future randomized multicenter studies with longer follow-up are essential to confirm these outcomes and guide evidence-based standardization of care.

**Authors' contributions:** Each author contributed individually and significantly to the development of this article: JAB *(https://orcid.org/0009-0001-5434-9158) Clinical management and data acquisition; KV *(https://orcid.org/0009-0005-1280-0800) Study design, manuscript drafting, and correspondence; KSP *(https://orcid.org/0009-0003-3787-5177) Literature review and critical revisions. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

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