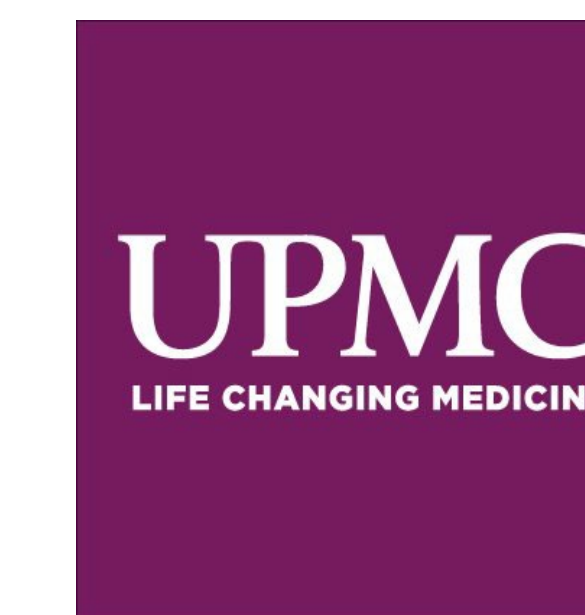


Peptide Biomimetic Matrix shows Rapid Regranulation of Complex, Deep Wounds requiring Surgical Intervention



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Introduction

Complex wounds are difficult-to-treat and often involve necrotic tissue, exposed structures (muscle, tendon, or bone), as well as infection or biofilm persistence. Highly complex wounds require surgical procedures and advanced treatment modalities. The ideal treatment promotes rapid formation of healthy tissue while preventing (re)infection. This case series evaluates the performance of a novel, **self-assembling peptide-based biomimetic matrix* (BMM*)** in complex wounds requiring surgical intervention. BMM is deployed in a prefilled syringe with an optional applicator tip for access to hard-to-reach areas. The peptide self-assembles into a 3D scaffold that mimics the extracellular matrix (ECM) while providing antibacterial protection.

Figure 1: Features of the novel self-assembling peptide biomimetic matrix (BMM)



3D scaffold resembles the native ECM to support tissue regrowth and revascularization.



Antibacterial barrier to control bioburden and prevent biofilm reformation.



Space-conforming for intimate contact with the wound, including hard-to-access areas.

Methods

Nine patients with multiple comorbidities presenting with complex, difficult-to-heal wounds requiring OR procedures for **surgical management / limb salvage**, were treated with BMM (G4Derm Plus, Gel4Med Inc, MA). All wounds were extensive and full-thickness, involving **exposed tendon/bone**. Seven cases were complicated by **infection** (77.8%), and four presented with **deep tunneling** (44.4%). Wounds were extensively debrided surgically (in the OR) using a hydrosurgery system for removal of devitalized tissue prior to BMM treatment (single application). Wound characteristics were assessed at baseline and monitored during follow-up visits. The primary endpoint was coverage of the originally exposed structures.

Table 1: Patient medical history and wound characteristics

#	Medical History	Wound type & complexity	Wound location	Wound age	Previous interventions
1	Peripheral Venous Disease, Multiple Biopsies, Suspected Pyoderma	VLU with Exposed Tendon (+ Biopsies) and Severe Pain	Left Leg	3+ months	Vein Ablation
2	Diabetes (Uncontrolled), Severe Abscess with Deep Infection	Severe Abscess with Deep Tunneling	Right Dorsolateral Foot	3+ months	Synthetic grafting, in office debridement, offloading
3	Diabetes, Peripheral Vascular Disease, Osteomyelitis	Recalcitrant DFU with Exposed Bone	Left plantar Heel	6 years	Multiple Surgical Debridements, Offloading, Amniotic Tissue (10 applications)
4	Diabetes, Gas Gangrene, Osteomyelitis	Amputation/Ray Resection with Exposed Bone and Deep Tunneling	Left 1st and 2nd ray	3 weeks	RLE angiogram, bedside I&D, antibiotics
5	Diabetes, Gas Gangrene, Acute Coronary Syndrome	TMA/Ray Resection with Exposed Bone and Active Infection	Right leg and Foot	2 years	RLE angiogram, OR I&D
6	Diabetes, Peripheral Neuropathy, Charcot Foot®, Smoking	DFU with Exposed Bone, Tunneling, and Recurrent Infections	Right Forefoot	3+ years	IV antibiotics, TCC, SOC
7	Uncontrolled Diabetes, Peripheral Neuropathy	DFU with Exposed Bone and Active Infection	Heel	3+ years	Multiple I&D, Silver Dressings, SOC, Various Wound Matrices
8	Diabetes, Peripheral Arterial Disease, Smoking	DFU/Pressure Ulcer with Exposed Bone	Heel	7 weeks	Unknown
9	Venous Insufficiency	VLU with Exposed Bone	Leg	2 years	Multiple Debridements, Amniotic Tissue Applications


Results

All patients responded positively to BMM treatment, showing rapid wound healing progression with **coverage of originally exposed structures after a single BMM application**. Complete coverage was observed in 8/9 patients; 1 patient achieved partial coverage. In all cases, a **rapid and substantial wound depth reduction** with robust formation of **healthy granulation tissue** was noted. **Full granulation** was achieved as early as **2-weeks after a single application**, with a median of 4 weeks to 100% granulation. Easy access of BMM to hard-to-reach areas was also observed and resulted in substantial **progress towards resolution of tunneling**. Moreover, within 2 weeks, signs of reepithelialization, exudate improvement, and intact peri-wound skin were noted. In all cases, the BMM treatment was well tolerated; post-treatment visits recorded no increase in pain and **no signs of infection**. No adverse events were observed.


Figure 2: Representative images of wounds before and after BMM treatment (single application)

Patient 1: VLU with Exposed Tendon

Before BMM treatment (Baseline)




After 1 BMM application (2 weeks post-BMM)




- ✓ Complete coverage of exposed tissues (muscle & tendon)
- ✓ Rapid & substantial wound depth reduction (approx. 3.4 cm depth reduction)
- ✓ Robust healthy granulation tissue
- ✓ Early signs of re-epithelialization at the wound edges
- ✓ Pain reduction

Patient 2: Severe Abscess with Tunneling into First Ray

Before BMM treatment (Baseline)




After 1 BMM application (4 weeks post-BMM)




- ✓ Complete granulation tissue coverage
- ✓ Substantial depth and area reduction
- ✓ Resolution of deep tunnel

Patient 4: Amputation with Exposed Bone & Deep Tunnel

Before BMM treatment (Baseline)



After 1 BMM application (6 weeks post-BMM)



- ✓ Complete healing

Conclusions

This case series demonstrates the potential of BMM in the treatment of complex wounds with exposed structures that require surgical intervention, such as surgical debridement and/or limb salvage procedures. BMM conformed to the complex wound geometries, even deep tunnels, resulting in **rapid coverage of the exposed structures with healthy tissue regrowth and prevention of re-infection**. Larger clinical studies are needed to expand on these findings.

References

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*BMM: G4Derm® Plus, Gel4Med Inc.

