

# Durable Wound Closure in Smokers Using an Autologous Multilayer Leukocyte-Platelet-Fibrin Patch: A Case Series

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## PURPOSE AND BACKGROUND

Chronic wounds in patients with a history of tobacco use present a significant clinical challenge due to smoking-induced vasoconstriction, endothelial dysfunction, impaired nitric oxide signaling, and persistent tissue hypoxia. These pathophysiologic effects impair angiogenesis and oxygen delivery, resulting in delayed healing, failure of standard wound therapies, and high rates of wound recurrence. Autologous multilayer leukocyte-platelet-fibrin patch (MLPF patch; 3C Patch) is a biologic therapy that supports cellular migration, immune modulation, and sustained release of growth factors without exogenous additives. Prior studies have demonstrated that autologous MLPF provides a stable, angiogenic effect capable of supporting healing in recalcitrant wounds<sup>1</sup>

## WHAT IS MLPF PATCH

Produced from the patient's own blood by a proprietary, point of care, fully automated procedure

100% autologous

Three-layer structure of leukocytes, platelets, and fibrin which facilitates a sustained release of living immune cells and growth factors into the wound bed



## METHODS

This case series evaluated five patients with active or recent smoking history and complex lower-extremity wounds treated at a single wound care center. Wound etiologies include diabetic foot ulcers and post-amputation stump wounds, many complicated by peripheral arterial disease, chronic kidney disease, prior amputations, diabetes, and failure of advanced wound therapies. Several patients had critically impaired arterial disease. Patients received serial applications of MLPF patch prepared from their own blood. Adjunctive therapies including hyperbaric oxygen therapy (HBOT), vascular intervention, offloading, infection management, and glycemic optimization, were utilized as indicated. Outcomes assessed included wound progression, achievement of closure, limb salvage, and durability of closure.

## CASE STUDIES



### Case Study 1

- 57 y/o Female
- Smoker, DM II, CAD, Depression, Neuropathy, PAD, HGBA1C: 7.9
- DFU to Rt plantar x 5 months. Poor arterial flow 0.4 with intervention. TCC and MLPF initiated. HBO initiated one month later. **10 treatments applied to achieve closure in 12 weeks.**
- RLE ABI: 0.77 (most recent)
- **Wound remains closed**



### Case Study 2

- 64 y/o Male
- DLU post amputation due to ischemic limb RLE
- Smoker, DMII, ESRD on dialysis, arterial, HGBA1C: 6.7
- Wound to Rt BKA. AKA recommended due to nonhealing ulcer. Limb Salvage started. HBO at 3 weeks, and MLPF initiated at 4 wks. X 20 weeks. RLE ABI: Totally occluded. Limb salvage achieved.
- **Wound closed 4 weeks after MLPF treatment complete. Wound remains closed**

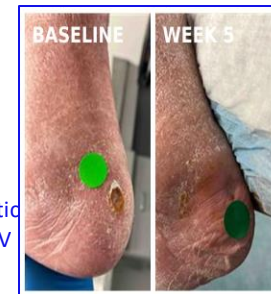
### Case Study 4

- 66 y/o Male
- Smoker, DM II, Arterial intervention, HTN, hyperlipidemia, PAD, CAD, HGBA1C: 14.0
- Rt 4<sup>th</sup> and 5<sup>th</sup> digits amp site (gangrenous DFUs) failed treatment due to poor diabetic control. MLPF initiated with IV antibiotics, offloading shoe, and HBO therapy.
- **Healed in 8 weeks. Wound remains closed**



### Case Study 5

- 64 y/o Female
- Smoker, ESRD with dialysis, DM II, diabetic retinopathy, CHF, HTN, Prior BKA onHGBA1C: 5.9
- LLE, seizures,
- 3-month-old DFU Rt heel declining, MLPF initiated. **Wound closed in 5 weeks.**
- **Wound remains closed**



### Case Study 3

- 59 y/o Female
- Smoker, DFU, diabetic retinopathy, angiogram with stenting, HTN, HGBA1C: 5.8
- Rt plantar chronic DFU. Refusal of TCC to support wound healing. Wearing DM shoes with inserts. MLPF initiated after 5 months stalled. **Healed in 10 weeks**
- **Wound remains closed**



## CONCLUSIONS

Prior to initiation of MLPF therapy, all wounds demonstrated stalled or declining healing trajectories despite prolonged treatment and advanced wound care. Following the MLPF application, progressive granulation tissue formation, improved wound tissue quality, and epithelization were observed. MLPF was applied a mean of 11 times (range: 5–20). All five wounds achieved complete closure, including cases in which major amputation had been considered. Limb salvage was achieved in all applicable patients, and all wounds remained closed at follow-up despite ongoing vascular disease and the known risk of recurrence in smokers.

## REFERENCES

Lundquist R, Holmström K, Clausen C, Jørgensen B, Karlsmark T. Characteristics of an autologous leukocyte and platelet-rich fibrin patch intended for the treatment of recalcitrant wounds. *Wound Repair Regen.* 2013;21(1):66-76.