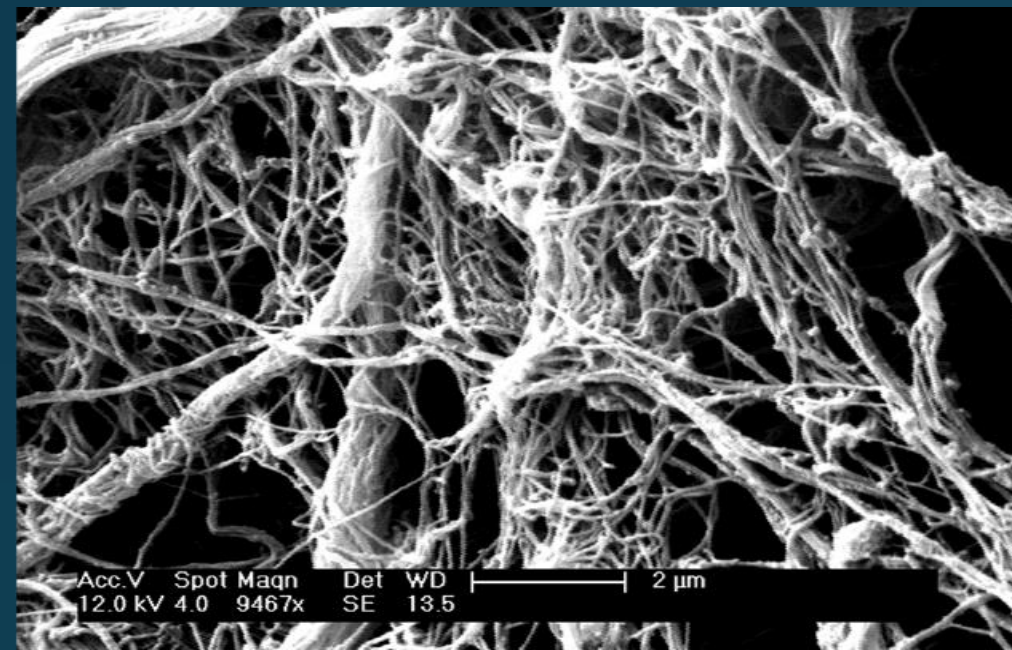


# Early Experience Using 3D Electrospun Polymer Matrix<sup>1</sup> in Open Wounds

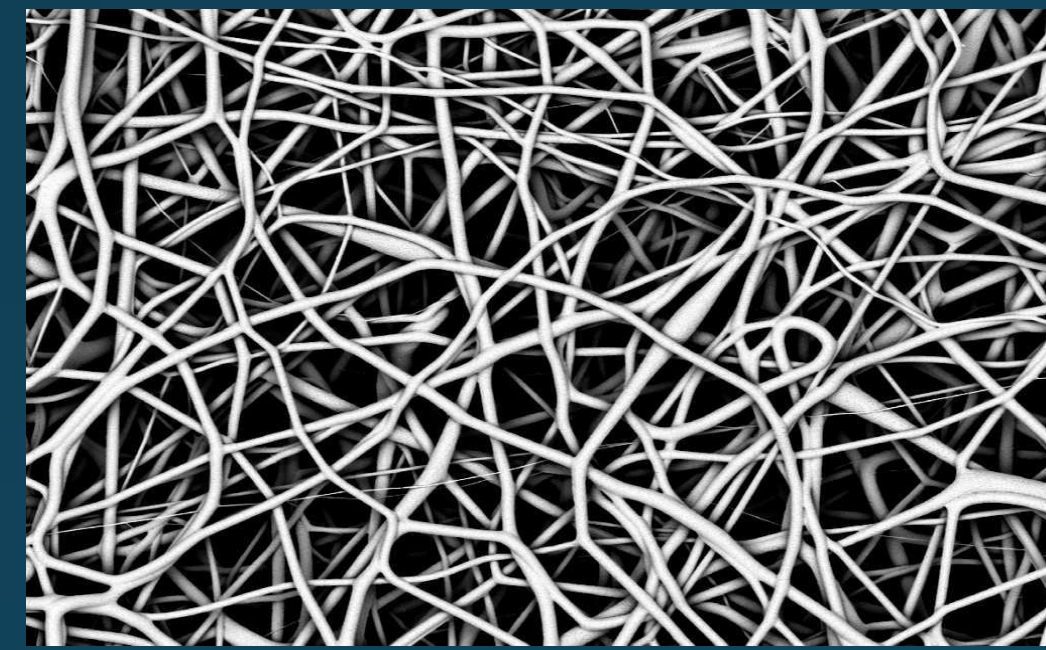
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(Prospective study from a single practitioner setting so no IRB was required)

## Introduction

Collagen, the most abundant protein in the human body, is an essential component of wound healing. Collagen attracts fibroblasts, promotes autolytic debridement, encourages angiogenesis and re-epithelialization, and stimulates new tissue growth<sup>2</sup>. 3D-electrospun polymer matrix (EPM) is structurally similar to native collagen proteins<sup>3</sup> and biocompatible for tissue ingrowth. This study reviews an initial experience using EPM for wound care in an office setting. EPM was applied to 31 wounds (22 acute/9 chronic) from 19 patients with average wound 7.4 cm<sup>2</sup> (range 1.08-60.06 cm<sup>2</sup>). The average age of the chronic wounds was 15.3 months (range of 5-28 months).



Decellularized Human Tissue



Electrospun Polymer Matrix<sup>1</sup>

## Wound Care Methods

1. Old dressings removed then wound washed and dried.
2. Debridement performed (as indicated). Adherent EPM was left intact. New EPM was placed (weekly) if no EPM was apparent in wound bed.
3. Cultures obtained (when indicated).
4. Measurements were recorded after debridement.
5. EPM fenestrated manually.
6. EPM was secured depending on the wound type and location. Steri-strips, VAC therapy, cotton Kling most common.
7. Absorptive contact dressing was placed over EPM.
8. Multilayer compression applied to VLU wounds and when indicated.
9. Aggressive offloading was utilized when indicated.
10. Adjuvant therapy was utilized occasionally on non-VLU wounds.
11. Dressing changes performed every 3 to 7 days primarily depending on the exudative volume/soiling of the wound.

## Results

EPM was used to treat 19 patients (ages 43-90) with 31 wounds (22 acute/9 chronic) with an average wound size of 7.4 cm<sup>2</sup> (range 1-60 cm<sup>2</sup>). Wound (primary) etiology is shown in Figure 1.

Five patients with 11 wounds (7 acute/4 chronic) had therapy change or were lost to follow up. Two patients with tracts—one chronic (sacral decubitus) and another acute (elbow bursa tract from gout)—were treated with EPM but had therapy changed at 1 and 3 weeks as EPM did not optimally “fill” the tract(s). There was 37% surface area reduction (SAR) at one week and 45% SAR at 3 weeks with these patients. One 87-year-old diabetic man with 2 acute foot wounds with critical aortic stenosis, cardiomyopathy, and severe PAD underwent successful revascularization, had 89% SAR at 4 weeks of therapy but developed CHF and was admitted to the hospital. He was placed in hospice care at that time and expired the next week. Another patient with 4 acute VLU was found to have infected hardware (+ tagged WBC scan) from ankle fracture (>10 years ago). She had one application but elected to transfer at week 2 to a wound care center that was nearer to her home. She had 33% SAR at that time. The 5th patient presented with 3 chronic VLU (5-months-old) and was treated with a single EPM application. He was poorly compliant but did have 56% SAR at 4 weeks. He was admitted for cellulitis at that time and was discharged to SNF that had in-house wound care.

All 5 remaining chronic wounds healed well. One 28-month-old DFU was treated with a single application and aggressive offloading that resulted in complete healing at 5 weeks. A 24-month-old sacral decubitus wound was treated with 3 weekly applications and completely healed in 4 weeks. Another patient referred with (2) 6-month-old DFUs was severely ischemic and underwent revascularization. EPM single application resulted in excellent integration of the graft. The wound healed completely in 12 weeks. The final patient was treated for non-healing wound of the lateral malleolus. He failed multiple biologic applications and failed mist therapy. Biopsy revealed pseudoepitheliomatous hyperplasia (PEH). He was then treated with UV light therapy and had 8 applications of EPM with complete wound healing at 14 weeks. The overall healing in these chronic wounds averaged 8 weeks with 2.8 applications.

The 15 remaining acute wounds (9 patients) healed at an average of 4.4 weeks (range 1-9) treated with an average of 2 applications (range 1-3).

To summarize, all patients that completed therapy healed (100%) in an average of 5.25 weeks (range 1-14) with an average of 2.4 applications (range 1-8). 9 patients with 15 wounds (75% of the wounds that completed therapy) healed with only 1 to 2 applications at an average of 2.6 weeks. 4 patients (4 wounds) healed with 3 applications in an average of 7.25 weeks (range 4-9). The final patient, diagnosed with PEH, required 8 applications and healed in 14 weeks.

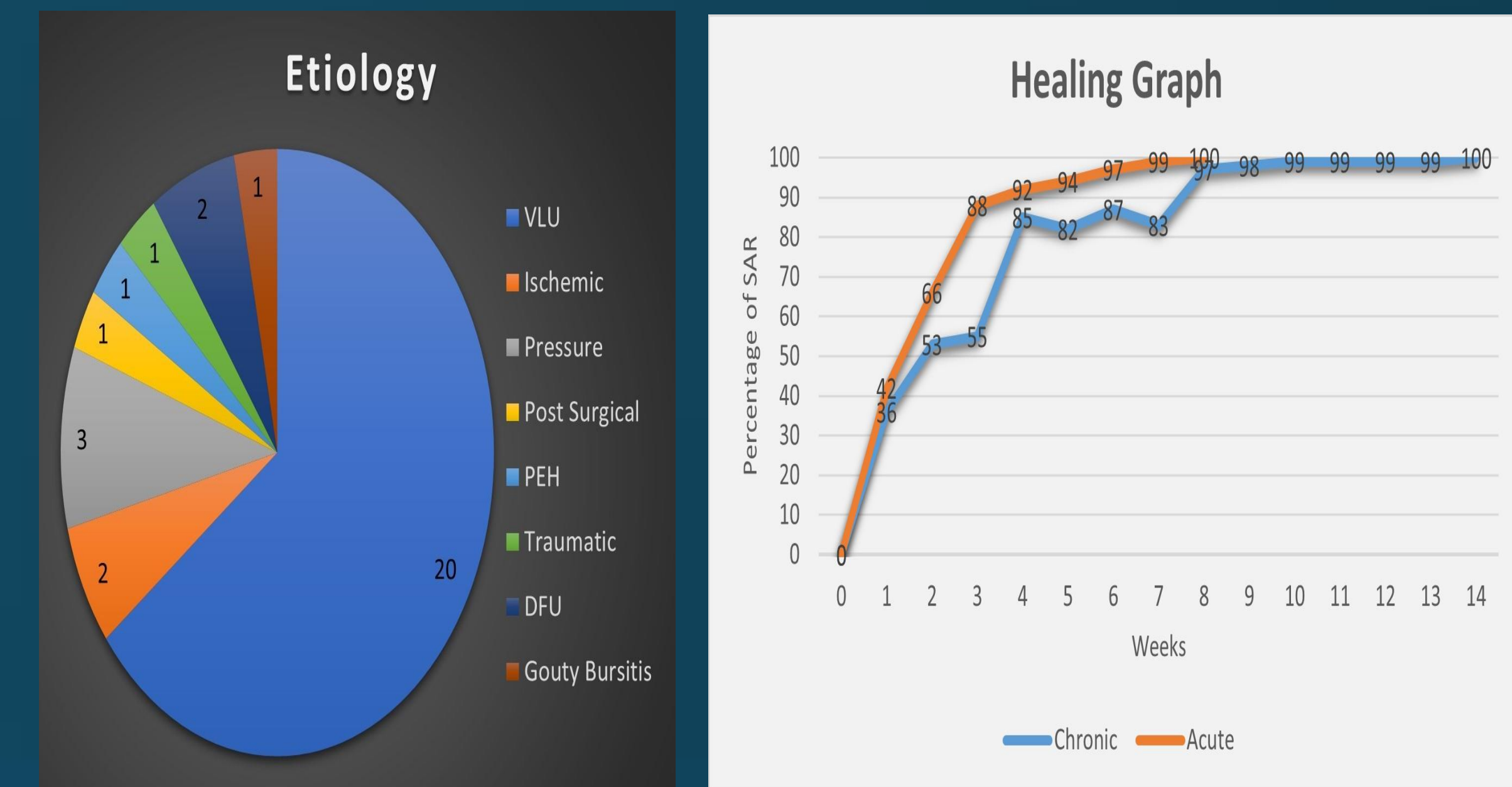


VLU 10.5 cm<sup>2</sup>



Healed in 2 weeks

Figure 1



## Conclusion

Early experience using EPM to treat wounds demonstrated excellent and efficient healing in both acute and chronic wounds. The healing curves were similar in both acute and chronic wounds. 75% of wounds that completed therapy (15/20) actually healed with 1 or 2 applications at 2.6 weeks. The average number of applications was relatively small at 2.4 (range 1-8). Further study of the use of EPM, especially in chronic wounds, is needed. A randomized trial of EPM versus standard of care versus other biologic/collagen products should be considered.

## Limitations

The results of this study were limited by several factors. The number of patients and wounds are small. There were a fair variety of wounds but not enough to be sure that EPM is effective in all situations. Chronic wound therapy with EPM looks favorable but more evaluation is needed. Although all wounds showed favorable response to treatment with EPM, the 5 patients with 9 wounds that did not complete therapy did dilute the results. Some patients were more compliant than others in their treatment and less compliant patients did prolong wound healing as should be expected. This study was prospective but there was no comparison to standard treatments. Randomized treatment groups for comparison would provide greater knowledge of how EPM compares to other standard therapies.

## References

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