

WE'RE CHANGING THE DYNAMICS IN TISSUE REPAIR & WOUND HEALING

*Accelerating outcomes and decreasing costs with
a cutting-edge, multi-dimensional wound healing
solution for Acute and Chronic Wounds, and Burns.*



PHOENIX™
WOUND MATRIX

*Powered by Electrospun
Synthetic Polymer Technology*

↑ OUTCOMES. ↓ COSTS.

RENOVODERM

RENOVOVODERM



PHOENIXTM
WOUND MATRIX
Powered by Electrospun Synthetic Polymer Technology

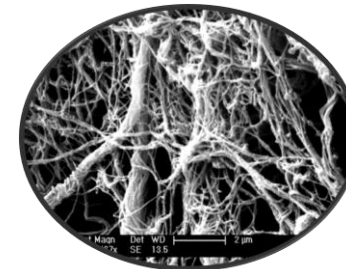
Mission Statement

RenovoDerm is a regenerative medicine company focused on the development and manufacture of scientifically engineered 3D electrospun synthetic polymer technology to help advance clinical practice, improve patient outcomes and reduce the overall cost of care.

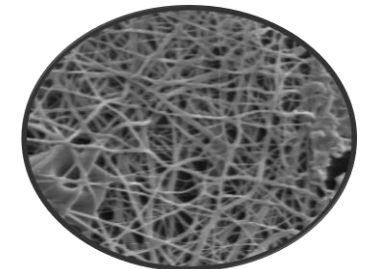
Our mission is to change the dynamics in wound healing to make a profound impact on the clinical and economic burden of wound care with PHOENIX Wound Matrix – a cost-effective, sophisticated 3D electrospun synthetic matrix for tissue regeneration and repair of acute and chronic wounds, and burns.

Base Technology Developed by Nanofiber Solutions

- Cutting-edge technology supported by **over 50 issued and pending patents**
- Over 12 years of research in tissue regeneration (soft tissue, trachea, esophagus, intestine, vascular, heart)
- Over \$10M dollars of non-dilutive funding (NIH/NSF/State of Ohio)
- Engineered to mimic cellular structure and encourage the bodies natural restorative process
- Acidic degradants accelerate pro-regenerative cellular function
- NFS manufactures and supplies products to Renovoderm

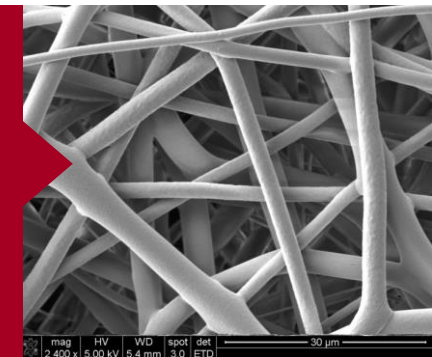


Decellularized Tissue



Nanofabricated Matrix

The 3D structure of the scaffold permits the incorporation of cells and can be engineered to meet specific parameters, making it ideal for a range of applications.



The Problem: Chronicity and Persistent Inflammation

Normal Wound Healing

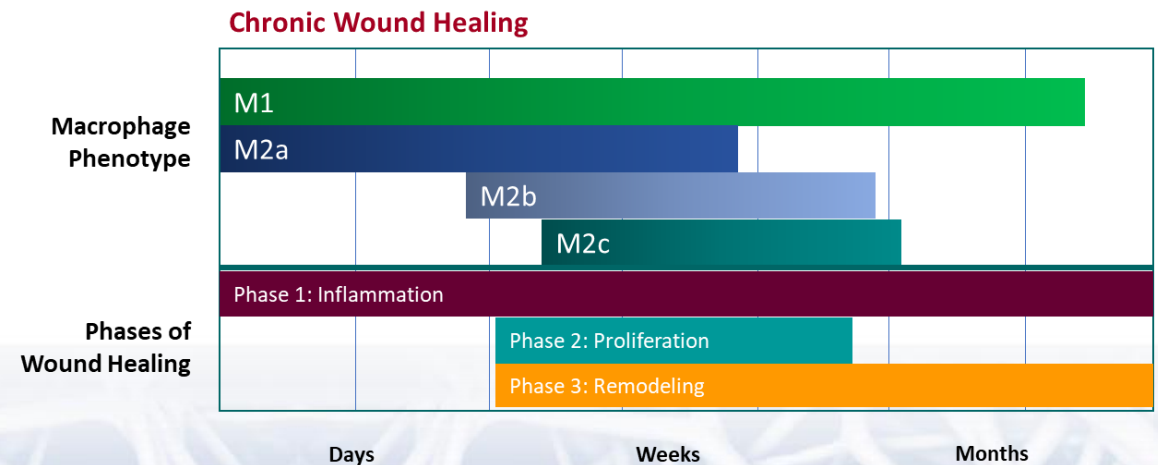
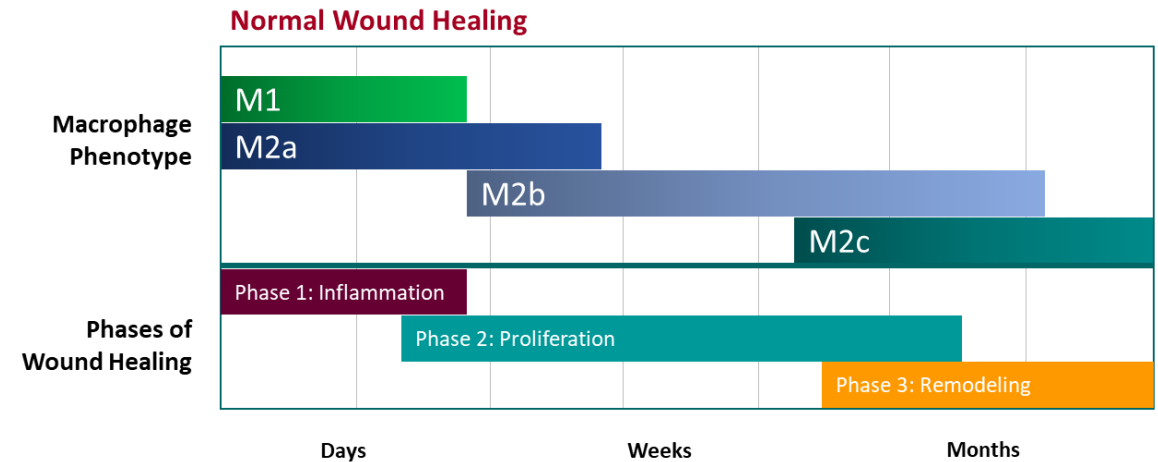
- Acidic milieu – low pH
- A balance of macrophage phenotypes M1 & M2 allow for normal wound healing
- All wounds *have the opportunity to become chronic*

GOAL: Mitigate risk of chronicity and decrease time to wound closure.

Chronic Wound Healing

- Alkaline milieu – high pH
- Up-regulation of pro-inflammatory M1 down-regulates pro-regenerative M2 capability
- Causes **sustained inflammatory response** leads to skin breakdown, infection, **chronicity and delayed wound healing**

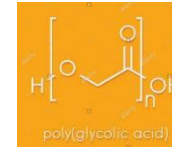
GOAL: Address chronicity and sustained inflammation to accelerate the wound healing process.



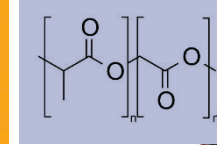


PHOENIX™ WOUND MATRIX

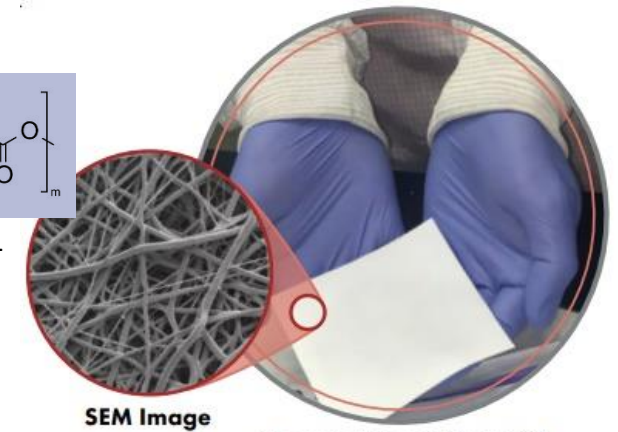
Powered by Electrospun Polymer Technology



PGA



PLCL



SEM Image

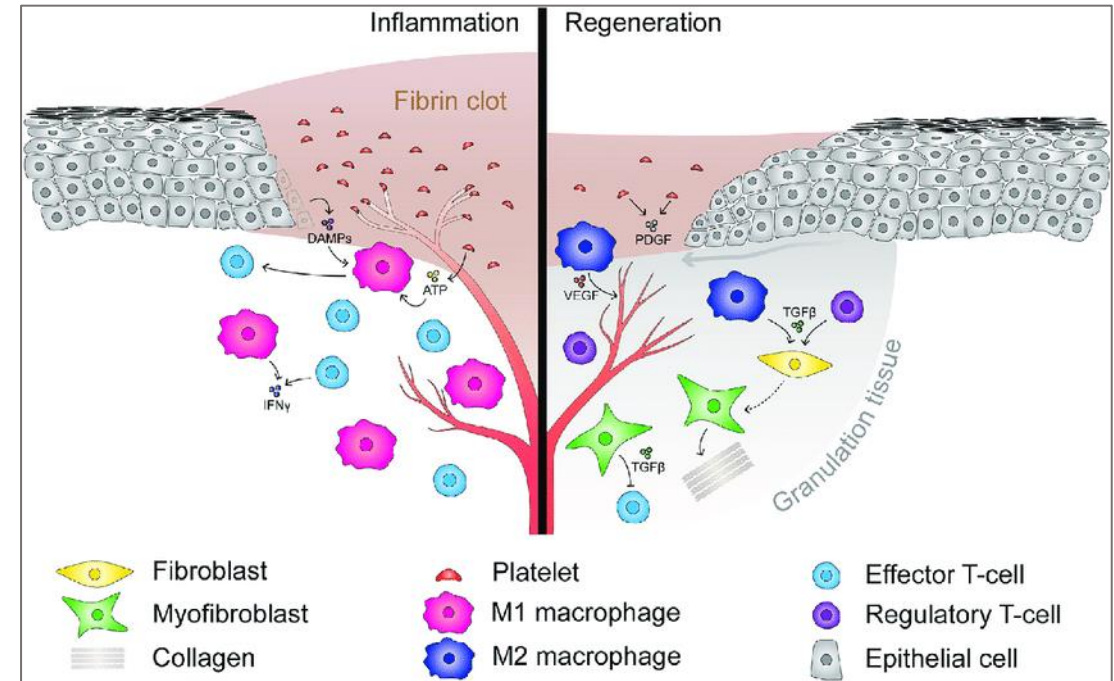
Phoenix Wound Matrix™

A cutting-edge, multi-dimensional wound healing solution

Phoenix Wound Matrix is a sophisticated, 3D electrospun synthetic polymer matrix designed to improve wound healing outcomes by **addressing chronicity and persistent inflammation**.

- 1 Scientifically engineered to **mimic native extracellular matrix (ECM)** morphology providing a **multi-dimensional, microporous scaffold stimulus** to facilitate natural cellular adhesion, infiltration and proliferation.
- 2 Comprised of **polymers which naturally biodegrade to α -hydroxy acids and fatty acid**, PHOENIX Wound Matrix acts as a **protective barrier** to quickly inspire a pro-healing wound environment.
- 3 Supports low pH and lactate expression that address chronicity and persistent inflammation to accelerate the wound healing process of acute and chronic wounds, and burns¹⁻³.

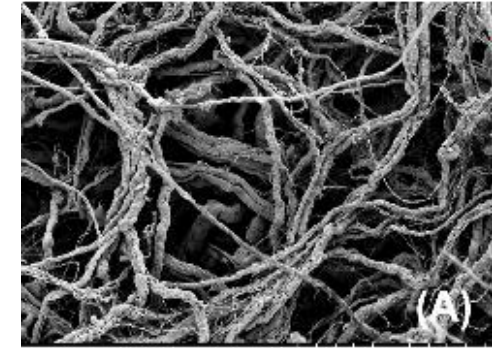
Scaffold Degradants Facilitate Wound Healing



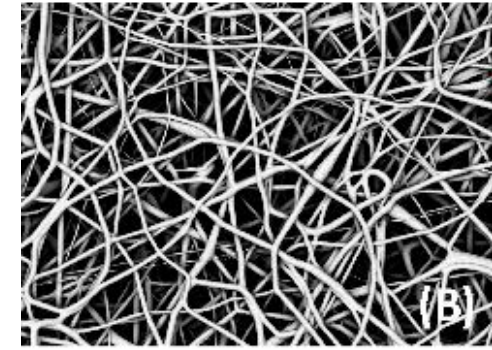
Sophisticated ECM Design

Supports pro-regenerative cellular activity

- Pore size and structure promotes cellular adhesion, **infiltration** and proliferation
 - **1 μm** (micron) = 1 millionth meter
 - **1 nm** (nanometer) = 1 billionth meter = 1/1000 micron
 - **Fibroblast** average dia.: 10-15 μm (10,000-15,000 nm)
 - **Phoenix fibers dia. range:** 600 – 1000 nm
- Supports appropriate macrophage phenotype balance (M1/M2) to enable a pro-healing activity
- Offers a consistent and predictable ECM structure versus human/animal derivatives



Dermal ECM



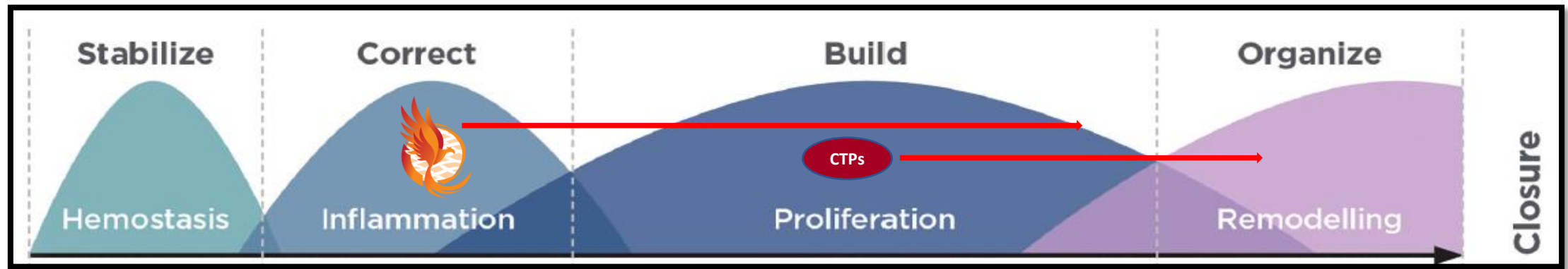
The Phoenix Wound Matrix



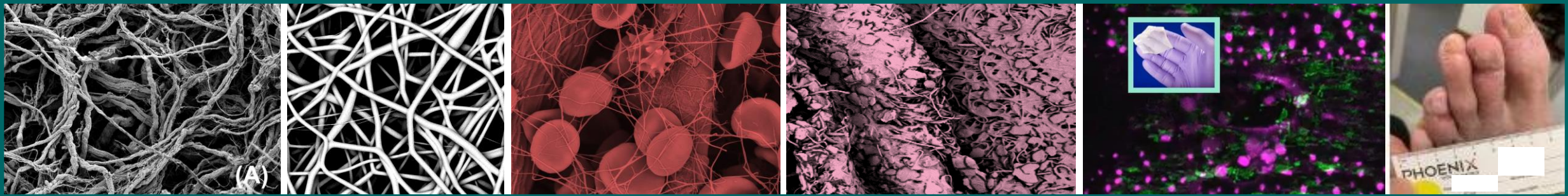
Phoenix cellular proliferation

Positioning as a 1st Line Treatment

- **Complex Acute Wounds** – mitigate the risk of chronic activity
- **Chronic Wounds** – disrupt chronic activity to accelerate wound healing



Fulfilling the Promise of Regenerative Medicine



Native ECM PHOENIX ECM Cell migration & infiltration Cell proliferation Cell viability Durable wound closure

Sophisticated microporous electrospun polymer scaffold mimics native ECM

Acidic degradants address chronicity & persistent inflammation

Accelerated wound healing & cost effective durable tissue repair

Goal ↑ **Graft Success Rates** ↓ **pH** ↓ **M1** ↑ **M2** ↑ **OUTCOMES** ↓ **COSTS**

Changing the dynamics in Wound Healing



Addressing chronicity and persistent inflammation.

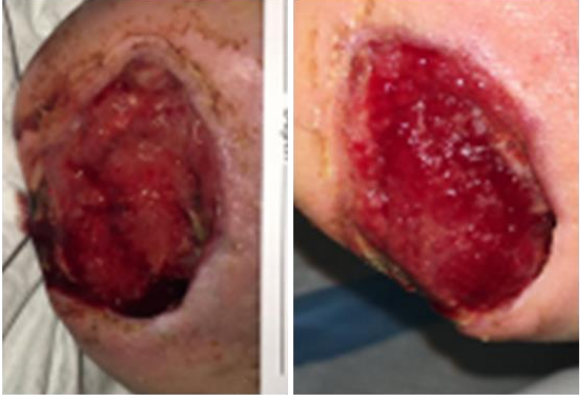
Necrotizing Fasciitis



Visible change in tissue within 11 days

within 11 days

DFU Pressure Injury - 4 months in duration



Healthy granulation tissue within 7 days

within 7 days

2-year Complex Ulceration of the Left Foot



Healthy granulation tissue within 14 days -Neovascularization within 28 days

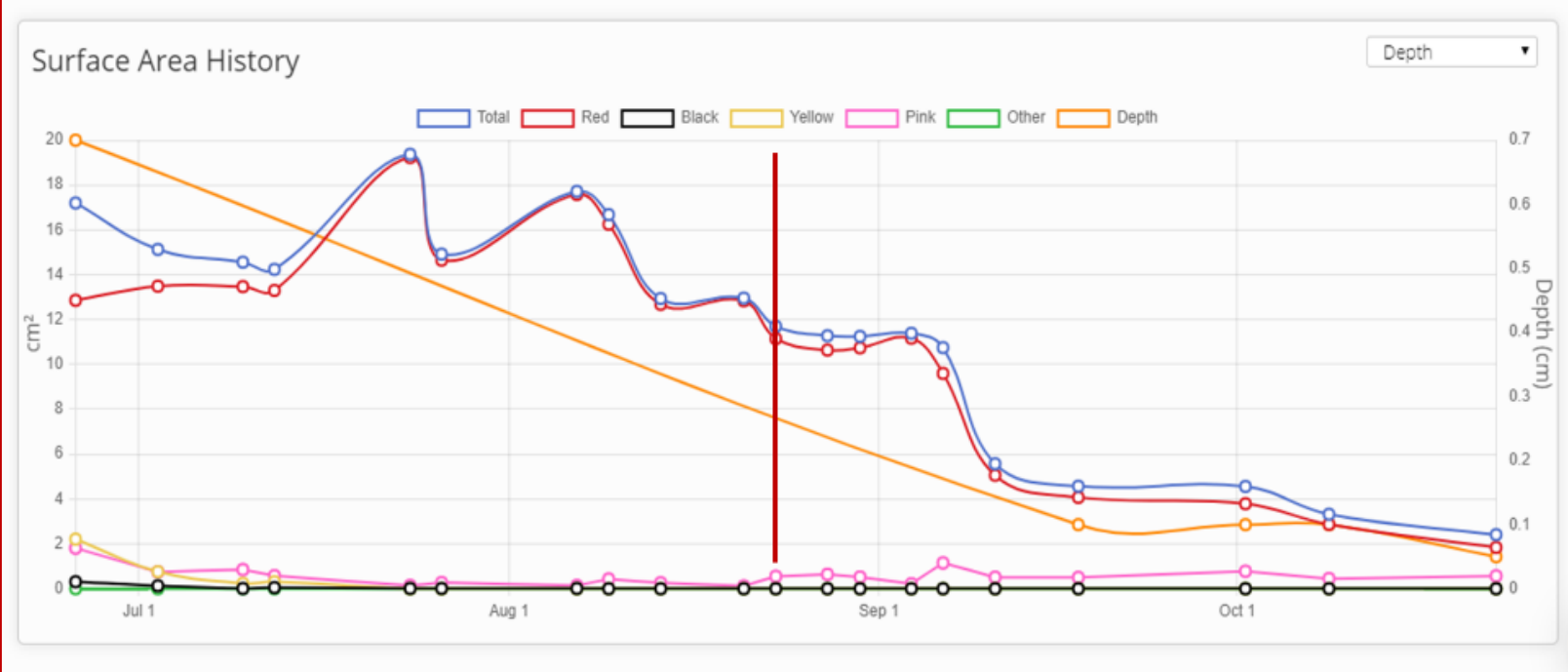
within 28 days

Changing the Healing Trajectory

Wound healing trajectory prior to application of PHOENIX



Wound healing trajectory post application of PHOENIX



52%
reduction in
wound area in
18 days

Treatment Period	Day	Wound Area Reduction (%)
Prior to Phoenix	45	3%
Prior to Phoenix	59	32%
PHOENIX	18	52%
PHOENIX	46	72%
PHOENIX	59	79%



Clinical and Economic Value

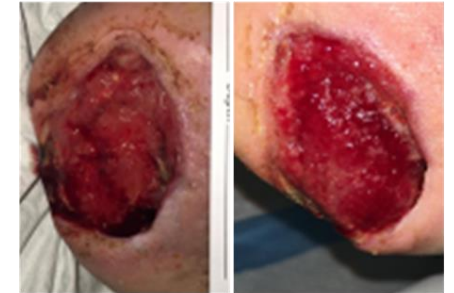
Improves outcomes by addressing the primary problem, wound chronicity and inflammation

- CTPs are designed to combat chronic wounds. Approximately **45% - 50% of cases do not heal in 12 weeks***
- PHOENIX demonstrates consistent healing outcomes with decreased time to wound closure
 - Rapid reduction in inflammation observed in 100% of wounds treated with PHOENIX Wound Matrix
 - Increased healing rate with **≈ 88% wound area reduction in first 4 weeks**
 - Median time to wound closure - **5 weeks**
 - **Median application – 2 PHOENIX Wound Matrix**

Reduce expenses and improve profitability

- PHOENIX is typically 40-50% less the cost of CTP's
- Encourages a pro-healing wound environment to help decrease the utilization of more expensive, cellular tissue products
- Potential to significantly impact throughput by reducing patient return visits

DFU Pressure Injury - 4 months in duration



Healthy granulation tissue within 7 days
within 7 days

2-year Complex Ulceration of the Left Foot



Healthy granulation tissue within 14 days - Neovascularization within 28 days
within 28 days

Compelling Clinical Outcomes – Median Data

100%

Demonstrated rapid improvement in tissue appearance and reduced inflammation

88%

Median wound area reduction within **4 weeks**

2*

Median number of product applications

~5 weeks

Median time to wound closure



PHOENIX WOUND MATRIX Post Market Surveillance Median Case Data Summary

	All Cases	Pressure Injury	DFU	Chronic Lower Extremity	Complex Chronic	Surgical Wound	Trauma Wound	Complex Acute	Burn
Patients	47	5	18	16	2	1	3	1	1
Wounds	65	5	20	32	2	1	3	1	1
Significantly improved tissue appearance after 1st application	100%	100%	100%	100%	100%	100%	100%	100%	100%
% area reduction within 4 weeks	88%	95%	89%	90%	87%	61%	63%	97%	100%
% area reduction within 8 weeks	97%	100%	98%	86%	92%	80%	97%	100%	



*National average for CTP applications: 5-8

Necrotizing Fasciitis

				
<p>Day 0 1st PHOENIX application Planimetric area: 256.9 cm²</p>	<p>Day 11 2nd PHOENIX application Planimetric area: 115.7 cm² Plan. area reduction: 55%</p>	<p>Day 32 3rd PHOENIX application Planimetric area: 58.4 cm² Plan. area reduction: 77%</p>	<p>Day 67 Planimetric area: 11.4 cm² Plan. area reduction: 96%</p>	<p>Day 121 17.3 weeks Planimetric area: 0.96 cm² Plan. area reduction: >99.9%</p>

77%
reduction in
wound area at
4.5 weeks

Images courtesy of Frank Aviles, Jr., PT CWS FACCWS CLT AWCC

Case Brief:

57-year-old male with type 2 diabetes and hypertension, presented 3-weeks after sustaining a fall to the sacral area. Patient was diagnosed with **necrotizing fasciitis**, requiring **extensive surgical debridement**, antibiotics, and hyperbaric oxygen therapy (HBOT). The resulting wound extended from upper right inguinal region, through perineum, to perianal area. Patient reported significant wound pain requiring pain medication for dressing changes. PHOENIX Wound Matrix was applied to anterior aspect of wound, and negative pressure wound therapy (NPWT) was also applied in combination with PHOENIX. **By Day 7, patient reported considerable decrease in pain, no longer required pain medication**, and healthy granulation tissue was observed. By Day 32, planimetric area of anterior wound decreased 77%. By Day 67, 96% reduction in planimetric area was achieved. **Wound closure was achieved on Day 125.**

Summary:

57-year-old male with diabetes and large open wound, resulting from extensive surgical debridement of necrotizing fasciitis tissue, **closed in 18 weeks with 3 PHOENIX applications**, combined with wound care best practices, including HBO and NPWT.

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Diabetic Foot Ulcer – 7 months in duration



Day 1
0.3cm x 0.2cm x 0.2cm
1st PHOENIX

Day 7
0.2cm x 0.1cm x 0.1cm
83% wound closure
2nd PHOENIX

Day 14
CLOSED

Wound closure
achieved in
14 days

Case Brief: Case Brief: 51 y/o DM male with neuropathy. Pedal pulses were 2/4 bilateral with hair growth presented with a diabetic ulcer of left toe. **Ulcer was present for 7 months without resolution prior to PHOENIX application.** The area has been off-loaded in cam boot for over 6 months. Previous treatments include Iodosorb, Medihoney, amniotic membrane. Treatment strategy switched to utilize Phoenix Wound Matrix. Patient RTC after one week with 83% reduction in wound volume, Phoenix applied 2X. Wound closure in two weeks.

5 Complex Arterial Ulcers

Complete wound closure
Amputation avoided

					
<p>Day 0</p> <p>1st PHOENIX application</p> <p>Hallux: 0.5cm x 0.8cm x 0.2cm 2nd toe: 3.5cm x 2.0cm x 0.2cm 3rd toe: 3.6cm x 0.7cm x 0.1cm 4th toe: 3.6cm x 4.5cm x 0.1cm 5th toe: 0.3cm x 0.2cm x 0.1cm</p> <p>Combined area: 26.18cm²</p>	<p>Day 7</p> <p>2nd PHOENIX application</p> <p>Hallux: Epithelialized 2nd toe: 1.8cm x 1.1cm x 0.2cm 3rd toe: 2.7cm x 1.2cm x 0.1cm 4th toe: 3.3cm x 2.7cm x 0.2cm 5th toe: Epithelialized</p> <p>Combined area: 26.18cm² Area reduction: 44%</p>	<p>Day 36</p> <p>6th PHOENIX application</p> <p>Hallux: Epithelialized 2nd toe: 2.8cm x 2.0cm x 0.2cm 3rd toe: 0.8cm x 0.5cm x 0.1cm 4th toe: 1.8cm x 1.9cm x 0.3cm 5th toe: Epithelialized</p> <p>Combined area: 26.18cm² Area reduction: 64%</p>	<p>Day 49</p> <p>8th PHOENIX application</p> <p>Hallux: Epithelialized 2nd toe: 2.0cm x 2.7cm x 0.2cm 3rd toe: Epithelialized 4th toe: 1.4cm 2.0cm x 0.3cm 5th toe: Epithelialized</p> <p>Combined area: 26.18cm² Area reduction: 69%</p>	<p>Day 84</p> <p>Hallux: Epithelialized 2nd toe: 1.3cm x 1.2cm x 0.2cm 3rd toe: Epithelialized 4th toe: 1.3cm 1.7cm x 0.3cm 5th toe: Epithelialized</p> <p>Combined area: 26.18cm² Area reduction: 85%</p>	<p>Day 155</p> <p>Wound Closure</p> <p>Hallux: Epithelialized 2nd toe: Epithelialized 3rd toe: Epithelialized 4th toe: Epithelialized 5th met: Epithelialized</p>

Images courtesy of Dan Davis, DMP and Denise Riera, DPM

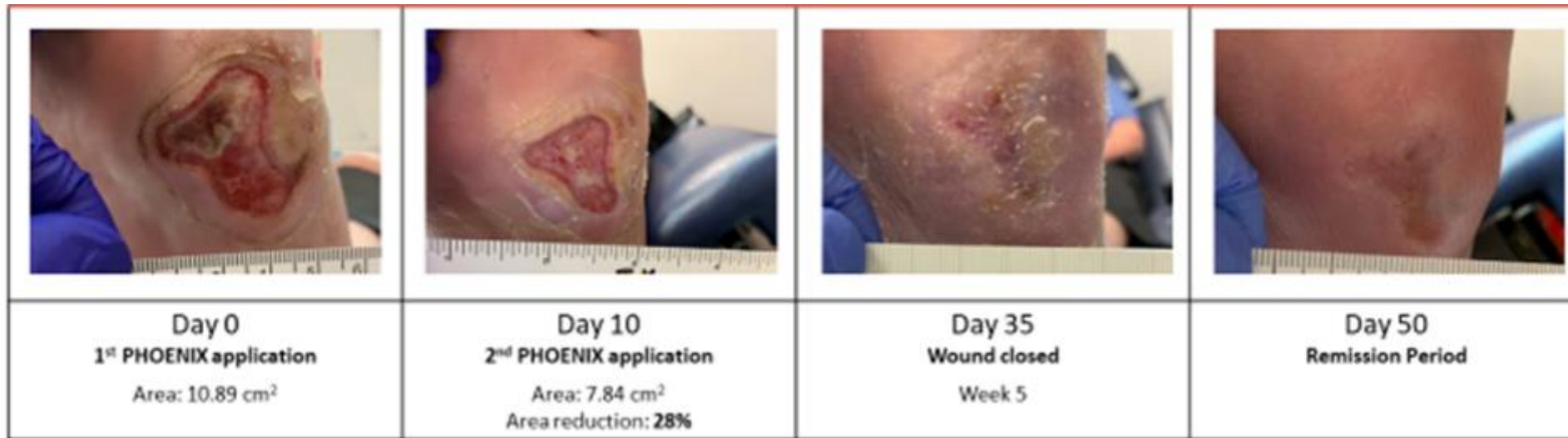
Case Brief:

74-year-old male with type 2 diabetes, severe peripheral artery disease resulting in markedly inadequate perfusion status, and peripheral neuropathy presented with 5 ischemic diabetic toe ulcers of the left foot, after having failed SOC for 4 weeks. Prior consult recommended amputation of the gangrenous 2nd and 4th toes. Collectively, wound areas measured 26.18cm². On Day 0, sharp debridement was performed and treatment with PHOENIX Wound Matrix initiated. By Day 7, epithelialization of Hallux and 5th toe wounds was achieved, along with a 44% reduction in combined wound area. By Day 36, the Hallux and 5th toe remained epithelialized and a combined wound area reduction of 64% noted. Patient continued to respond well to treatment with PHOENIX achieving an 85% reduction in combined wound area in 12 weeks. 100% reduction in combined wound area was achieved in 22 weeks with closure of the 2 initially gangrenous toes.

Summary:

74-year-old complex male patient severely compromised perfusion status and 5 ischemic diabetic ulcers achieved closure of all wounds in 22 weeks with 8 applications of PHOENIX, avoiding the loss of 2 gangrenous toes. Patient wears shoes and is ambulatory, adding friction to the challenge of healing the ischemic, diabetic wounds.

Diabetic Foot Ulcer



Images courtesy of Dan Davis, DPM

Case Brief:

66-year-old male with **Charcot-Marie-Tooth (CMT) disease**, **peripheral neuropathy** and **neurological issues** presented on Day 0 with a plantar pressure ulcer over the left 5th metatarsal. Wound measured 3.3cm x 3.3cm x 0.2cm. Sharp debridement was performed, followed by application of becaplermin gel (recombinant PDGF) and PHOENIX Wound Matrix. Patient was not a candidate for total contact casting; bolstered padding was utilized to offload. By Day 10, a 28% reduction in total wound size was noted with wound measuring 2.8cm x 2.8cm x 0.2cm. **By Day 35, complete wound closure was achieved.** On further evaluation at Day 50, the wound remained closed and continued healthy tissue remodeling was noted.

Summary:

PHOENIX was selected as **first-line treatment option**, and wound closure of pressure ulcer in **66-year-old male** with **CMT** was achieved in **5 weeks** with **3 PHOENIX applications**, combined with wound care best practices.

Diabetic Foot Ulcer



43%
reduction in
wound size within
14 days

Images courtesy of Richard Schilling, DPM

Case Brief:

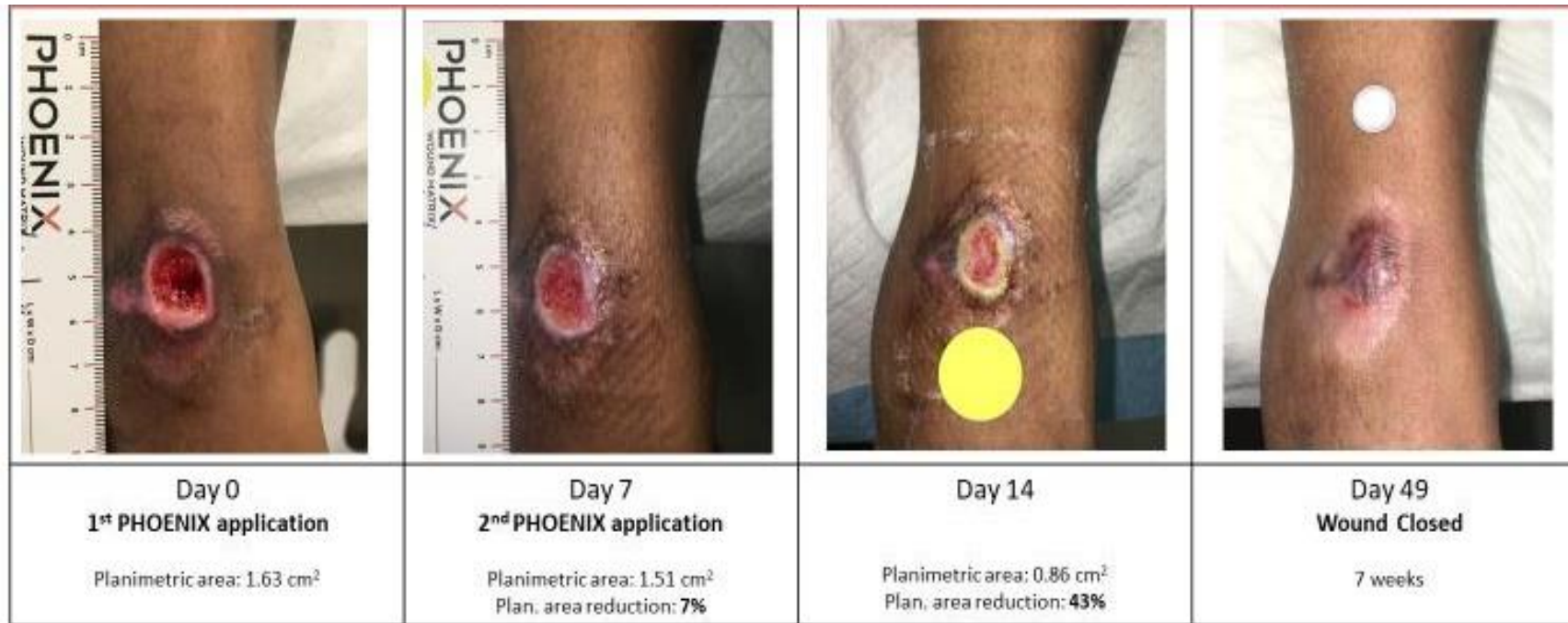
51-year-old male with chronic **diabetic** foot ulcer (DFU), of over 2 months duration, due traumatic puncture wound to the lateral left foot plantar surface. Patient has a history of **peripheral neuropathy**, **hypertension**, **BMI 40**, **osteomyelitis**, and is **status post resection of 5th metatarsal head** followed by 6 weeks IV antibiotics. Treatment with PHOENIX began 8 weeks post surgery. Wound healed in 6 weeks with 3 applications of PHOENIX Wound Matrix.

Summary:

51-year-old male with **DFU**, secondary to trauma and subsequent osteomyelitis necessitating amputation of the 5th metatarsal head, **healed in 6 weeks with 3 PHOENIX applications.**

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Diabetic Ulcer/Trauma



43%
reduction in
wound size within
14 days

Case Brief:

40-year-old female with history of type 1 diabetes, multiple sclerosis, and Raynaud's disease, presented to the wound care clinic status post a fall 4 weeks earlier. Following thorough debridement, PHOENIX was applied. Wound depth was visibly reduced within 1 week of treatment. **The planimetric area decreased by 43% after 2 weeks of treatment and 2 applications of PHOENIX.** The wound closed following 49 days of treatment.

Pressure Injury

				
Day 0 1 st PHOENIX application Planimetric area: 11.8 cm ²	Day 7 2 nd PHOENIX application Planimetric area: 11.3 cm ² Plan. area reduction: 4%	Day 42 Planimetric area: 3.6 cm ² Plan. area reduction: 70%	Day 77 11 weeks Wound closed	Day 91 Remission Period

Images courtesy of Frank Aviles, Jr., PT CWS FACCSW CLT AWCC

70%
reduction in
wound size within
42 days

Continued
wound closure
at Day 91

Case Report:

90-year old male with **paraplegia** presented with right heel **pressure ulcer of over 4 months duration**. Additionally, at presentation, a **2.2 cm tunnel** was observed superomedially. Despite receiving best practice standard of care plus other advanced modalities, patient developed osteomyelitis and required surgical debridement. Following surgical debridement, the 1st PHOENIX Wound Matrix was applied on Day 0. Robust granulation tissue was noted within days; second PHOENIX was applied on Day 7, and accelerated progress continued. On Day 42, 70% decrease in planimetric area was observed. **Full wound closure was achieved on Day 77.**

Summary:

90-year-old male with paraplegia and heel pressure ulcer achieved wound closure in 11 weeks with 2 PHOENIX applications, combined with wound care best practices, including NPWT and offloading.

Venous Leg Ulcer

I N I T I A L U L C E R					
	Day 0 1 st PHOENIX application Area: 20.46 cm ²	Day 7 2 nd PHOENIX application Area: 13.75 cm ² Area reduction: 33%	Day 22 3 rd PHOENIX application Area: 12.6 cm ² Area reduction: 38%	Day 28 Wound closed	
	R E C U R R E N C E				
		Day 0 Phoenix application Area: 1.21 cm ²	Day 21 Wound closed		

Images courtesy of Dan Davis, DMP and Denise Riera, DPM



Case Brief:
66-year-old male with history of recurrent leg ulcers and multiple comorbidities including type 2 diabetes, congestive heart failure, peripheral artery disease, peripheral neuropathy, and hypertension, presented with a right, lower leg venous ulcer. PHOENIX Wound Matrix treatment was initiated as first-line therapy on Day 0, along with Regranex Gel for moisture. By Day 7, a 33% reduction in wound size was noted. Wound closure was achieved in 28 days with 3 applications of PHOENIX. One-week post closure, patient presented with a recurrence measuring. PHOENIX was applied once and wound closure was achieved in 3 weeks.

Summary:
66-year-old male with extremely poor vascular status and history of recurrent leg ulcers responded well to treatment with PHOENIX Wound Matrix. PHOENIX was selected as 1st line therapy to facilitate rapid wound healing in this complex patient. Initial wound closed in 4 weeks with 3 PHOENIX applications. Recurrence closed in 3 weeks with 1 PHOENIX application.

Arterial Leg Ulcer

			
<p>Day 0 1st PHOENIX application 3.8cm x 3.7cm x 0.1cm Area: 14.06 cm²</p>	<p>Day 4 3.8cm x 2.8cm x 0.1cm Area: 10.64 cm² Area reduction: 24%</p>	<p>Day 11 2nd PHOENIX application 0.7cm x 0.5cm x 0.1cm Area: 0.35 cm² Area reduction: 97%</p>	<p>Day 25 Wound closed</p>



Images courtesy of Dan Davis, DMP and Denise Riera, DPM

Case Brief:

84-year-old male with **peripheral artery disease**, **coronary artery disease**, and **peripheral neuropathy** presented with a left lower leg ischemic ulcer measuring 3.7 x 3.6 x 0.1 cm. Treatment with PHOENIX Wound Matrix was initiated on Day 0. On Day 4, a 24% reduction in wound area was noted. The matrix was still visible on the wound bed, therefore, no new graft was applied. On Day 11, accelerated wound healing was noted with an 97% reduction in wound area. Remarkably, wound closure was achieved on Day 25.

Summary:

84-year-old patient with an **arterial leg wound** achieved **wound closure in 4 weeks** of treatment and **2 applications of PHOENIX Wound Matrix**. Ischemic wounds are challenging to manage and often exceed 6 months in duration.

2nd degree burn - forearm



Images courtesy of L. Horn, MD



Case Brief:

50-year-old female with acute 2nd degree burn, of 6 days duration, to anterior forearm. PHOENIX Wound Matrix[®] was applied 6 days post trauma. Telfa pad was placed on PHOENIX and secured with Ace bandage wrap. Per patient, pain was alleviated immediately following application of PHOENIX on the wound. Seven days post application, wound was observed to be healing well. Wound healed in 18 days.

Summary:

50-year-old female with 2nd degree burn to anterior forearm healed in 18 days with 1 PHOENIX application. Patient reported immediate alleviation of pain following PHOENIX application.

Summary

Changing the dynamics in wound healing with PHOENIX

- PHOENIX Wound Matrix is a cutting-edge, 3D electrospun synthetic polymer technology that addresses **two unmet needs in wound care**:
 - **Improved outcomes**
 - **A lower cost to the healthcare**
- Data demonstrates **60% of PHOENIX wounds achieved complete wound closure within 5 weeks** versus industry standard of 50% of wounds treated with a CTP are not healed at 12 weeks
- Reduce expenses and improve profitability
 - PHOENIX demonstrates consistent healing outcomes with decreased time to wound closure
 - PHOENIX is typically 35% less the cost of CTP's
 - Encourages a pro-healing wound environment to help decrease the utilization of more expensive, cellular tissue products
 - Potential to significantly impact throughput by reducing patient return visits



PHOENIX Wound Matrix Product Line

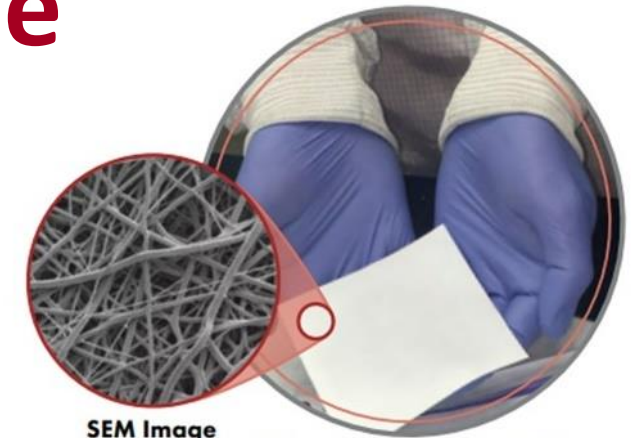


PHOENIX™
WOUND MATRIX

*Powered by Electrospun
Synthetic Polymer Technology*



PHOENIX™
WOUND MATRIX
FENESTRATED

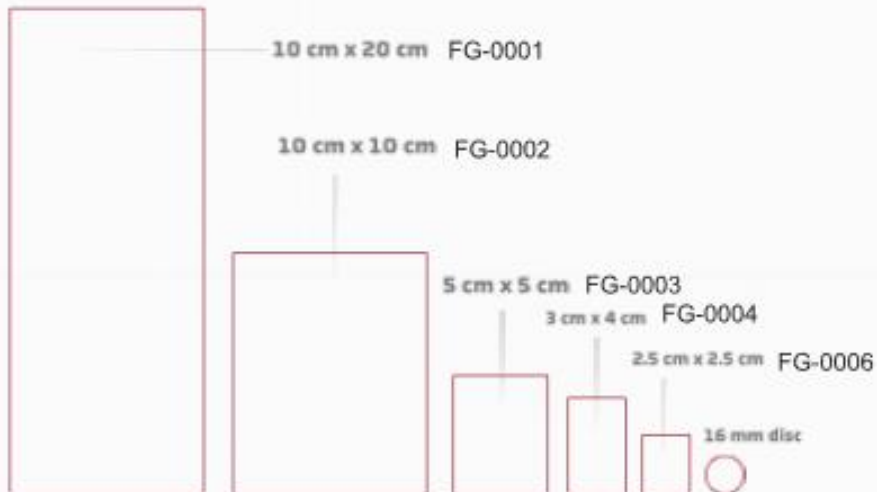


SEM Image

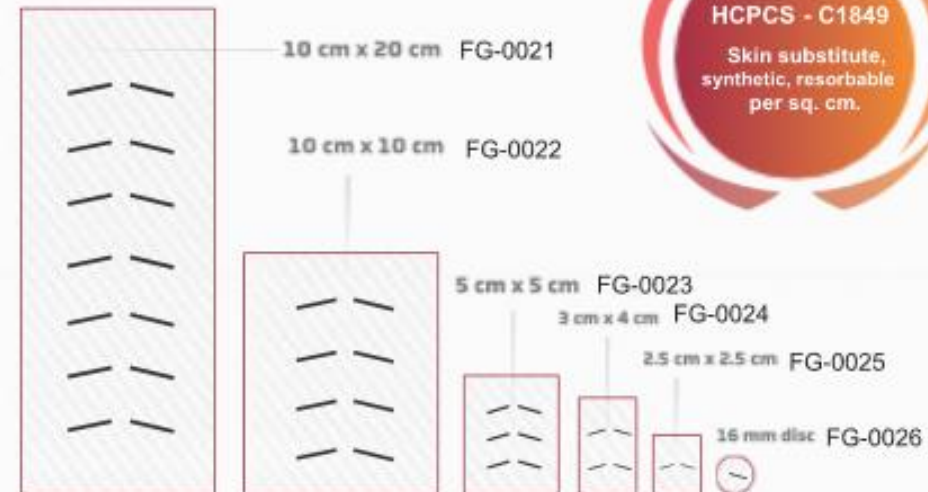
Phoenix Wound Matrix™

SIZING AND REIMBURSEMENT

PHOENIX™ Wound Matrix



PHOENIX™ Wound Matrix Fenestrated



References

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5. Bell AL, Cavorsi J. Noncontact ultrasound therapy for adjunctive treatment of nonhealing wounds: retrospective analysis. *Phys Ther*. 2008;88:1517–1524.
6. Data on file, DOC-3487
7. Clinical case documentation. Data on file.

*Advanced wound care device, also known as cellular and/or tissue-based product (CTP) or skin substitute.

† All claims supported by human use studies, Good Lab Practice (GLP), porcine animal study and veterinary case studies