

3M™ Tegaderm™ Matrix

Matrix Dressing



Clinical Case Studies

A Canadian Experience

**Evaluation of 3M™ Tegaderm™
Matrix Dressing in the management
of non-healing wounds where
other therapies have failed**

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Introduction

Chronic wounds are those that fail to progress through a normal, orderly and timely sequence of repair.¹ They are not only characterized by delayed healing for weeks, months, or even years, but also by a resistance to treatment with conventional dressings and therapies. They impart a particularly devastating financial and quality of life burden on individuals suffering from the wounds, and are frustrating to caregivers and clinicians attempting to manage the wounds, as nothing they try appears to be effective.

Non-healing chronic wounds are thought to be a consequence of factors that affect both the production of new tissue and elevated destruction of existing tissue.² Biochemically, these wounds appear to be stuck in a catabolic, inflammatory phase that is hostile to local growth factors and the activity of fibroblasts and keratinocytes. In particular, increases in matrix metalloproteinases (MMPs) MMP-2 and MMP-9 are of significance in non-healing chronic wounds.^{3, 4} MMPs are a group of zinc-containing proteolytic enzymes that play an important role in remodeling of the extracellular matrix of wounds.⁵ An overproduction of MMPs may result in degradation of the extracellular matrix and inactivation of vital growth factors.⁶ A precisely orchestrated balance of MMP production and their natural inhibitors (TIMPs) is needed.

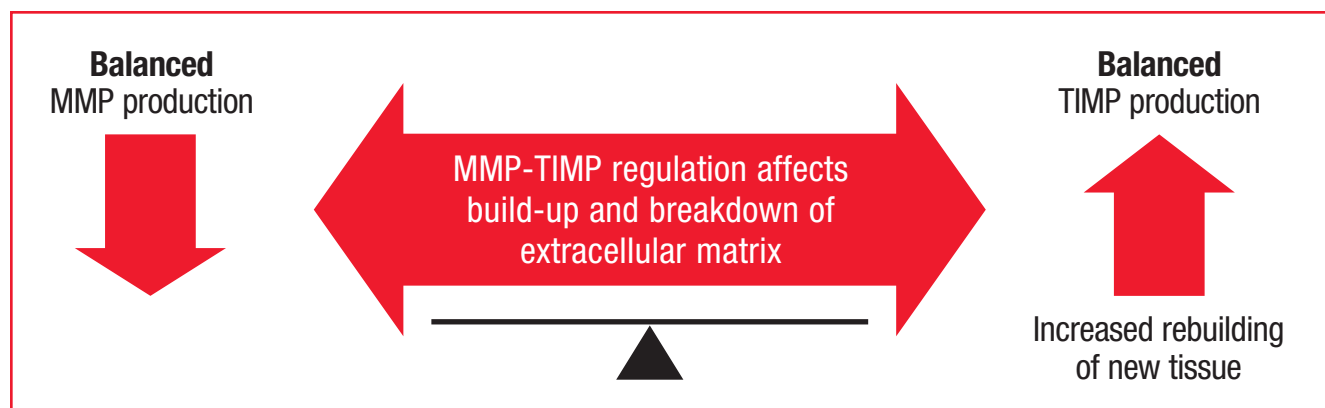
Additionally, it is theorized that wounds stuck in the inflammatory phase persistently overproduce free radicals or reactive oxygen species (ROS).⁶ At low concentration and early in the inflammatory phase of wound healing, ROS such

as hydrogen peroxide (H_2O_2), have a positive effect on healing through stimulation of fibroblast proliferation.⁷ However, persistent overproduction of ROS is thought to be detrimental to healing.⁸⁻¹²

A new treatment strategy has emerged focused upon manipulating the expression of genes which control the endogenous production of MMPs and TIMPs within the local wound environment.^{9, 13, 14} Contrary to modalities designed to sequester MMPs and/or act as a competitive substrate for protease activity,⁴ this strategy relies on delivery of metal ions (rubidium, potassium, zinc, and calcium) into the wound to help regulate gene expression for the production of MMPs and TIMPs, thus bringing them into balance. These metal ions are delivered via a polyethylene glycol based, polyhydrated ionogen (PHI) ointment, which also contains citric acid to help normalize wound pH and reduce ROS activity.⁹ The PHI ointment is delivered via an acetylated regenerated cellulose carrier which allows for the passage of wound drainage and is non-fibre shedding. The entire composition is marketed as a primary wound dressing called 3M™ Tegaderm™ Matrix Dressing.

Case Series Objectives

The objective of this case study series was to evaluate clinical performance and acceptance of 3M™ Tegaderm™ Matrix in treatment of non-healing chronic wounds where other therapies have failed.



In chronic wounds, an imbalance between MMP and TIMP production slows down the healing process. Prolonged MMP expression destroys growth factors, impairing the wound's ability to heal.⁵

Case Study 1

Client History

A 56 year old male client with a recurrent subkeratotic hematoma on the amputation site of the right great toe. Approximately 2.5 years ago a pin point wound developed at this site. It was debrided and revealed a 3cm wound which failed to heal. Other significant medical problems include Type 1 diabetes, retinopathy, neuropathy, and primary renal failure.

Past Treatment

The ulcer was treated unsuccessfully with a variety of active and antimicrobial dressings including an oxidised regenerated cellulose and collagen with and without silver, a hydrofibre with silver, a silver mesh, and cadexomer iodine.

Initial Wound Description

Prior to enrollment in this case study (Figure 2), the wound was full thickness with a diameter of 3 cm (~7 cm²). The peri-wound skin was macerated and the wound bed consisted of granulation tissue with a small amount of slough and minimal serous drainage.

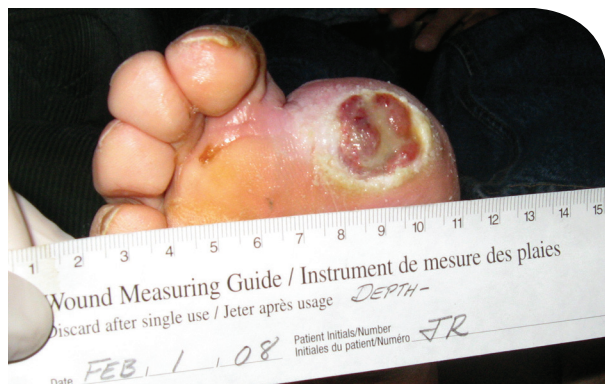


Figure 2. Case study 1: wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.

New Treatment

On February 1, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with a custom cut 3M™ Tegaderm™ Non-Adhesive Foam Roll. The dressings were changed daily for 2 weeks and then decreased to every other day for 6 weeks (until healing). 3M™ Tegaderm™ Matrix was cut to fit the size of the wound as it healed.

Case Study Results

After 8 weeks of treatment with 3M™ Tegaderm™ Matrix (Figure 3), wound size had decreased to less than 0.5 cm in diameter and was essentially closed. It remains closed to this day.

Case Study Summary

This case study highlights a client with an amputation site wound that was stalled for approximately 2.5 years. Almost immediately after initiating treatment with 3M™ Tegaderm™ Matrix, the wound responded and progressed toward healing over an 8 week period. Numerous previous treatments failed to move the wound out of a persistent non-healing state.



Figure 3. Case study 1: wound nearly closed after 8 weeks of treatment with 3M™ Tegaderm™ Matrix.

Case Study 2

Patient History

A 57 year old male patient with two toe wounds on his right foot of approximately 2 to 3 months duration. Other significant medical problems include smoking and non-insulin dependent diabetes mellitus.

Past Treatment

The wounds were unsuccessfully treated for two months with betadine, cadexomer iodine, and an alginate.

Initial Wound Description

There were two wounds present on the foot, one was a burn wound on the great toe (Figure 4) and the other was an amputation site wound at the 3rd toe site (Figure 5). The larger of the two wounds located on the great toe measured 2.8 x 0.5 cm (~1.4 cm²) with a depth of 0.1 cm. The smaller of the two wounds was located on the 3rd toe amputation site and measured 0.6 x 0.4 cm (~0.2 cm²) with a depth of 0.7 cm. Both wounds were covered with approximately 50% slough and 50% granulation tissue.

New Treatment

On March 18, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with a dry gauze dressing. The dressings were changed daily for 1 month and then decreased to 3 times per week for 2 weeks. 3M™ Tegaderm™ Matrix was cut to fit the size of the wound as it healed.

Case Study Results

Both wounds began to heal quickly after initiation of treatment with 3M™ Tegaderm™ Matrix. After six weeks of treatment, both wounds were closed (Figures 6 and 7).

Case Study Summary

This case study highlights a patient with diabetes with two toe wounds that were stalled in a non-healing state for 2 to 3 months. Almost immediately following initiation of treatment with 3M™ Tegaderm™ Matrix, the wound responded and progressed toward healing over a six week period. The caregivers found 3M™ Tegaderm™ Matrix easy to work with and it stayed in place well (without shifting) with a simple dry gauze cover dressing.

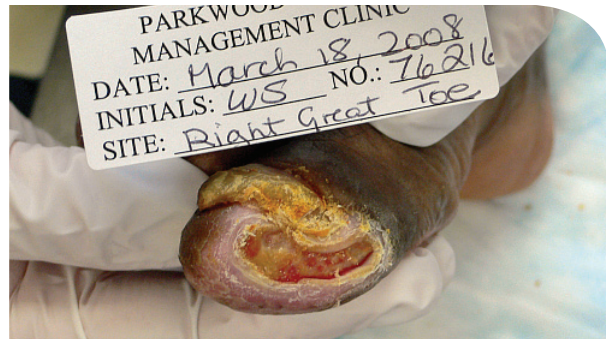


Figure 4. Case study 2: great toe wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.



Figure 5. Case study 2: amputation site wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.

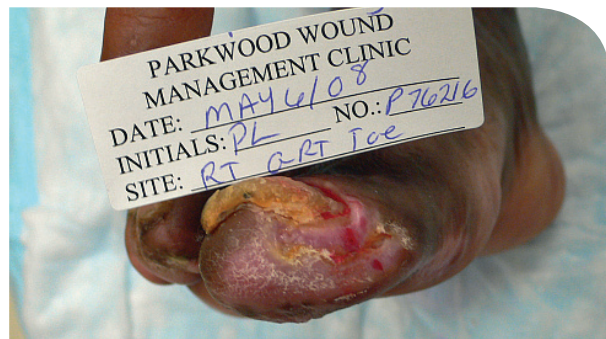


Figure 6. Case study 2: great toe wound closed after 6 weeks of treatment with 3M™ Tegaderm™ Matrix.

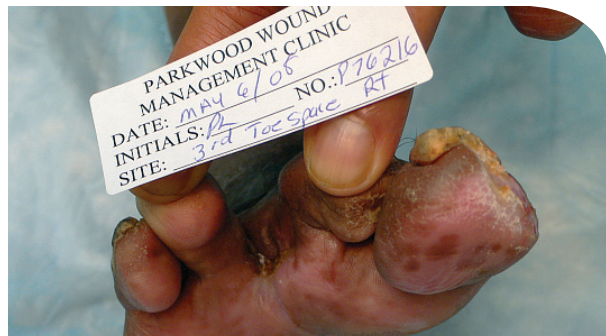


Figure 7. Case study 2: amputation site wound closed after 6 weeks of treatment with 3M™ Tegaderm™ Matrix.

Case Study 3

Resident History

A 96 year old female resident in a long term care facility with a Stage III pressure ulcer of 10 months duration located on her left heel. During this time, the wound went through periods of improvement and deterioration, but eventually became stalled. Other significant medical problems include dementia, hiatal hernia, glaucoma, hypertension, emphysema, dysphagia and decreased hemoglobin (82 g/L). She had a Braden risk assessment score of 14, indicating high risk for developing pressure ulcers.

Past Treatment

The resident was placed on a low air loss bed and was repositioned with a slider sheet due to limited mobility. The resident was treated unsuccessfully with multiple courses of antibiotics, nutritional supplements, off-loading heel boots, and with numerous dressings. Dressing types included: calcium alginates, sodium chloride impregnated gauze, cadexomer iodine, silver, hydrogel, foam and composites. At the time this resident was enrolled into this case study, a soft silicone contact layer was applied to the wound bed covered with a foam dressing.

Initial Wound Description

Prior to enrollment in this case study (Figure 8), the wound measured 5 x 3 cm (~15 cm²), the peri-wound skin was macerated, and the wound periphery edematous. The wound edges were rolled with undermining, and the wound bed was bleeding, gray in colour, with friable red patches. There was a large amount of yellow drainage and the wound was resistant to epithelialization.

New Treatment

On December 17, 2007, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with gauze and paper tape. Both the primary 3M™ Tegaderm™ Matrix and the secondary gauze dressings were changed daily for 9 weeks. The dressing was cut to fit the size of the wound as it healed.

Case Study Results

After the first two weeks of treatment with 3M™ Tegaderm™ Matrix, there was noticeable improvement in wound status (Figure 9). The wound closed after approximately 9 weeks (Figure 10). Before use of 3M™ Tegaderm™ Matrix, the resident withdrew her foot and moaned during dressing changes

indicating a great deal of pain. After initiation of the dressing, she no longer withdrew her foot or moaned. The caregiver staff reported a high level of satisfaction with the dressing, as it was easy to use and resulted in increased comfort to the resident. They also reported the resident's daughter was favorably impressed with the results. The daughter stated that she felt her mother's quality of life was improved, particularly as pain was minimized.

Case Study Summary

This case study highlights a resident with a pressure ulcer that was stalled in a non-healing state for approximately 10 months. Two weeks after initiation of treatment with 3M™ Tegaderm™ Matrix, and without additional antimicrobial treatment, the wound responded and progressed toward healing over a 9 week period. As the wound healed, it became less painful, which resulted in improved the resident's quality of life.



Figure 8. Case study 3: wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.

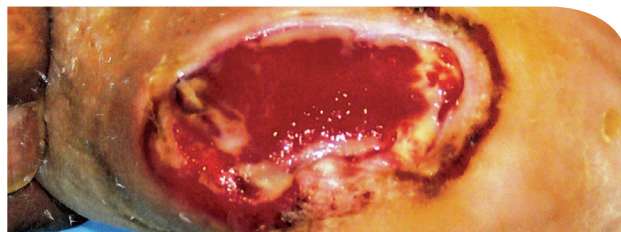


Figure 9. Case study 3: wound after 2 weeks of treatment with 3M™ Tegaderm™ Matrix.



Figure 10. Case study 3: wound nearly closed after 9 weeks of treatment with 3M™ Tegaderm™ Matrix.

Case Study 4

Resident History

A 95 year old female resident with a skin tear on the lower left leg of approximately 2 months duration. Other significant medical problems include cardiac disease and dementia.

Past Treatment

The ulcer was treated unsuccessfully with a variety of dry dressings.

Initial Wound Description

Prior to enrollment in this case study (Figure 11), wound size was 3 x 1 cm (~3 cm²). The peri-wound skin was pink and the wound bed consisted of hypergranulation tissue, which was whitish in color.

New Treatment

On March 6, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with a transparent film dressing. The dressings were changed daily. 3M™ Tegaderm™ Matrix was cut to fit the size of the wound as it healed.



Figure 11. Case study 4: wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.

Case Study Results

The wound responded immediately to 3M™ Tegaderm™ Matrix with resolution of the hypergranulation after 7 days of treatment. After 18 days of treatment (Figure 12), wound size decreased to 0.5 x 0.5 cm (~0.3 cm²) with minimal depth. Wound closure was nearly complete.

Case Study Summary

This case study highlights a resident with a skin tear containing hypergranulation tissue that was stalled for approximately 2 months. After 7 days of treatment with 3M™ Tegaderm™ Matrix, the hypergranulation had completely resolved, and after 18 days of treatment, wound closure was nearly complete.



Figure 12. Case study 4: wound nearly closed after 18 days of treatment with 3M™ Tegaderm™ Matrix.

Case Study 5

Resident History

A 81 year old female resident with two pressure ulcers of approximately 3 months duration located on her coccyx. The ulcer could not be properly staged due to the presence of yellow slough. Other significant medical problems include diabetes mellitus.

Past Treatment

The ulcer was treated unsuccessfully with several different dressings, including an alginate dressing and a transparent film dressing to cover a hydroactive gel.

Initial Wound Description

Prior to enrollment in this case study (Figure 13) there were two wounds present. The larger wound measured 3 x 1 cm (~3 cm²), and the smaller wound measured approximately 1 cm in diameter (~0.8 cm²). The peri-wound skin was macerated and excoriated. The wound bed consisted of yellow slough with a small amount of granulation tissue around the edges.



Figure 13. Case study 5: wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.

New Treatment

On March 13, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with a transparent film dressing. The dressings were changed once daily. 3M™ Tegaderm™ Matrix was cut to fit the size of the wound as it healed.

Case Study Results

After 20 days of treatment with 3M™ Tegaderm™ Matrix (Figure 14), the larger wound bed had 100% granulation tissue and measured 0.8 x 0.5 cm (0.4 cm²), representing an 87% reduction in size. The smaller wound was completely closed approximately half way through the treatment.

Case Study Summary

This case study highlights a resident with diabetes with two neighboring pressure ulcers on the coccyx that were stalled for approximately 3 months. The wound responded almost immediately to treatment with 3M™ Tegaderm™ Matrix. After only 20 days of treatment, the smaller wound was completely closed and the larger wound had decreased approximately 87% in size and contained healthy granulation tissue. Subsequently the wound went on to closure and the staff commented that they really liked the product.

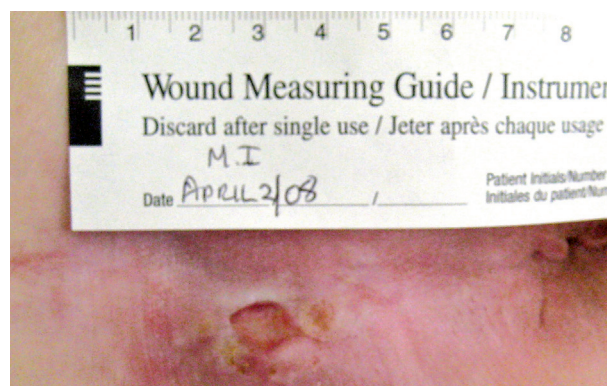


Figure 14. Case study 5: wound nearly closed after 20 days of treatment with 3M™ Tegaderm™ Matrix.

Case Study 6

Patient History

A 68 year old male patient with an ulcer of mixed vascular etiology on his left malleolus that had been present for approximately 10 months. Other significant medical problems included palindromic arthritis, liver cirrhosis, and a cardiac pacemaker.

Past Treatment

Past wound treatment included cadexomer iodine, a silver impregnated dressing, and compression therapy.

Initial Wound Description

Prior to enrollment in this case study (Figure 15), the wound measured 0.6 x 0.5 cm (0.3 cm²). Though small in size, it simply would not close.

New Treatment

On May 5, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with dry gauze and a transparent film dressing. The dressings were changed after a 48 hour period.

Case Study Results

After just 48 hours of treatment with 3M™ Tegaderm™ Matrix, the wound was nearly closed (Figure 16). The dressing was changed and left in place for another week and the wound closed.

Case Study Summary

This case study highlights a patient with a long-standing (~10 months), non-healing wound of mixed venous and arterial etiology. While small in size, the wound was painful and discouraging to the patient. After just 48 hours of treatment with 3M™ Tegaderm™ Matrix, the wound immediately showed substantial improvement and went on to close one week later.



Figure 15. Case study 6: wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.



Figure 16. Case study 6: wound nearly closed after 48 hours of treatment with 3M™ Tegaderm™ Matrix.

Case Study 7

Resident History

A 101 year old female resident with a Stage III pressure ulcer of 4 months duration located on her left heel. Other significant medical problems included congestive heart failure, gout, non-insulin dependent diabetes mellitus, hypothyroidism, osteoarthritis, dementia and previous history of osteomyelitis and ulceration in the same area.

Past Treatment

The ulcer was treated unsuccessfully with several different dressings. These dressings included an oxidised regenerated cellulose and collagen, an absorbent silver, an analgesic-containing foam, and a silicone-coated foam with tape.

Initial Wound Description

Prior to enrollment in this case study (Figure 17), wound diameter was 1.5 cm (1.8 cm²) to a depth of 6 mm. The peri-wound skin was macerated and the wound bed consisted of red granulation tissue visible under a thin layer of yellow slough. The wound produced a small amount of sero-purulent drainage.

New Treatment

On January 30, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with a thin silicone-coated foam dressing. The dressings were changed daily for 4 weeks and then decreased to every other day for 3 weeks. 3M™ Tegaderm™ Matrix was cut to fit the size of the wound as it healed.

Case Study Results

After six weeks of treatment with 3M™ Tegaderm™ Matrix (Figure 18), wound size decreased to 0.4 cm in diameter (0.1 cm²) with a depth of approximately 2 mm. Epithelialization was present on all edges, the wound bed consisted of clean, pink granulation tissue, and there was scant drainage. Complete closure occurred after 9 weeks of treatment with 3M™ Tegaderm™ Matrix (Figure 19).

Case Study Summary

This case study highlights a resident with a pressure ulcer that was stalled for approximately 4 months. Almost immediately following initiation of treatment with 3M™ Tegaderm™ Matrix, the wound responded and progressed toward eventual healing over a 9 week period. Numerous previous treatments failed to move the wound out of a persistent non-healing state.

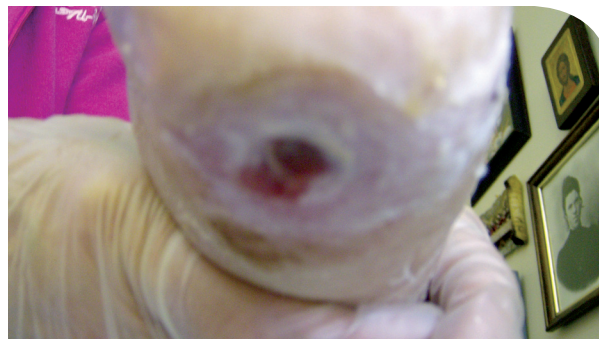


Figure 17. Case study 7: wound on day 1 prior to treatment with 3M™ Tegaderm™ Matrix.



Figure 18. Case study 7: wound after 6 weeks of treatment with 3M™ Tegaderm™ Matrix.



Figure 19. Case study 7: wound closure after 9 weeks of treatment with 3M™ Tegaderm™ Matrix.

Case Study 8

Patient History

A 71 year old female patient with an arterial ulcer of 16 months duration located on her anterior lower right leg. Other significant medical problems included non-insulin dependent diabetes mellitus. Her ABPI was 0.625. The patient had two previous aorto-bifemoral by-passes, and now has significant blockage in the right femoral graft. Additional revascularization is planned.

Past Treatment

The ulcer was treated unsuccessfully with a hydrofiber with silver dressing, manuka honey, and an oxidised regenerated cellulose and collagen dressing with silver.

Initial Wound Description

Prior to enrollment in this case study, the wound was full thickness with an area of 13.1 cm². There were sharp edges circumferentially (360°) with a wound bed containing 50% dark, red, friable granulation tissue.

New Treatment

On February 4, 2008, a new treatment regimen was initiated. The primary dressing was 3M™ Tegaderm™ Matrix Dressing, covered with a self-adhesive polyurethane foam dressing. The dressings were changed twice per week for 7 weeks. 3M™ Tegaderm™ Matrix was cut to fit the size of the wound as it healed.

Case Study Results

Over approximately 15 weeks of treatment with 3M™ Tegaderm™ Matrix, the wound size decreased from 13.1 cm² to 0.6 cm² (Figure 20), representing a 95% reduction in size in this previously non-healing ulcer. There was steady improvement throughout the course of treatment with obvious visual changes within 4-5 dressing applications.

Case Study Summary

This case study highlights a patient with an arterial ulcer that was stalled for approximately 16 months. Numerous previous treatments failed to move the wound out of this persistent non-healing state. The patient had very little circulation to the limb and will need additional revascularization surgery soon. Despite poor circulation, almost immediately after initiation of treatment with 3M™ Tegaderm™ Matrix, the wound responded and progressed toward healing over a 15 week period (Figure 20).

Progression of healing of Case Study 8 with 3M™ Tegaderm™ Matrix

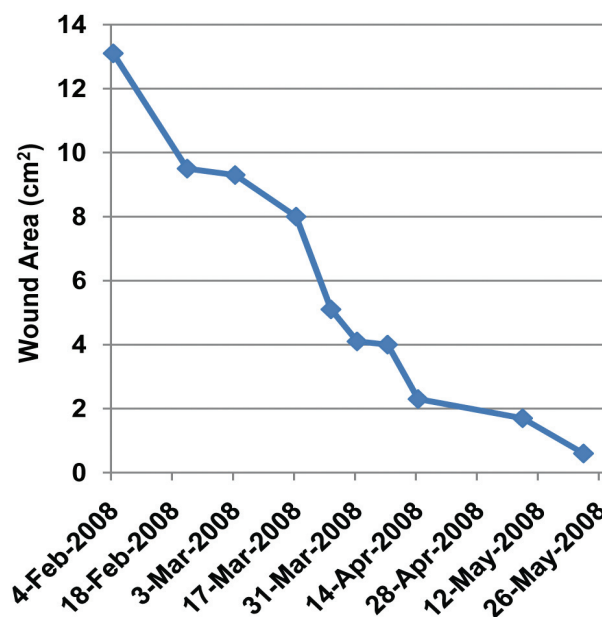


Figure 20. The progression of healing of case study 8 wound throughout the course of treatment with 3M™ Tegaderm™ Matrix.

Conclusions

These case studies highlight eight patients with very slow to non-healing wounds which did not progress using numerous therapies. Almost all eight patients showed immediate response to a new active dressing technology, 3M™ Tegaderm™ Matrix Dressing, which is reported to regulate gene expression for the production of MMPs within the local wound environment.

The dressing technology delivers the polyhydrated ionogen (PHI) ointment to the wound. The PHI technology is comprised of a blend of metal ions (rubidium, potassium, zinc and calcium) as well as two different types of polyethylene glycol. It also contains citric acid to help normalize wound pH and reduce free radical/reactive oxygen species activity.⁹ The PHI ointment is delivered via an acetylated regenerated cellulose carrier which allows for the passage of wound drainage and is non-fibre shedding.

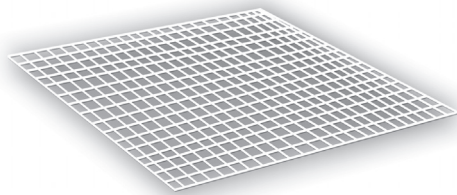
Results of this case study series demonstrate that treatment with 3M™ Tegaderm™ Matrix should be considered as a first line treatment strategy for patients with non-healing chronic wounds.



3M™ Tegaderm™ Matrix

Matrix Dressing

Supports faster healing in chronic wounds¹⁵



- Normalizes the wound micro-environment^{9, 16, 17}
- Regulates MMPs (*matrix metalloproteinases*)¹⁸
- Facilitates re-epithelialization¹⁶

Ordering information

Catalogue No.	Size	Dressings/Box	Boxes/Case
90900	2 in x 2 3/8 in 5 cm x 6 cm	10	8
90901	3 1/8 in x 4 in 8 cm x 10 cm	5	8

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PHI: Polyhydrated ionogens

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