

**Controlling Wound Edema with Fuzzy Yarn Focused Compression  
in Direct Contact with Granulation Tissue Speeds Healing**



- Stasis Dermatitis and Ulcer x 20 years



**Right leg.** Patient has incision; partial loss of feeling; partial edema. Note the magnitude of dermatitis from venous insufficiency; severe weeps from skin breaks during the last of the day.

- Polymer powder LYC dressings 2x week



Day #10 of Non-Pressured Compression (CVC) with elastomer in direct contact with the surrounding wound. Chlorhexine foam culture for skin appears after 8 days of elastic compression with bulky pain-free, red, less reduction of light brown water-tagged dermis. For comparison, new elastic fibers. Wound granulation tissue has appeared epithelial stretch. Epithelial cell migration from the skin edges is observed.

- Polymer powder gel controls ulcer pain. Patient compliance is high,
- Ulcers heal with two wound center visits over 32 days



NIH Day #32 shows complete healing of the ulcer and progressive improvement of the skin desquama.



- Poor response to four layer dressing
- To control wound edema LYC stockinet is placed directly on wound surface

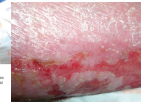
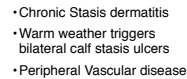


**Response to therapy with alginate under a first layer consisting of a red gauze. Absorption of second water, a decision to use Veno-Paste® Compression (VPC) in Direct Contact with granulation tissue. Zinc oxide is applied to second and Longitudinal Veno Compression (described) is used on the first layer of a Veno-Spex dressing. (Dr. Ingrid Weidner/MS, FACS), an Ottawa vascular surgeon suggested Veno-Paste® Compression as an alternative to a elastic cast when before LPHI foot.**

- Yarn Focused Compression directly on wound surface results in healing



This photo taken two weeks after the photo above. Note the skin grafts visible. Healing complete after 2 months of Maltacel® dressing. GFC (active in direct contact with the tissue) has helped the wound to epithelialize in 16 days. Puffy granulation compresses and creates correct tension on the healing surface. Puffy gran. may "dist" the tissue and speed healing.



Left radial cuff shows dermatitis with superficial partial ulcers.

- Polymer powder gel
- Yarn Focused Compression in direct contact with wound granulation tissue



Polysine applied to the skin elicits. The VPC itself is placed on over the powder dressing. Talcum is used to transform the powder into a gel.



- Rapid control of stasis dermatitis and skin edema
- Rapid epithelization of wound surface



Clad results are shown in 15 rows.



This photo shows a classic stiffness noticed in chronic stress disorders, creating serious progress because of untreated stress disorders and multiple co-morbidities. These disorders are painful and pay less, prevented adequate debilitation over the prior 30 months of therapy in a second center.

- Stasis Dermatitis, recurrent ulcers x 20 years



Re Clay #6. Should have been loaded with Longhulst Varn Compression slackcoat and polymer powder. Note the pyroplastic pigment in mudslide. This slackcoat will be washed in a washers machine, not a

- Polymer powder dressings (2 per week)



On Day # 4, Powder is sprinkled through long-handled yards after the treatment has been placed over the spot upwards. Shaking the yarders allows powder to fall like snow onto the wound surface. After dusting the site with 2ozs of powder, saline spray is used to "s" the powder into a gel.

- Polymer powder gel controls ulcer pain
- Longitudinal Yarn Compression stockinet (LYC) in direct contact with granulation tissue speeds healing
- Ulcers healing, at time of publication, after 17 days of Longitudinal Yarn Compression.



No Day #11. With using and Longitudinal Tens Compression, note that the muscle is separating from the ulnar that the patient had previously refused to be deltoided.

**www.CompressionDynamics.com**  
**www.UluruInc.com**

**2010 SAWC Meeting  
Orlando, FL**

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**Clinical Problem:** Wound pain is a significant issue for many patients with chronic wounds. 80% of patients with venous leg ulcers (VLUs) experience pain.<sup>1</sup> Its sequelae include fatigue, alterations in interpersonal relationships, sleep disturbances, and depression<sup>2,3</sup>.

**Methods:** Seven patients with VLUs were treated with a transforming powder dressing (TPD)<sup>4</sup> during an initial evaluation of this dressing's utility in wound management. All patients had failed previous attempts using various advanced dressings, bioengineered skin, or split thickness skin grafts. All had varying levels of non-adherence to the systemic plan of care – including inconsistency with compression garments/dressings, management of glucose, and routine, consistent dressing changes. Age of wounds varied from 3 to 27 years. All patients reported pain as an inhibiting factor with adherence with recommended regimen and wound sizes and had not decreased in several months.

**Initial Application of Transforming Powder Dressing**



**Initial Application of Transforming Powder Dressing**

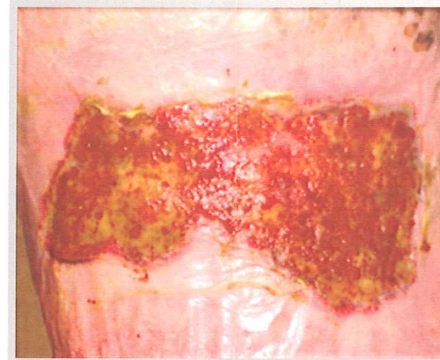
**Presented Case:** 62 year old male developed a right lower leg ulceration after post-phlebotic syndrome as a sequelae to a work accident. Co-morbidities include obesity, +MRSA, COPD, HTN, hyperlipidemia and Type 2 diabetes. Patient lives alone and refused home health services after receiving care from 5 different agencies. Patient has received a number of previous treatments for the last 27 years including STSGs, compression, NPWT, bioengineered skin, lymphedema, IV and oral antibiotics, pain management referral, and a variety of topical antimicrobial and non-antimicrobial dressings. Adherence to the treatment plan would vary but always would eventually fail. Pain associated with the wound itself, coupled with treatment pain often hindered compliance. The patient refused further surgical interventions to achieve wound closure. Pain levels were reported by the patient as 9-10 continuously.



# Serendipity: Use of a Novel Transforming Powder Dressing to Treat Chronic Wounds Reduces Lower Extremity Wound Pain in Patients with Venous Wounds

At the time of application of the TPD followed by a nonadherent dressing to absorb drainage, the patient reported immediate reduction of wound pain to a level of 2. Within 2 weeks of continuous pain reduction, he agreed to light compression. He has steadily increased his compliance to the recommended treatment regimen and is now on full therapeutic compression levels but continues to refuse other modalities of care.

**5 Months on Treatment Regimen of TPD with Compression**



**15 Months on Treatment Regimen**

**Results:** All patients reported serendipitous and unexpected improvements in pain levels within 15 minutes of TPD application. As a result, this group of chronic wound patients increased compliance to the recommended treatment plan – including compression, the mainstay of VLU treatment. All patients reduced oral pain medications and had slow, steady decreases in wound size and drainage.

**Conclusion:** The mechanism of sudden reduction of wound pain after dressing application may have several explanations including bacterial toxin binding, high moisture vapor transmission rate, or Substance P blockade. Regardless of the physiological mechanism, the reduction of pain in this group, this serendipitous finding and its subsequent impact of patient adherence and quality of life measures warrants further study.

1. Nemeth KA, Harrison MB, Graham RD, et al. Understanding venous leg ulcer pain: results of a longitudinal study. *Ostomy Wound Management*. 2004; 50:34-6.
2. Woo K, Sibbald RG. Chronic wound pain: a conceptual model. *Advances in Wound and Skin Care*. 2009; 21(4):175-188.
3. Gonçalves M, de Oliveira Santos VL, de Moraes Pimenta CA, Suzuki E.
4. Romagosa MM. Pain in chronic leg ulcers. *J WOCN*. 2004; 31:275-83.

<sup>4</sup> Altrazeal™ Transforming Dressing-ULURU, Inc.  
Financial Disclosure: Costs associated with poster presentation were provided by ULURU, Inc.



# Application of a Novel New Wound Conforming Dressing

**Purpose:**  
The purpose of this presentation is to demonstrate the versatility of a new powder dressing.

**Background:**  
The ideal wound dressing would maintain a moist wound environment, allow gaseous exchange so that oxygen, carbon dioxide and water vapor can pass in and out of the dressing, be thermally insulating, be impermeable to bacteria to protect from contamination, be non-traumatic and not adhere to the wound, be user friendly and easy to apply, remain in place, be cost effective and have minimal need for secondary dressing (2,3,4). Dehydrated particles that contain a methacrylate backbone and a terminal hydroxyl group have been developed such that when placed in a wound and exposed to physiological fluid aggregate into a structural gel that intimately covers the wound (1). Poly-2-hydroxyethylmethacrylate (pHEMA) and Poly-2-hydroxypropylmethacrylate (pHPMA) particles are synthesized as a powder that can be applied into a wound and hydrated with saline by drip method or misting that aggregate into a wound contour conforming dressing (1). When hydrated, this dressing aggregates to a final content of approximately 65% moisture by weight (1). This presentation illustrates uses of this novel new technology with three clinical case studies.

**Methods:**  
A new powder dressing became available. To evaluate this dressing in our clinic, we applied the dressing to a variety of wounds. Applied alone, under compression wraps and under contact casts; this powder dressing was observed for ease of use, staying in place, and for effectiveness in healing wounds by weekly wound measurements (5).

**Case 1:** A 47 yo Insulin dependent Diabetic white male presented with a neuropathic Wagner Grade 2 ulcer on the lateral aspect of his right foot. He had been treated with an offloading DH Walker and daily dressing with a currently available collagen silver dressing. Wound healing progress had stalled and powder dressing was used under a contact cast to better offload and treat his neuropathic ulcer. A breathable wound veil was placed over the aggregated dressing along with a foam under the cast. The wound healed on a sharp trajectory based on calculated wound volume measurements (Figure 1).

**Case 2:** A 59 yo white male with chronic venous stasis had been on palliative care with his ulcers for 30 months. He had in the past been treated with bioengineered skin grafts, operative skin grafts, and multiple different wound products. He currently was returning to the clinic for twice weekly Multi-layer compression wrapping. Powder dressing was applied weekly after selective debridement while his compression wraps were changed twice weekly. The powder dressing was applied and covered with veil and absorbent foam under the compression wraps. Patient went on to heal his wounds.

**Case 3:** A 57 yo white male undergoing active chemotherapy and radiation for intra-cranial metastatic melanoma lost his balance and fell against a steam heat radiator and suffered 3rd degree burn wounds to his right thigh. Concerned that the patient's debility while undergoing active chemotherapy would not support a graft or heal a donor site, dressing therapy was to be used. After debridement of dead eschar, powder dressing was used without a secondary dressing. It stayed in place over the course of the week and reduced the patients pain. His wound healed without grafting.

## CASE 1

### Diabetic Wagner Grade 2 Neuropathic Ulcer



#### Application of Powder Dressing



#### Powder Dressing Covered with Wound Veil



#### Diabetic Ulcer with Foam Before Contact Cast



#### Application of Contact Cast



## CASE 2

### Right Leg Venous Ulcer



#### Powder Application



#### Powder Dressing Left Leg Venous Ulcer



### Left Leg Venous Ulcer



#### Powder Dressing Right Leg Venous Ulcer



#### Compression Wraps Applied After Powder Dressing



## CASE 3

### 3rd Degree Burn Wound to Right Thigh



#### Application of Powder Dressing



#### Dressing on Right Leg Burn Wound Aggregating with Saline



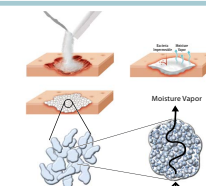
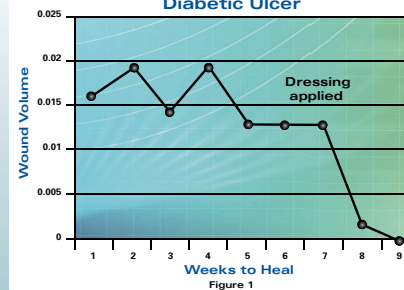
#### Powder Dressing In Place



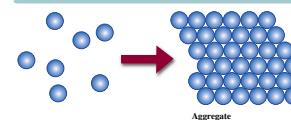
#### Third Degree Burn Wound Healed



## Powder Dressing and Diabetic Ulcer



The dressing components consist of polymer particles. The polymer particles are composed of 85% poly-2-hydroxyethylmethacrylate (pHEMA) and 15% poly-2-hydroxypropyl methacrylate (pHPMA). The polymers pHEMA and pHPMA are both non-reabsorbable, non-degradable, hydrophilic crosslinked polymers that are in the ratio of 85:15 by weight and maintain a fluid content of approximately 65% by weight of the matrix. The powder aggregates (coalesces) immediately and irreversibly from polymer particles into an intact dressing. There is no chemical reaction during dressing formation. The dressing binds together physically and not chemically and remains bound together with the wound exudate through hydrophilic/hydrophobic interactions, hydrogen bonding and VanDerWaals forces. An illustration of the dressing displaying the mechanism of action is shown.

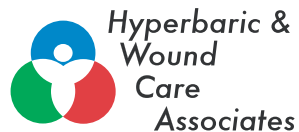


## Conclusions:

Powder dressing is a versatile new wound dressing material that can be applied in a variety of wound conditions. The ability to leave the dressing in place for up to 30 days is a characteristic that is desirable in applications where dressings aren't typically changed daily. Treating wounds under contact casting is one such application. Dressing worked well under contact casting in the treatment of diabetic neuropathic ulcers. A similar observation was made in use in conjunction with compression wrapping of venous stasis wounds. Although the compression wraps were changed twice weekly according to our protocol, the dressing was left in place for the week and changed at the patients weekly physician visit after debridement. In treatment of burn wounds, this dressing reduces pain and does not require frequent changes which also reduces painful dressing change episodes. It stays in place and does not require a secondary dressing. This treatment brought about healing of a third degree burn wound in a difficult patient who was undergoing active chemotherapy. Dressing worked well in these 3 applications and all three wounds healed.

## References:

- 1.) St. John J V, Brown S A, Hatel DA, Unzeitig A W, Noble D, Waller L K, and Ponder B C. Formulation development and in vivo testing of a novel powder wound dressing. The University of Texas Southwestern Medical Center at Dallas, Department of Plastic Surgery, 1801 Inwood Rd., Dallas, TX 75390
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- 3.) Thomas S, Loveless P A comparative study of the properties of six hydrocolloid dressings. Pharm J 1991; 247:672-675.
- 4.) Sharman D. Moist wound healing: a review of evidence, application and outcome - Review. Diabetic Foot, The Autumn 2003.
- 5.) Kantor J, Margolis DJ. Efficacy and Prognostic Value of Simple wound Measurements. Arch Dermatology. 1986; 124: 1571-1574.



Exceptional Results

# Altrazeal™ Transforming Powder Wound Dressing: The Clinical Experience

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## Introduction

The optimal moist dressing should maintain intimate contact at a wound surface yet allow high rates of moisture vapor transfer, prevent external contamination, while extending the dressing change interval. We demonstrate a new product that meets these criteria. Altrazeal™, a Transforming Powder Wound Dressing is designed to interact, protect and seal the wound bed, ultimately resulting in optimized wound healing. When applied to a wound, the nanoflex particles hydrate upon interaction with wound exudate. Hydration causes the particles to rapidly aggregate forming a strong uniform gel material with intimate contact to irregular surfaces of the wound bed.



## Technology Description



Altrazeal™ Transforming Powder Wound Dressing is applied to wounds by pouring or sprinkling the product onto the open wound. Immediate and irreversible aggregation occurs upon contact with wound exudate. Normal saline or hypochlorous solutions may be added to provide additional moisture in wounds without heavy drainage. The hydrogel aggregate seals the wound and provides a strong but flexible dressing that has been maintained in some patients for up to 18 days. The dressing remains in intimate contact with the wound surface without a secondary dressing while allowing high moisture transpiration. The aggregate can be easily removed without harming underlying granulating tissue and then reapplied as necessary.

## Conclusion

A series of patients with a variety of wound types have been successfully managed with Altrazeal™ Transforming Powder Wound Dressing. The early clinical experience demonstrates excellent patient toleration, with superb clinical results with improved wound healing trajectories. Additional benefits include a single application with extended wear times with or without a secondary dressing.



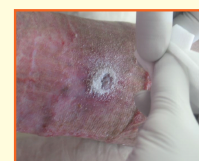
## Application Technique



Sprinkle Altrazeal™ on Clean Wound Base

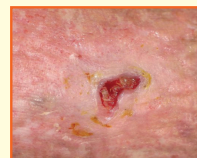


Hydrate Altrazeal™ with Saline

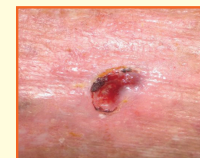


Cover Aggregated Altrazeal™ with Nonadherent Dressing

## Case Study 1



7-29-2008  
Ulcer present for 6 months.



8-5-2008  
Altrazeal™ applied.



8-8-2008



8-12-2008  
Wound Healed.

## Case Study 2



7-7-2008  
Ulcer present for 6 months.



8-18-2008  
Altrazeal™ initiated.



9-15-2008



10-21-2008  
Wound Healed.

1. Control of Vascular Proliferation and Healing in Acute Wounds with Controlled Release of VEGF from Hydrogel Nanoparticle Dressings: 2008 World Biomaterials Meeting, Oral Presentation, **Strategies for Vascular Regeneration Symposium**, Amsterdam, J. St. John (presenter), B. Ponder, D. Hatel, J. Huang, S. A. Brown.
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