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## Diabetes Watch: Does A New Cellulose Dressing Have Potential In Chronic Wounds?

- By Barbara J. Aung, DPM

We have all heard about the concept of moist wound healing. We know that the right moisture balance is critical to the healing of chronic wounds because it promotes a healthy wound environment. We have modalities such as hydrogels and hydrocolloids, as well as normal saline and gauze. The latter is becoming antiquated but nonetheless continues to support the theory of moist wound healing principles.

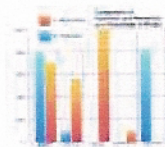
The new modality to emerge in wound care is the XCell® Cellulose Wound Dressing (Xylos Corporation). This product reportedly provides both hydration and absorption to achieve the moisture balance that wounds require for optimal healing.

XCell is derived from a new technological process. The product is comprised of biosynthesized cellulose which is produced in a liquid media during a static fermentation process. Cellulose is one of the most abundant natural biopolymers and is synthesized by many organisms, including multicellular plants, unicellular plants and bacteria.

The







*The XCell Cellulose Wound Dressing reportedly provides both hydration and absorption to achieve the moisture balance that wounds require for optimal healing.*

organism in this fermentation process is the *Acetobacter* species, which takes in sugar molecules and polymerizes them into distinct microfibrils excreted through the organism's cell wall. This same bacteria is

also used in the manufacturing of natural vinegar. The cellulose film is generated on the liquid surface during fermentation, and the length of the fermentation process determines the thickness and amount of the material formed. These sheets of cellulose are called a pellicle. The cellulose pellicle contains 99 percent fluid and 1 percent solid. The bacteria cells that produce the cellulose are removed by a series of chemical washes without disrupting the existing cellulose matrix.

This biosynthesized cellulose is about 200 times smaller than the cellulose from multicellular plants (trees and cotton), giving it a natural high fluid holding capacity and tensile strength. It also has shape retention superior to many synthetic fibers so you can form or cut the material into virtually any size or shape.

### **Assessing The Indications And Possible Impact Of The Dressing**

The XCell Wound Dressing is available in 3.5-inch and 5.5-inch square pads, a larger 6- by 7-inch sacral pad and in a rope form. It comes individually in a single use sterile pouch. The indications for this product include autolytic debridement, exudate absorption and tissue hydration. You can leave it in place for up to seven days. The non-adherent nature of



the dressing allows for painless dressing changes with little to no disruption of new granulation tissue within the wound bed. The features of this dressing may simplify the complex process of dealing with chronic wounds at the clinic level.

This dressing may facilitate an easier dressing change and possibly less of them. If we can reduce the amount of materials needed, reduce the frequency of dressing changes and make it easier for patients to make the dressing change themselves, it can certainly reduce the cost of caring for these chronic wounds. Using the dressing may also reduce or eliminate the cost of home care nursing.

However, keep in mind that when you use XCell, you do need to use a secondary dressing whether it's a thin film or gauze and Kling. XCell is also now available with antimicrobial properties.

### **What Clinical Testing Has Revealed About Cellulose Products**

There have been several publications about the use of biosynthesized cellulose products as a temporary skin substitute. One of the latest articles on biosynthesized cellulose illustrates its use as a permanent implantable patch for neurosurgical applications for repairing dura mater.

The preclinical animal testing and biocompatibility testing have shown no evidence of delayed dermal contact sensitization in the guinea pigs,



*A 66-year-old Hispanic female presented with a non-healing ulcer to the plantar aspect of the left hallux (as shown*



and there was no *above*).  
evidence of  
significant irritation or toxicity  
when it was injected  
subcutaneously into rabbits. The  
cytotoxicity of the dressing with  
mammalian cells showed no  
cytotoxicity and did not inhibit cell  
growth. The cellulose wound  
dressing successfully passed all of  
these tests, ensuring that the  
product is biocompatible, safe and  
will not inhibit wound healing.

During human clinical trials,  
the cellulose wound dressing  
exhibited strength in removing  
slough necrosis in deep pressure  
ulcers. It also reduced the  
hypergranulation tissue down to  
the level of the surrounding  
epithelium. Researchers found the  
dressing also helped promote  
autolytic debridement and  
provided a moist wound  
environment to maintain a healthy  
granulation tissue base. The  
wound dressing also aids in  
cleansing wound margins to help  
epidermal migration, which leads  
to wound size reduction and the  
healing of various chronic wounds.

### **Case Study: How XCell Can Aid Ulcer Healing**

A 66-year-old Hispanic female  
presents to our office with a non-  
healing ulcer to the plantar aspect  
of the left hallux. She has been  
treated by a general surgeon since  
1996 for this condition. The  
patient has undergone several  
debridements and hospitalizations  
with IV antibiotic therapy. She has  
also used orthotics to reduce  
pressure to this area. A biopsy of  
the ulceration showed squamous  
epithelial hyperplasia,  
parakeratosis and marked  
inflammation.

Her past medical history  
includes IDDM for 16 years, HTN,  
hyperlipidemia and depression.  
The patient underwent a left  
breast mastectomy and is



currently undergoing chemotherapy. She also experienced renal failure and is undergoing renal dialysis with the fistula in the left upper arm. Her current medications include insulin and a HTN medication. The patient does not know the name of the HTN medication. She denies using tobacco and alcohol. The patient was scheduled for X-rays, lab work with CBC w/diff, A1c and noninvasive vascular studies. She reports a random blood sugar of 120 to 140.

The physical exam reveals a frail woman, who is cooperative and oriented. She is concerned that her toe will need to be amputated, which is adding to her stress and depression. The exam of the lower extremity shows nonpalpable pulses. Her skin temperature is warm proximal to distal with equal and adequate hair distribution to bilateral limbs and toes. There are no foot deformities other than the ulceration to the left plantar hallux and edema to the entire left hallux. There is no cellulitis. We did note mild erythema distal to the first metatarsophalangeal joint.

The wound itself is 3 cm in diameter with a thick callus rim and 2 mm deep. The base of the wound appears macerated with white and yellow fibrotic tissue with bleeding within the hyperkeratosis layer. The wound did not bleed with debridement. There was a foul odor during the debridement but no drainage.

### **Proceeding With Treatment**

We emphasized an initial home care regimen, having the patient apply enzymatic debridement ointment daily with saline moistened gauze and Kling wrap. We ordered a wheelchair for the patient to facilitate offloading.

The X-ray findings do not



show evidence of acute or chronic osteomyelitis. They did reveal diffuse osteopenia. Her labs were normal and, as expected, the noninvasive vascular study is abnormal with moderately severe occlusive disease, femoral-popliteal disease. The left ABI is 0.41 mmHg.



*Here one can see the XCell dressing applied to the wound. A month later, there was resolution of the ulceration, according to the author.*

The patient lives one hour from the clinic and has missed several appointments, but I maintained phone contact weekly to stress to the patient the need for follow-up and to remind her of the signs

of worsening of the condition.

Two months later, the wound was unchanged. I obtained a wound biopsy and requested quantitative analysis. At this point, I initiated the antimicrobial XCell wound dressing along with continued sharp debridement. The patient began performing dressing changes herself with the XCell dressing, followed by normal saline moistened gauze and Kling every other day.

Results of quantitative analysis was  $2.2 \times 10^6$  bacteria, gram positive cocci. I did not initiate an oral antibiotic based on the clinical exam and my clinical experience.

A month later, the exam showed resolution of the ulceration so I discontinued the wound care regimen and fit the patient for multi-density insoles and extra depth shoes. I encouraged the patient to continue nonweightbearing to prevent reoccurrence until she receives her new insoles and shoes.

## **In Conclusion**



This biosynthesized cellulose wound dressing, which has a dual moisture handling capability to donate moisture to dry surfaces and absorb fluid from a highly hydrated environment, shows promise in caring for diverse wounds. The ease of application and the ability to leave the dressing in place for up to seven days allows the private practice clinician to offer wound care services within his or her own practice, and schedule follow up care that is more manageable on a weekly basis.

Does this mean we only need to have one type of wound care dressing available in our clinics? That remains to be seen. However, the concepts that originated this material are founded in sound science and as I have used the wound dressing in a wide variety of cases, I have found it useful in almost every case. As always, we cannot forget the need for sharp debridement, when appropriate, as well as a complete and comprehensive history, physical exam, and clinical assessment of the patient and the wound to determine why the wound has gone from an acute wound to a chronic wound.

All wounds need some sort of dressing and XCell may be able to play a more significant role as the first choice, regardless of the wound type, due to its pure nature to hydrate dry necrotic areas, cleanse wound margins and to absorb excess exudate when present.

*Dr. Aung is in private practice in Tuscon, Ariz. She currently serves on the Diabetes Advisory Committee of the American Podiatric Medical Association and is a PPOD (podiatry, pharmacy, optometry, dental) Workgroup Member for the CDC-NIH National Diabetes Education Program.*



*Editor's Note: For a related article, see "Achieving Adjunctive Success With Wound Dressings" in the July 2003 issue of Podiatry Today or check out the archives at [www.podiatrytoday.com](http://www.podiatrytoday.com).*

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Podiatry Today - ISSN: 1045-7860  
- Volume 17 - Issue 3 - March  
2004 - Pages: 20 - 26

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