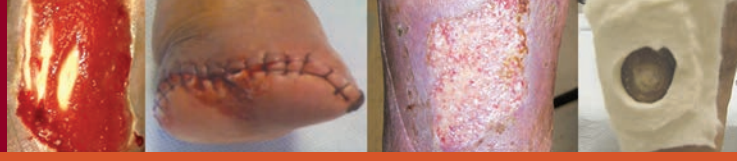


Collagen: Its Role in Wound Healing

Here's an update on the practice management of this treatment.

BY ALEC O. HOCHSTEIN, DPM AND ANIMESH (ANDY) BHATIA, DPM

What Is Collagen?

Collagen is the most abundant protein in the human body and is a major component of the extracellular matrix (ECM). It is comprised of three polypeptide chains that are rich in hydroxy-proline amino acids and are twisted together into a triple-helical structure.

Over 20 different types of collagen have been identified in humans; the main types are type I, II, and III; and together they make up 80% of the body's collagen. Type I and III are important for wound healing.

Role of Collagen in Wound Healing

In a healing wound, a cascade of events occurs and is broken into what is known as the phases of wound healing. These include platelet accumulation, inflammation, fibroblast proliferation, cell contraction, angiogenesis and re-epithelialization. This cascade ultimately leads to scar formation and wound remodeling.

Collagen plays an important role in each of these phases of wound healing due to its chemotactic role. It attracts cells such as fibroblasts and keratinocytes to the wound. This encourages debridement, angiogenesis and re-epithelialization.

A chronic wound is stalled at one of these healing stages. This usually occurs during the inflammatory phase and is linked to elevated levels of matrix metalloproteinases (MMPs) in the wound. In normal wound healing, proteases such as MMPs, are attracted to the wound during the inflammatory phase and have an important role in breaking down unhealthy ECM so that new tissue forms. However, when MMPs are present in a wound at elevated levels for a prolonged period of time, this results in the destruction of healthy ECM, which is associated with delayed wound healing and an increase in wound size.

When the excess of MMPs is not balanced by normal physiological processes, alternative methods are required to reduce protease levels in the wound. This suggests a role for dressings containing collagen in the management of wounds where healing is stalled (Rangaraj, et al., 2011).

Collagen plays an important role in each of these phases of wound healing due to its chemotactic role.

What are Collagen Dressings?

Native intact collagen provides a natural scaffold or substrate for new tissue growth. Dressings containing collagen are thought to provide the wound with an alternative collagen source that can be degraded by the high levels of MMPs as a sacrificial substrate, leaving the endogenous native collagen to continue normal wound healing.

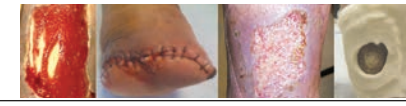
There are a number of different collagen dressings available that use a variety of carriers and combining agents such as gels, pastes, polymers, and oxidized regenerated cellulose. The collagen contained in these products also varies in type and source. Certain dressings contain native (type I) collagen in which the triple helix formation is intact; others contain denatured or reconstituted collagen, which is referred to as gelatin.

Most collagen dressings contain collagen derived from bovine and porcine sources. Although these collagens are purified, there remains a theoretical concern regarding the potential for prion diseases such as bovine spongiform encephalopathy. There have also been concerns regarding the integration of porcine collagens into scar tissue, while cultural/religious issues may prevent their use on some patients. Human-derived collagens are linked with fewer immunological concerns; however, they tend to be more expensive than animal-derived collagens.

Collagens and Wound Healing

Bringing successful wound care

Continued on page 104



Collagen (from page 103)

protocols into a podiatric practice requires familiarity with the available wound products, as well as their intended and appropriate use depending on the type of wound presentation the practitioner is presented with.

Collagen has been used widely within wound care, and in multiple forms for different reasons. The multiple forms of collagen lend themselves to a variety of wound presentations, making it a favorite among wound specialists.

It had become apparent that chronic wounds were trapped in the inflammatory phase of wound healing and would not progress to healing without resolving inflammation. During the inflammatory phase, a wound attempts to cleanse itself of all non-viable tissue and debris by utilizing digestive enzymes to break down non-vital tissue and exudate to wash away the debris.

The major classes of enzymes responsible for digesting non-viable tissue (largely collagen) are the matrix metalloproteases (MMPs), including several that digest collagen. The current justification for use of collagen dressings suggests that they provide a sacrificial substrate that diverts the MMPs from digesting newly formed tissue and by tipping the balance towards wound healing. Collagens were thus considered "bioactive" in having a physiological activity beyond moisture management.

Wounds cannot heal without growth factors in the right places at the right times in the right quantities. MMPs also degrade growth factors (e.g., protein chains) that regulate cell populations and activity. Inflammation and the production of MMPs can be prolonged due to failure to completely remove necrosis or debris or by the presence of microorganisms in numbers beyond critical colonization. Microorganisms contribute to the MMP mix and stimulate inflammatory mediators and cells, trapping the wound in the inflammatory phase of healing. Many discussions focus on the need to reduce bio-burden, and collagen products that contain silver have been introduced to this effect.

Collagen Dressing Types and Uses:

Collagen dressings are available in:

- Powders
- Amorphous gels/pastes
- Gel-impregnated dressings
- With and without adhesive borders
- Standard-size wound dressing pads
- Ropes for undermining or cavity wound fill

Collagen is often combined with other substrates to provide additional properties such as gelling (alginate) or the expansion of enzyme removal to elastase (ORC-oxidized regenerated cellulose). Some products promote native long-chain collagen as superior for scaffolding and activation of growth factors, while others promote denatured (partially broken-down) presentations for their ability to provide high numbers of active binding sites that rapidly interact and remove offending MMPs and high levels of amino acids for use in building new collagen structures. Newer classes promote the use of "Activated" or hydrolyzed collagen which are immediately bioactive and are readily taken up by the cellular matrix of the wound.

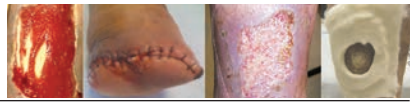
Collagen dressings can be tried for jumpstarting wounds that are stalled in the inflammatory phase, as they may be responsible for reducing inflammation as well as pain (or the results and mediators of inflammation). They have been shown to attract and activate fibroblasts (proliferative stage cell population) and may provide an organizing or scaffolding effect.

Activated, Native, Processed and Denatured Collagens

Native collagen materials present a more natural 3-D structure that may provide a more natural environment for fibroblasts and better targets for MMPs. They also bind better to elastin and may aid in conserving elastin levels.

Processed or denatured collagen may provide a more readily available source of amino acids necessary for tissue reconstruction and a higher number of exposed active sites to divert MMPs from digesting newly formed tissue.

Continued on page 105



Collagen (from page 104)

Advances in Wound Dressings

Over the last 30 years, there has been a shift from traditional wound dressings towards those advanced therapies that aim to optimize the wound healing environment (Enoch and Harding, 2003). In more recent years, wound care products have been developed that aim to replicate or add to the ECM. The ECM is the major component of the dermis and provides a structural support for cells, growth factors, and receptors that are essential to wound healing. The ideal dressing should achieve rapid healing at reasonable cost with minimal impact on the patient's daily activity.

DMERC Reimbursement Model and Documentation Requirements

The benefits of using collagen in the podiatric office extend beyond the efficacy it affords patients for their wounds. Collagen as a DMERC dispensable and reimbursable product can have significant financial impact for the dispensing wound care practice. Podiatrists have been very effective at enhancing outcomes for patients by dispensing orthotic devices, braces, and splints at point of service. Wound care products can be as significant, if not more so, for our patients and the bottom line.

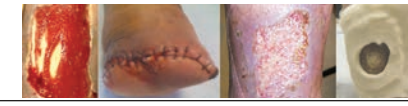
Most insurers reimburse DME. Medicare, which handles these devices through one of four Durable Medical Equipment Regional Carriers (DMERC), requires a separate provider number in order to submit claims.

Information defining the number of surgical/debrided wounds being treated with a dressing, the reason for dressing use (e.g., surgical wound, debrided wound, etc.), and whether the dressing is being used as a primary or secondary dressing or for some non-covered use (e.g., wound cleansing) must be included in your documentation.

Current clinical information which supports the reasonableness and necessity of the type and quantity of surgical dressings provided must be present in the patient's medical records. Evaluation of a patient's wound(s) must be performed at least on a monthly basis unless there is documentation in the medical record which justifies why an evaluation could not be done within this timeframe and what other monitoring methods were used to evaluate the patient's need for dressings.

Evaluation is expected on a more frequent basis (e.g., weekly) in patients in a nursing facility or in patients with heavily draining, infected wounds or those wounds where there have been significant clinical changes. The evaluation may be performed by a nurse, physician, or other healthcare professional. This evaluation must include the type of each wound (e.g., surgical wound,

Continued on page 106



Collagen (from page 105)

pressure ulcer, burn, etc.), its location, its size (length x width in cm.) and depth, the amount of drainage, and any other relevant information.

Dispensing Products in a Podiatric Medical Office

Why should a podiatrist dispense wound products from the office? The most important reason is that it will lead to better compliance and outcomes. The patient leaves your office with exactly what you want them to have, right away. The convenience factor: no trips to the pharmacy, no waiting for it to arrive in the mail, no delays. Patients have a clear understanding of what needs to be done, and they are more likely to be compliant. What's more, it makes your practice look comprehensive, leading to more referrals.

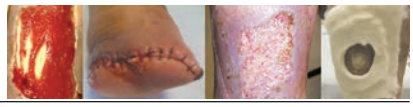
When you write a prescription for your patients' wound dressings (or other supplies) and then send them to a pharmacy, or arrange for a home delivery company to mail them the products, the likelihood of the patient following your instructions accurately is slim at best.

Additionally, the care may not start immediately. When the patient receives a large intimidating box with a whole bunch of instructions, this obviously isn't a good thing for your patient or for you. It isn't hard to imagine how much better it would be for the patient when you dispense the products, you bill their insurance for the products, and you (or your staff) show the patient how and when to use said products.

The patient leaves your office with exactly what you want them to have, right away.

- Wound dressings are a covered benefit under Medicare Part B if they are medically necessary, and if they are used in the treatment of a wound caused by or treated by a surgical procedure.
- In general, for wound supplies to be a covered benefit, the wound must be full thickness (this requires a wound grade and documentation of depth in your note)
- Documentation must indicate some type of debridement(s) having been done at some point in the course of treatment.

Continued on page 109



Collagen (from page 106)

Remember that patients are not eligible for coverage for wound dressings provided by a physician supplier if they are in hospice or on a home healthcare plan (for any reason), or if they are in a Part A stay or in a skilled nursing facility (place of service 31).

Check DME HCPCS Codes for Surgical Dressings and PDAC Product listings for the most appropriate code for the product being dispensed. WWW.DMEPDAC.COM

When billing for wound care products, submit claims to the appropriate DME MAC or private insurance with the appropriate diagnoses, the HCPCS code for the product, the number of units dispensed, and finally the modifier A*, where * is the total number of wounds being treated.

Once a system and protocols are established, the benefits will immediately become obvious. Training your staff to know how to handle and apply these products, along with getting all of the compliance templates set up, will be essential steps to ensure compliance. Also, you cannot bill for the dressings you apply in the office; those are considered part of your office visit charge (incident-to). Some fine tuning would be necessary after checking with the requirements of the respective DME MAC covering your state. Per claim submitted, essentially there are six documents that are needed:

1) Progress note: This is what will justify medical necessity for the product you have dispensed. It must be a detailed assessment of the wound(s) with medical decision-making leading to the ultimate decision to prescribe and dispense the product appropriate for the wound. The description must include type of wound, location, size, depth, amount and type of drainage, debridement method, and depth of tissue removed. It must also include the appearance of the wound bed, stage or grade, and presence of infection. Wound measurements must be documented at least monthly. The wound must be full thickness, at least Wagner Grade 2 or NPUAP Stage 3 and must be debrided at some point…. but not necessarily on the day of dispensing.

2) Prescription: This could either be a separate form on file or within the progress note and must include name or type of product, size of dressing, amount needed, frequency of change, and expected duration of need. A new order is needed if a) the quantity or frequency of the dressing is increased, b) a new dressing is started, or c) three months, whichever comes first.

3) Patient acknowledgement of receipt of goods form: This form should have warranty and complaint resolution information in it. It must be signed by the patient or responsible party, and it must include the name of dressing, size, number given, and frequency of change. Such forms can easily be created listing only the particular items in stock at the office with easy check-off boxes. A copy of this must be offered to a patient who wants one. Here it is important a) to be aware of the amount of dressings the DME MAC allows to be dispensed per month for each category of dressing and b) only dispense a maximum of a month's supply at a time, no more.

For example, you can dispense up to 30 pieces of a collagen product for a patient with a full thickness wound per wound per month. The same is true for saturated gauze and calcium alginates. For foams, up to 12 pieces can be dispensed per wound per month.

4) 30 Supplier standards form: This list of standards, which each DME supplier has to comply with, print, and hand a copy to the patient could be printed on the back of the above goods receipt form, and a one page double-sided copy could be provided to the patient. Rigorously implementing the numerous requirements of these 30 standards is obviously the first step to dispensing any DME and must be adhered to before any of this is done.

5) Instructions: Written instructions on the use of the product must be provided. Again, this is a matter of a one-time effort of making an instruction form for every product in the office intended for dispensing. Or, if the product comes with instructions in its insert, that is sufficient.

6) Purchase Receipt: Receipts must be able to be provided showing the purchase of the products supplied.

Inventory concerns can be kept to a minimum by stocking a few nationally-used products in each category.

Next, set up basic protocols for the most common types of wounds. This will ensure consistent and efficient delivery of care. The protocols must be comprehensive to include vascular and neurological testing, offloading, compression, infection management, biologic products, and debridements. Inventory concerns can be kept to a minimum by stocking a few nationally-used products in each category. The choice of products has been the subject of many articles and can easily be narrowed. The shelf life of products nowadays is in the range of two years. Follow this with a little training of the staff to learn their function and appropriate use; then get the paperwork in order, follow the billing guidelines, and you are ready to go!

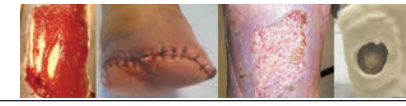
CASE PRESENTATION 1

Wound Type: Diabetic Ulceration, Post-op Necrotizing Fasciitis

Wound Presentation

Patient presents to author three weeks status post incision and drainage, including right 5th digit amputation and partial ray resection (Figure 1). The patient had been diagnosed with a necrotizing fasciitis of the left foot. After adequate and emergent incision

Continued on page 110



Collagen *(from page 109)*

and drainage, the patient was left with a large soft tissue defect that included exposed extensor tendons.

Initial Presentation

Sharp debridement of the right foot wound edge, application of topical CellerateRx® Gel, petroleum gauze, moist gauze applied, light compressive top cover

Size: L = 10cm W = 6cm D = .5cm

Wound Base: Granular with extensor tendon exposed

Exudate: moderate serosanguanous

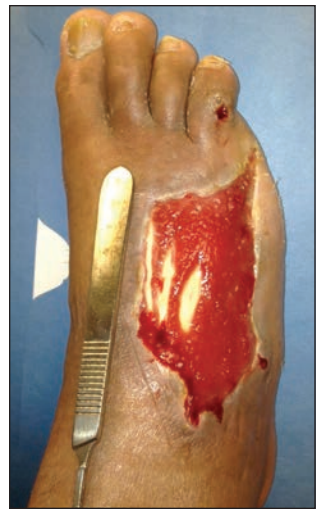


Figure 1: Diabetic ulceration, post-op necrotizing fasciitis.

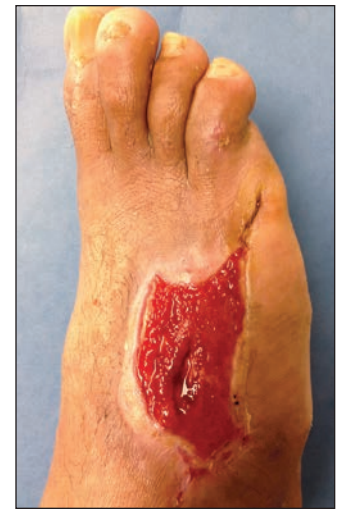


Figure 2: Wound at week 4.

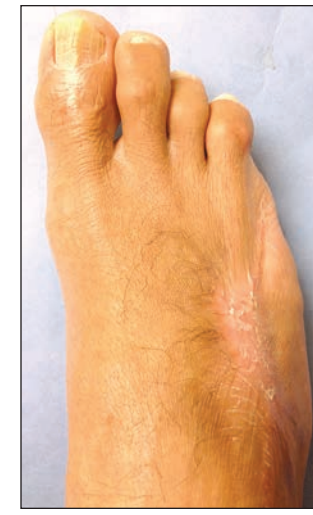


Figure 3: Wound healed at week 12.

4 Weeks (Figure 2)

Sharp debridement of the right foot wound edge, application of topical CellerateRx® Gel, petroleum gauze, moist gauze applied, light compressive top cover

Size L = 8cm W = 5cm D = .25cm

Wound base granular without exposed tendon, peri-wound hyperkeratosis.

Exudate scant serosanguanous

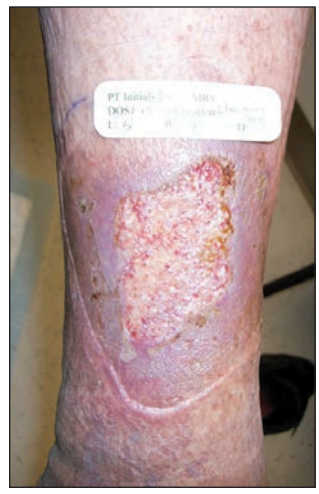


Figure 4: Venous status ulcer.

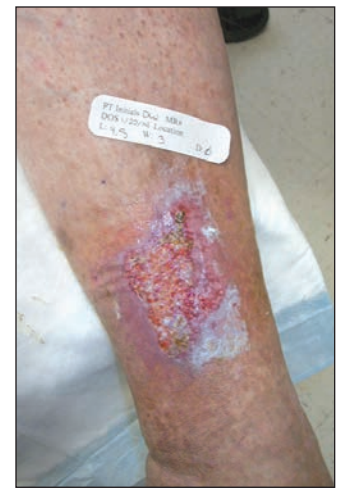


Figure 5: Wound at week 1.

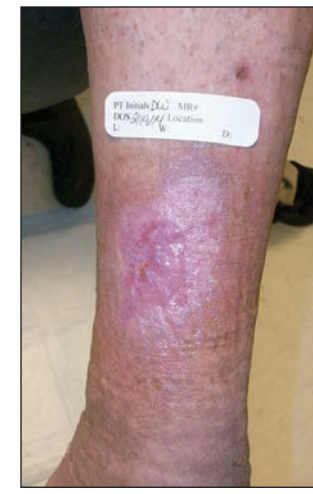


Figure 6: Wound healed at 5 weeks.

12 Weeks (Figure 3)

Sharp debridement of the right foot wound edge, application of Topical CellerateRx® gel, petroleum gauze, moist gauze applied, light compressive top-cover

Size: Wound closed

Wound Base—Epithelial

Exudate—NONE

CASE PRESENTATION 2

Wound Type: Venous Stasis Ulceration

Wound Presentation

Patient presents to author with chronic draining venous stasis ulceration (Figure 4). After extensive sharp debridement of wound and adequate cleansing, the patient was dispensed with CellerateRx Powder to apply to wound daily after cleansing with saline, and then caregiver was to wrap leg with a three-layer compression dressing.

One week later, patient presents with wound showing some maceration but significantly reduced non-viable tissue, and increased granulation.

Sharp debridement was performed, application of CellerateRx® powder, alginate pad, and a three-layer compression dressing. Instructions to continue same treatment at home as before (Figure 5).

The same process was continued weekly for the next four weeks, and on this visit the wound was completely healed with healthy epithelial tissue and no drainage (Figure 6).

Total healing time: 5 weeks **PM**

Dr. Hochstein is Medical Director of Wound Management Technologies.

Dr. Bhatia is Asst. Medical Director, Fairfield Medical Center Would Clinic and a member the APMA Coding Committee. He also serves on State of Ohio Prosthetics and Orthotics Board, the Board of Trustees of Ohio Foot and Ankle Medical Association, and the Board of AAPPM.