



The Whys and Hows of Epidermal Grafting for Lower Extremity Wounds

A new epidermal harvesting tool facilitates this method of wound management.

BY LEE C. ROGERS, DPM

Autologous skin grafting remains a viable and often used technique in the management of large or complex skin defects of the lower extremity.¹ Split-thickness skin grafting (STSG) requires the use of anesthesia, a dermatome, and the operating suite, but suction blister epidermal grafting (SBEG) can be accomplished in the clinic setting without anesthesia. Epidermal skin grafts consist of only the epidermis and contain keratinocytes and melanocytes. SBEGs have minimal or no scarring of the donor site and thus result in little or no donor site morbidity.

The earliest method for harvesting an SBEG was to use two larger volume syringes connected together by tubing with a stop-cock. The plunger is removed from one syringe and that is placed on the abdominal skin. The second plunger is pulled back and the stop-cock is turned to maintain suction over the skin. The tubing can be disconnected and the procedure can be repeated depending on the area of SBEG needed to cover the recipient defect. This process creates a fluid-filled bulla over the course of one hour or more. Once the bulla is created, the pressure is released in the syringe chamber; and using a forceps and scalpel or scissors, the donor skin is removed and transplanted to the recipient site.²

A new epidermal harvesting tool has been introduced to the market, called Cellutome® by Acelity® (KCI).³

⁴ The Cellutome harvester is attached



Figure 1: Placement of the Cellutome® harvester on the medial thigh.

to the thigh or calf via a Velcro strap and connected to the Cellutome® control unit via the CelluTome vacuum head (Figure 1). It provides continuous negative pressure at 400 to 500 mgHg and warmth of 37 to 41 degrees Celsius. The warmth and suction create multiple small blisters called microdomes in a 2.5 cm² or 5 cm² sized area (Figure 2).

Once the microdomes have fully formed, which usually takes 30 to 40 minutes on the medial thigh, the device is turned off and the vacuum head is removed. An adhesive dressing (Tegaderm® or Adaptic Touch®) is placed over top of the microdomes. Moving the blue lever to the armed position activates a surgical blade which severs

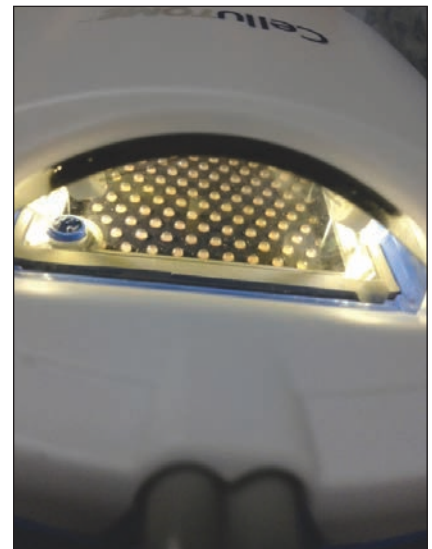


Figure 2: Small vesicles (microdomes) forming in the harvester window.

the microdomes. The microdomes are adhered to the dressing and can be transplanted to the recipient site (Figure 3). The donor site is barely visible, except for the indentations from the harvester's suction seal (Figure 4), is covered with a Tegaderm®, and heals completely in three to four days.

An adequately prepared wound bed is required prior to using an SBEG. Ensure that the wound is free from infection, has adequate perfusion, will be properly off-loaded, and that there is a majority of granulation tissue which is nearly level with the surrounding tissue.⁵ Since SBEGs harvested with Cellutome® only come in 2.5cm² or 5cm²,

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choose the appropriate-sized wound and harvester. For larger wounds, one can graft multiple times in the same setting using multiple harvesters, or the patient can return on a different day for a subsequent application. Once the wound bed is prepared and an SBEG is harvested, transplant the graft to the recipient site.

If Tegaderm® is used, piece the film a multitude of times with a #11 blade or an 18 gauge needle, as needed, to ensure that exudate passes to the secondary dressing. This step is unnecessary if Adaptic Touch® is used. Paint the margins of the wound with a skin preparation such as Marathon® (Medline). Apply the graft to the recipient bed and cover with a bolster dressing. One can cut a piece of foam to the same size as the recipient ulcer and secure it with Steri-Strips® and a conforming or elastic bandage, or use negative pressure wound therapy (NPWT) as a dressing.

The first dressing change depends on the expected amount of exudate from the wound. The patient or caregiver should leave the primary dressing (Adaptic Touch or Tegaderm) undisturbed for at least one week. The secondary dressing consisting of foam, gauze, or NPWT can be changed as often as necessary. At one week, the primary dressing and wound margins should be inspected. If there is no significant maceration or other signs of trouble, like infection, the primary dressing could be left intact for another week, though one week removal is typical.

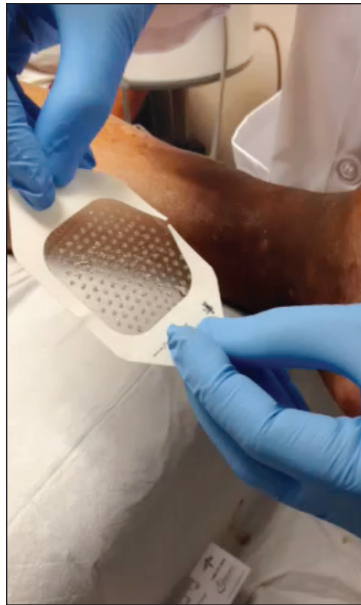


Figure 3: The microdomes transferred to an adhesive film dressing prior to transplant.



Figure 4: The donor site after the Cellutome harvester has been removed.

Mechanism of Healing

Epidermal grafts heal wounds by one of two mechanisms.⁶ Either they epithelialize the wound directly, or they provide growth factors from the living autologous cells which speed healing. After the primary dressing is removed, the wound should not be debrided unless there is nonviable tissue for up to four weeks. The wound should be supported with a non-adherent or collagen dressing and evaluated on a weekly basis.

Another epidermal graft could be considered necessary if the wound has not completely closed in four weeks. But success should

not only be measured by complete wound closure. Certainly, a reduction in wound area is a goal achieved by one of the mechanisms by which epidermal grafts work.

The scope of practice for podiatric physicians is sometimes a consideration in choosing the SBEG graft harvest site. While the medial thigh is the most advantageous site to harvest due to the quality and thickness of the

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Figure 6: A plantar lateral TMA ulcer prepared for grafting.



Figure 7: Epidermal graft placed on the ulcer.



Figure 8: Healed wound and reorganized skin at 7 weeks.



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skin, the posterior calf could also be used, but it may require more time to harvest grafts. Some state scopes of practice are more specific about the body area that is treated, like California's law which allows podiatrists to harvest a skin graft from the thigh, bone graft from the iliac crest, or administer systemic hyperbaric oxygen.

California's law and Board of Podiatric Medicine concerns itself mostly with where the treatment is occurring, on the foot or ankle. But if a harvest is needed more proximally to treat the foot or ankle, that is allowed. Likewise, it should be considered that harvesting an epidermal graft is not invasive. It does not break the level of the dermis. Podiatrists in many states can draw blood from an arm vein to be used for PRP, administer conscious sedation, or order systemic IV anti-

otics, all of which are more invasive than harvesting an epidermal graft.

Figure 5 is based on research into the state laws. Red indicates that the law clearly delineates the scope of practice does not include harvest from the thigh. Green indicates that skin may be harvested from the thigh. The gray and yellow areas are where the law is silent. Please note that the state board of podiatric medicine (or equivalent) may have a separate interpretation and you should confirm this with the state before proceeding with a plan to harvest a graft from the thigh.

Billing

Billing for epidermal grafting is straight-forward. This is an autograft, like a full- or split-thickness skin graft, which uses existing CPT codes. This is different from allografts, like living and non-living skin substitutes, which are billed with a CPT and a product Q code.

There is no product code for the use of an autograft. Table 1 shows the CPT codes to use for application based on location and the average reimbursement. Unlike skin substitutes/biologics, there are no Medicare Local Coverage Determinations (LCDs) for epidermal skin grafting nor are clinicians required to observe failure of conservative therapies before choosing epidermal grafts.

There is a 90-day global period for the patient with an epidermal graft. However, the 90-day global is in effect only for an uncomplicated post-operative course. For example, after an appendectomy, the global period would prevent billing for post-operative visits when removing sutures or for follow-up. But if there is any deviation from a normal post-operative course, like infection, wound dehiscence, or re-operation is necessary, the global period is no longer in effect and the

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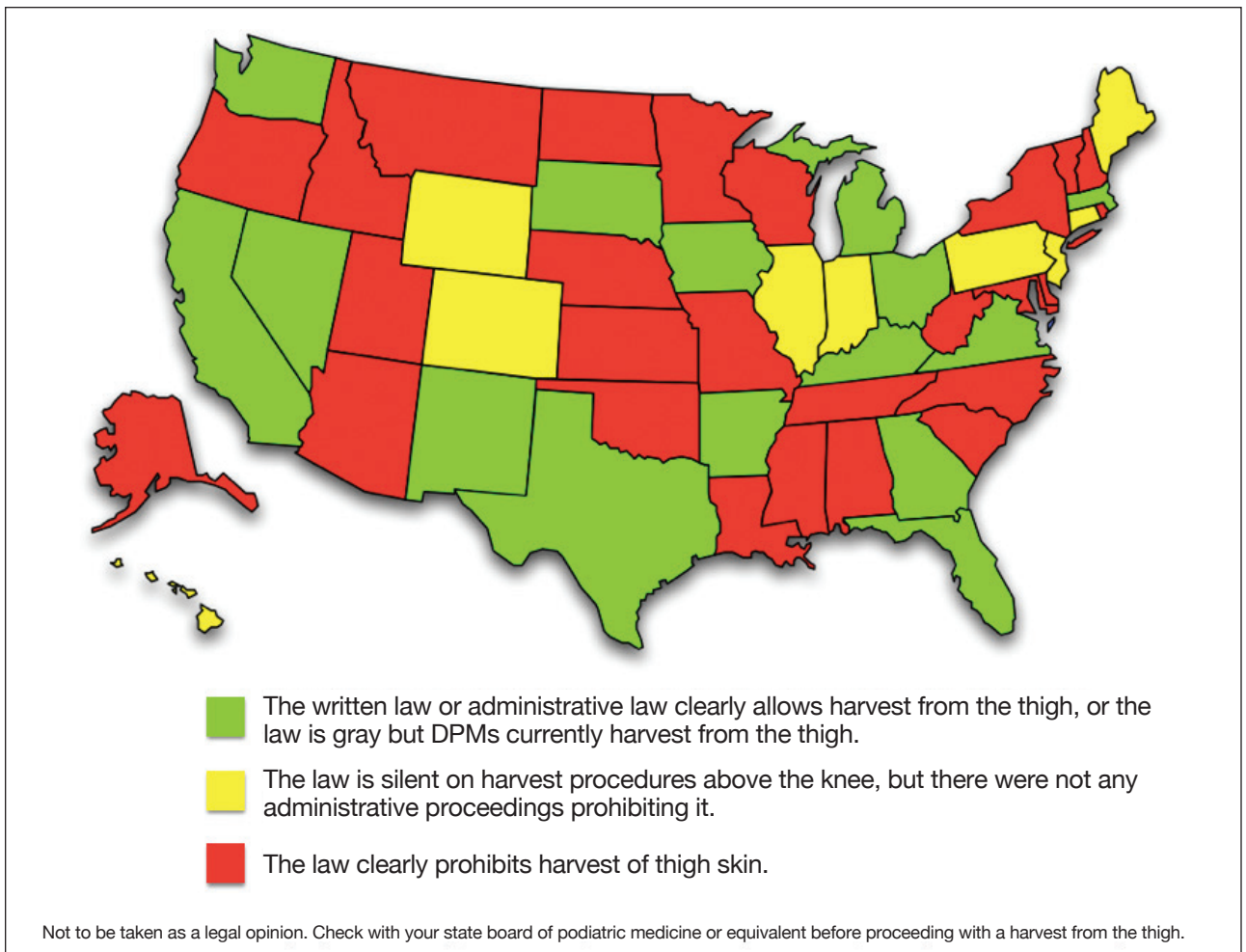


Figure 5: The U.S. map and state scope of practice for allowing thigh harvest of epidermal grafts by color.



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physician can bill for the services. Now consider the treatment of complex wounds with grafts; it is not common to have complete healing in a timely manner. If there is any deviation from this, it would be acceptable to bill for further evaluation and management (E&M) or subsequent procedures within the 90-day global period with a modifier-24.

Figure 6 is the foot of a 65-year-old male who had a partial take of an STSG over a TMA site. Approximately 30% of the wound remains open. A 5 cm² epidermal graft was harvested from the ipsilateral medial thigh and transferred to the recipient site with a Tegaderm (Figure 7). The Tegaderm was pierced multiple times with an 18 gauge needle prior to application. A skin prep cyanoacrylate was used to help adhere the film. The graft was covered with a foam dressing cut to the same size as the recipient ulcer and light compression with an elastic bandage was used to bolster the dressing. The Tegaderm was inspected in one week and removed at two weeks. The wound completely healed at five weeks (Figure 8). There were no complications of the donor site.

Summary

In summary, suction blister epidermal grafts can be valuable in the management of wounds that have been adequately prepared. While there are few studies on SBEG for lower extremity wounds,⁷⁻¹¹ rigorous studies are not often required for the use of autografts, which is the standard treatment for complex soft tissue defects. For podiatrists, it is important to know your state scope of practice and harvest the graft from a site that is permitted by your state board and law. The billing for epidermal grafts is uncomplicated and the 90-day global period should not be an obstacle to providing subsequent necessary care. **PM**

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TABLE I:
Typical Billing Codes for Epidermal Grafting

CPT Code	Description	Physician Office Fee Schedule*	Physician Facility Fee Schedule*	Hospital Outpatient Department Fee Schedule*
15110	Epidermal autograft, trunk, arms legs, first 100 sq cm	\$833.66	\$729.09	\$430.12 ^
15115	Epidermal autograft, feet, hands, face, head, genitalia, first 100 sq cm	\$844.80	\$739.87	\$1,407.42

*Based on Medicare Fee Schedule. Actual reimbursement depends on geographical index and payor. If wound bed preparation is performed on the same visit, it is also appropriate to bill 15002 (trunk, legs, arms) or 15004 (feet, hands, head, genitals) in combination with the epidermal graft code.
^ The HOPD fee for 15110 is expected to increase to match the 15115 on January 2016.

⁵ Kirsner RS, Bernstein B, Bhatia A, Lantis J, Le L, Lincoln K, Liu P, Rogers L, Shaw M, Young D. Clinical experience and best practices using epidermal grafts. *Wounds* 2015 in press.

⁶ Kirsner RS, Falanga V, Eaglstein WH. The biology of skin grafts. *Skin grafts as pharmacologic agents. Arch Dermatol* 1993; 129:481-483

⁷ Yamaguchi Y, Sumikawa Y, Yoshida S, et al. S. Prevention of amputation causes by rheumatic diseases following a novel therapy of exposing bone marrow, occlusive dressing and subsequent epidermal grafting. *Br J Dermatol* 2005; 152:664-672.

⁸ Yamaguchi Y, Yoshida S, Sumikawa Y, et al. Rapid healing of intractable diabetic foot ulcers with exposed bones following a novel therapy of exposing bone marrow cells and then grafting epidermal sheets. *Br J Dermatol* 2004;151:1019-1028.

⁹ Hanafusa T, Yamaguchi Y, Katayama I. Intractable wounds caused by arteriosclerosis obliterans with end-stage renal disease treated by aggressive debridement and epidermal grafting. *J Am Acad Dermatol* 2007;57:322-326.

¹⁰ Costanzo U, Streit M, Braathen LR. Autologous suction blister grafting for chronic leg ulcers. *J Eur Acad Dermatol Venereol* 2008;22:7-10.

¹¹ Limova M, Mauro T. Treatment of leg ulcers with cultured epithelial autografts: Treatment protocol and five year experience. *Wounds* 1995;41:170-180.



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