

Skin: Histology and Physiology of Wound Healing

Eric A. Gantwerker, MS, MD^a, David B. Hom, MD^{b,*}

KEYWORDS

- Scarring • Scars • Facial • Wounds • Healing
- Skin histology

Key Points

1. Skin is composed of several layers that are essential to its function and response to injury: the epidermis, dermis, and hypodermis. Healing is a dynamic progression encompassing hemostasis, inflammation, proliferation, and remodeling
2. Pilosebaceous units are the source of all epithelial stem cells essential for reepithelialization and wound healing
3. Multiple extrinsic and intrinsic factors affect healing, specifically the effect of immune system modulation (medications and diseased states)
4. It is most optimal to wait at least 4–6 weeks after smoking cessation for elective surgical interventions
5. Keloids and hypertrophic scarring are a result of overabundant collagen production, and decrease collagen breakdown. Keloids are difficult to treat, due to their recurrent nature. It is important to identify individuals prone to keloid formation for surgical planning purposes

Self-Test Questions

The following questions are intended for the reader to self-test. The answers, with full background, are covered within this article.

The correct answers are provided at the conclusion of the article.

1. A 19-year-old woman is on isotretinoin (Accutane) for acne and has a facial acne scar that she wishes to be dermabraded. What do you counsel the patient about?
 - a. She needs to be off the medication for 1 year to limit the risk of scarring
 - b. She should continue the medication because the extra vitamin A will improve her healing
 - c. You cannot resurface her acne scar because of the long-lasting effects of this medication
 - d. Encourage 2 g of vitamin C daily for 2 weeks before the procedure
2. A 73-year-old insulin-dependent diabetic man with a serum glucose level of 300 mmol/L comes to your office for a rhytidectomy. How do you optimize your results?
 - a. Refer to endocrinologist for tight diabetic control before surgery
 - b. Decline the surgery because the risk of failure is increased
 - c. Start the patient on vitamin E supplementation 2000 IE daily 2 weeks before surgery
 - d. Double his insulin dose on the morning of his surgery
3. A 30-year-old man has a partial-thickness 4 × 4-cm abrasion on his right cheek. What should be the best treatment?

This article originally published in *Facial Plastic Surgery Clinics*, August 2011, 19:3.

Disclosures: There are no affiliations, conflicts of interest, or financial disclosures by either author.

^a Department of Otolaryngology – Head and Neck Surgery, University of Cincinnati and Cincinnati Children's Hospital Medical Center, 231 Albert Sabin Way, Cincinnati, OH, USA

^b Division of Facial Plastic and Reconstructive Surgery, Department of Otolaryngology – Head and Neck Surgery, University of Cincinnati and Cincinnati Children's Hospital Medical Center, 231 Albert Sabin Way, PO Box 670528, Cincinnati, OH 45267-0528, USA

* Corresponding author.

E-mail address: david.hom@uc.edu

Clin Plastic Surg 39 (2012) 85–97

doi:10.1016/j.cps.2011.09.005

0094-1298/12/\$ – see front matter © 2012 Elsevier Inc. All rights reserved.

- a. Place a split-thickness skin graft
 - b. Place a full-thickness skin graft
 - c. Keep the wound bed moist with a moisture retentive ointment
 - d. Keep the wound dry to maximize reepithelialization.
4. A 50-year-old man sees you about a large wide scar on his neck. On inquiring, the patient states he had a lymph node removed last year and this scar has grown bigger than the cyst was. What do you counsel him about?
- a. That he most likely has a hypertrophic scar and that the likelihood is that this will not happen on further surgical procedures
 - b. That this is a keloid and that with vitamin E ointments it should resolve
 - c. That this is a hypertrophic scar that will completely go away with simple excision
 - d. That this is a keloid and that multiple procedures along with steroid injections may be required to excise it, but still there is no guarantee it will be removed completely.

The study and treatment of wounds go back to Ancient Egypt. In Ancient Egypt the clean edges of wounds were brought together with tape or stitches and a piece of meat was placed on the wound for the first day. Salves such as honey and Matricaria oil were used. The antibacterial and antiseptic properties of these compounds were later elucidated. Honey was later found to have mild antibacterial effects in controlling *Pseudomonas* and methicillin-resistant *Staphylococcus aureus*.¹ Other wound dressings and salves have been used throughout history until the advent of germ theory, which revolutionized medicine and made a significant impact on surgery and wound care. Research in the last decade has focused on growth factors and cytokines that control the complex wound-healing cascade. Newer research has focused on modulating these signaling molecules to improve healing and prevent scarring.

Wound healing in this article focuses on:

- Basic histologic characteristics of skin
- Four phases of wound healing
- Brief overview of collagen matrices
- Extrinsic and intrinsic factors that disrupt wound healing
- Scarring and current classifications
- Basic principles of wound care and scar treatment.

Although each surgeon has his or her own techniques, some based on evidence and others based on preferences, there are certain tenets that most agree on. Here the authors cover some of the evidence supporting practices, but in the

absence of definitive research their personal experience is relied upon.

The process of wound healing is a dynamic, complex interplay of cytokines, involving many different cell types. The skin has important immune and protective characteristics and has an amazing ability to heal, invariably with scarring. Scarring is quite variable and is based on many factors, dependent on patient characteristics and overall health (intrinsic) as well as the healing environment (extrinsic). All epithelial tissues in the body, except for bone, heal by scar formation rather than regeneration. The skin is not spared by this. It is important to identify wound-healing problems early to minimize scarring.

To understand the effects of injury and potential for scarring, one must first look at the layered histology and physiology of the largest organ in the body. The skin is separated into an epidermis, dermis, and hypodermis. The epidermis itself has 5 layers or strata from superficial to deep: corneum, lucidum, granulosum, spinosum, and basale (Fig. 1). The epidermis has variable thickness,

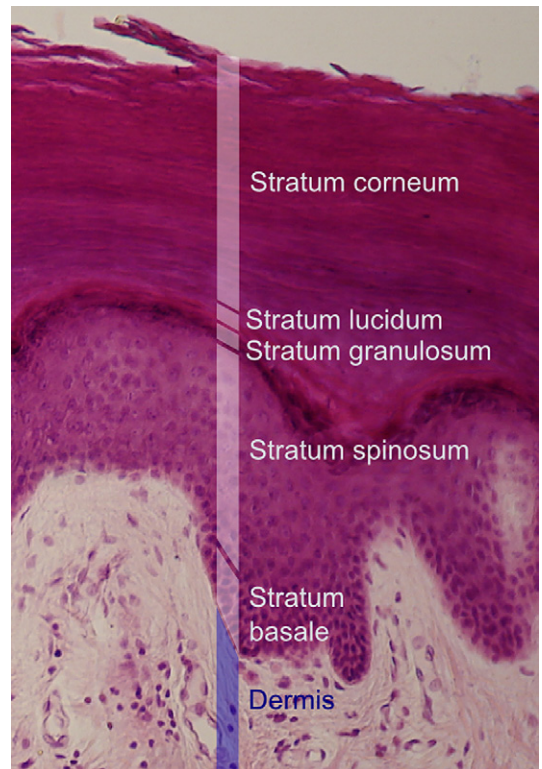


Fig. 1. Histologic section of the epidermis showing the 5 strata from superficial to deep: corneum, lucidum, granulosum, spinosum, and basale. (Courtesy of Mikael Haggstrom, Uppsala, Sweden; under GNU Free Documentation License. Available at: http://commons.wikimedia.org/wiki/File:Epidermal_layers.png.)

Download English Version:

<https://daneshyari.com/en/article/4108436>

Download Persian Version:

<https://daneshyari.com/article/4108436>

[Daneshyari.com](https://daneshyari.com)