

# Alabaster Skin After CO<sub>2</sub> Laser Resurfacing: Evidence for Suppressed Melanogenesis Rather Than Just Melanocyte Destruction

Thomas N. Helm, MD; Samuel Shatkin, Jr, MD

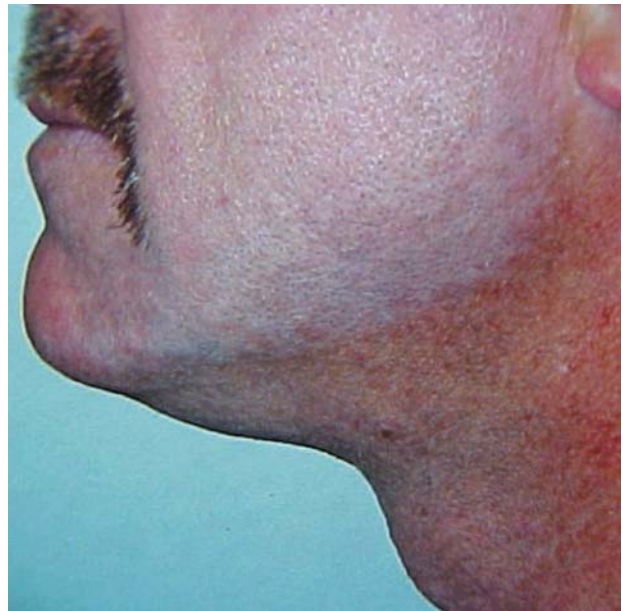
*Hypopigmentation is a recognized side effect of CO<sub>2</sub> laser resurfacing. Pigment abnormalities are a major side effect of facial laser procedures and can cause much emotional distress. We report a case of a patient who, after receiving laser treatment, developed persistent hypopigmentation that has defied a variety of treatment attempts. Results of histologic and immunohistochemical studies support the hypothesis that suppressed melanogenesis rather than just destruction of melanocytes is important in the etiology of the alabaster skin side effect.*

*Cutis.* 2006;77:15-17.

Laser resurfacing can be useful in controlling the signs of photoaging and intrinsic aging. Laser therapy also has been used to treat precancerous and cancerous conditions involving the face, head, and neck area. However, pigment problems are common after deep and medium-depth resurfacing procedures. The pigment abnormalities that sometimes occur after laser resurfacing can cause significant distress and concern. Few studies have characterized the etiology of alabaster skin.<sup>1</sup> Although treatment is difficult, some success has been reported with topical 0.001% 8-methoxypsoralen.<sup>2</sup>

## Case Report

A 50-year-old male smoker of Celtic descent presented for treatment of severe actinic damage. In December 1998, the patient received full-face laser resurfacing with a Sharplan® Surgilase® XJ150® CO<sub>2</sub>



**Figure 1.** Hypopigmentation in the laser-treated area. The excisional specimen was taken across the line of demarcation in the infra-auricular area.

laser. The FeatherTouch attachment was used with a 200-mm hand piece set at 120 W with an 11-mm spot size for 3 passes on the forehead. A setting of 120 W with an 11-mm spot size was used for 2 passes on the rest of the face. The eyes were treated using a 48-W setting and an 8-mm spot size. The nose was treated with one pass using a 120-W setting and an 8-mm spot size. The patient had an uneventful postoperative course, with full reepithelialization within 2 weeks.

In May 1999, hypopigmentation was noted on the patient's lower cheek. Hydroquinone 4% with glycolic acid was used on the adjacent skin of the neck to lessen any contrast. Secondary laser treatment was performed on the neck in December 2000. The Silk Touch attachment was used with a 200-mm hand piece set at 15 W with an 8-mm spot size for

Accepted for publication April 14, 2005.

From Buffalo Medical Group, Williamsville, New York.

The authors report no conflict of interest.

Reprints: Thomas N. Helm, MD, Buffalo Medical Group, PC, Dermatopathology Laboratory, Sheridan Meadows, 6255 Sheridan Dr, Bldg B, Suite 208, Williamsville, NY 14221 (e-mail: thelm@buffalomedicalgroup.com).

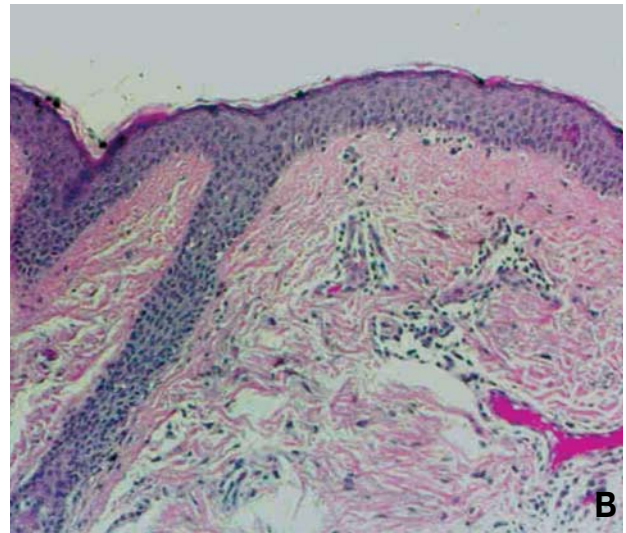
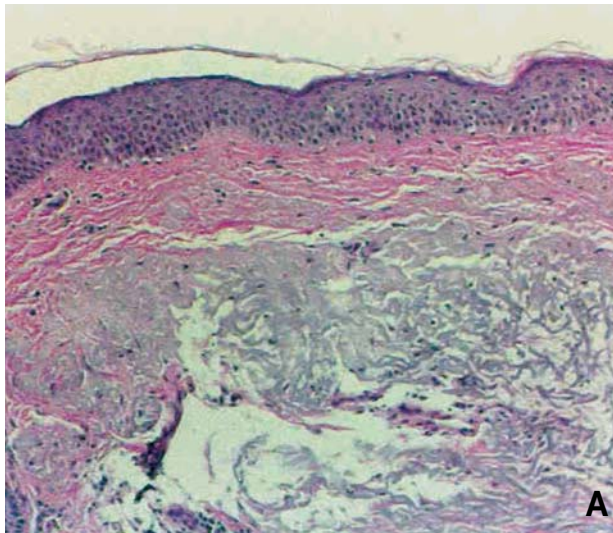
1.5 passes on the demarcation line. A single pass was performed adjacent to the demarcation line. The patient's recovery went well, but there was minimal improvement in the line of demarcation (Figure 1).

In December 2001, topical coal tar (V-tar 30%) was applied to the patient's face during an office visit. He was reassessed in May 2002, with no benefit. In February 2003, an excisional biopsy was performed to evaluate any histologic abnormalities; the biopsy specimen included both treated and untreated skin and crossed the line of demarcation. Evaluation of the excisional specimen revealed that the area treated with the CO<sub>2</sub> laser had a decreased density of melanocytes (Figure 2).

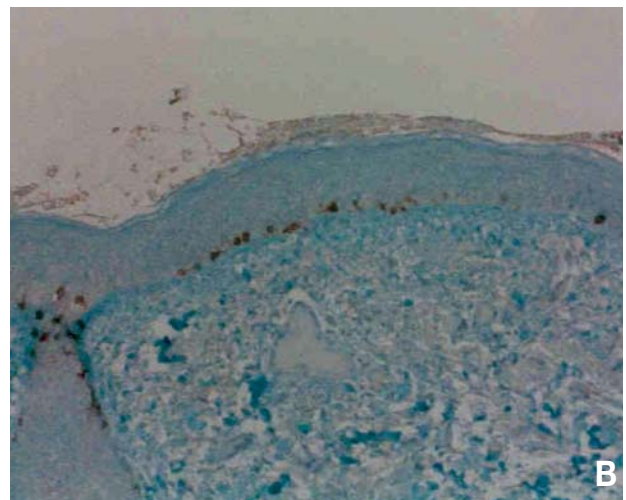
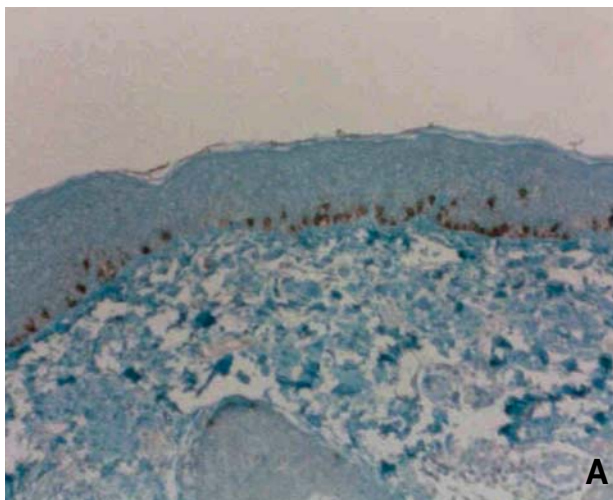
Staining for Melan-A/melanoma antigen recognized by T cells (MART)-1 was more intense in the untreated skin than in the areas treated with the CO<sub>2</sub> laser (Figure 3).

### Comment

Pigment problems are common after deep and medium-depth resurfacing procedures. Agents used for deep peel include occluded or unoccluded Baker-Gordon phenol peel (88% liquid phenol, tap water, Septisol<sup>®</sup> liquid soap, and croton oil), trichloroacetic acid in concentrations greater than 50%, wire brush or diamond fraise dermabrasion, CO<sub>2</sub> laser resurfacing, and combination erbium:YAG/CO<sub>2</sub> laser resurfacing.<sup>3</sup> Medium-depth



**Figure 2.** Melanocytes are noted along the dermal-epidermal junction, and solar elastosis is more prominent in the dermis of the untreated skin (A). Fewer melanocytes along the dermal-epidermal junction and pink collagen in the papillary dermis in the laser-treated area (B)(H&E, original magnifications  $\times 40$ ).



**Figure 3.** Intense staining and baseline number of melanocytes in the untreated area (A). Decreased numbers of melanocytes in the area treated with the CO<sub>2</sub> laser (B)(Melan-A, original magnifications  $\times 40$ ).

peels include the Jessner 35% trichloroacetic acid peel and solid CO<sub>2</sub> laser resurfacing coupled with a 35% trichloroacetic acid peel. Lines of demarcation may be evident between treated and untreated skin and often can be treated by directing attention to the lightening of the surrounding untreated skin. Hyperpigmentation typically is treated with topical retinoids, photoprotection, and topical hydroquinone preparations.<sup>3</sup> Laser resurfacing appears to produce more intense hypopigmentation compared with phenol chemical peel.<sup>4</sup> Evaluation of the effects of leukomelanosis suggests that pigment abnormalities due to topical phenol, catechol, and benzene derivatives may go through stages of immediate bleaching, hyperpigmentation, and then depigmentation through inhibition of melanin synthesis or melanocytotoxicity.<sup>5</sup>

The biopsy specimen results in our case revealed persistence of melanocytes along the dermal-epidermal junction. Staining for Melan-A revealed that the melanocytes had a decreased density and were more widely spaced along the dermal-epidermal junction compared with areas not treated with the laser. A previous study by Laws et al<sup>1</sup> noted no difference in the number of melanocytes but decreased epidermal melanin; the authors only used a 4-mm punch biopsy specimen, which made evaluation of melanocyte number and density more difficult because of the small sample size. The excisional biopsy obtained in our case allowed for correlation with the line of demarcation because the excisional

specimen included both treated and untreated skin. Clinical inspection allowed for accurate assessment of the areas of hypopigmentation. Unlike in vitiligo, melanocytes were present along the dermal-epidermal junction, though in decreased numbers. The hypopigmentation in our patient did not improve over time. Topical treatment with tar was not helpful, nor was a lightening treatment for the surrounding skin. Topical treatment with psoralen plus UVA light will be considered.

## REFERENCES

1. Laws RA, Finley EM, McCollough ML, et al. Alabaster skin after carbon dioxide laser resurfacing with histologic correlation. *Dermatol Surg.* 1998;24:633-636.
2. Grimes PE, Bhawan J, Kim J, et al. Laser resurfacing-induced hypopigmentation: histologic alterations and repigmentation with topical photochemotherapy. *Dermatol Surg.* 2001;27:515-520.
3. Monheit GD, Chastain MA. Chemical and mechanical skin resurfacing. In: Bologna JL, Jorizzo JL, Rapini RP, eds. *Dermatology.* Vol 2. New York, NY: Mosby Publishers; 2003:2379-2398.
4. Langsdon PR, Milburn M, Yarber R. Comparison of the laser and phenol chemical peel in facial skin resurfacing. *Arch Otolaryngol Head Neck Surg.* 2000;126:1195-1199.
5. Liao YL, Chiang YC, Tsai TF, et al. Contact leukomelanosis induced by the leaves of Piper betle L. (Piperaceae): a clinical and histopathologic survey. *J Am Acad Dermatol.* 1999;40:583-589.