

# Fractional Resurfacing

## A New Therapeutic Modality for Becker's Nevus

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### REPORT OF CASES

#### PATIENT 1

A 26-year-old white man presented with a pigmented lesion on the right upper chest that developed at 15 years of age. Results of physical examination showed multiple light brown macules coalescing into patches with terminal hairs (**Figure 1A**). The patient's medical history was unremarkable. No previous treatment to the area had been administered.

#### PATIENT 2

A 16-year-old white male adolescent was referred for treatment of a pigmented patch with terminal hairs on the right cheek (**Figure 2A**). His mother reported that the pigmented patch first developed at 5 years of age, and terminal hairs developed within the lesion during puberty. The patient's medical history was unremarkable. No previous treatment to the area had been administered.

Based on the history and clinical presentation, both patients were diagnosed as having Becker's nevus.

### THERAPEUTIC CHALLENGE

Traditional laser treatment of Becker's nevus may involve the use of ablative<sup>1,2</sup> and Q-switched<sup>1-3</sup> lasers. Ablative lasers remove the entire epidermis of the treatment area and are clinically effective.<sup>1,2</sup> However, patients experience a high incidence of significant adverse effects. Q-switched lasers are effective in the treatment of cutaneous pigmented lesions. The major disadvantage of this modality is that complete clearing of the lesion is rarely achieved, and many treatment sessions are usually required.<sup>1</sup>

### SOLUTION

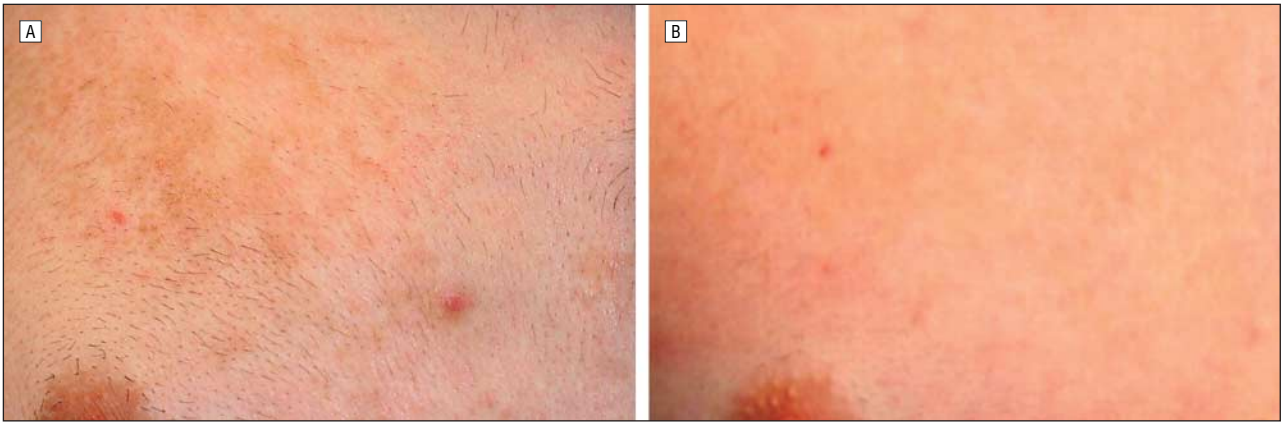
Both patients were treated with the 1550-nm wavelength erbium-doped fiber laser (Fraxel; Reliant Technologies Inc, Mountain View, California). The treat-

ment area was cleansed before the procedure using a mild soap. A topical lidocaine cream, 4% (LMX; Ferndale Laboratories Inc, Ferndale, Michigan), was applied under occlusion to the treatment area for 1 hour before treatment. A water-soluble tint certified by the US Food and Drug Administration (OptiGuide Blue; Reliant Technologies Inc) was applied to the treatment area to allow the laser's Intelligent Optical Tracking System (Reliant Technologies Inc) to adjust the treatment pattern with respect to handpiece velocity. An ointment (LipoThene Inc, Pacific Grove, California) was applied over the water-soluble tint so that the laser handpiece could glide smoothly over the treatment area.

Treatment variables were selected to target the pigment in the papillary dermis and adjusted for pain tolerance. In each treatment session, patients were treated with energy levels from 6 to 10 mJ, with final densities of 2000 to 3048 microscopic treatment zones per square centimeter (MTZs/cm<sup>2</sup>). Patients underwent 8 to 10 passes at a density of 250 or 254 MTZs/cm<sup>2</sup> per pass (**Table**). A cold-air cooling system (Cryo 5; Zimmer MedizinSystems, Irvine, California) was used to cool the skin during the treatment and to mitigate patient discomfort (fan power 2, 10-14 cm from the skin surface). Treatment sessions were performed at 4-week intervals. Patient 1 underwent 6 treatment sessions; patient 2, 5 treatment sessions. Patient 1 exhibited mild erythema before treatment 5, so the energy level was decreased to 6 mJ.

Photographic documentation and clinical improvement scores were determined at each treatment visit, at 1 month after the last treatment, and at 3 or 6 months after the last treatment. A medical evaluation was independently performed using the following well-established quartile grading scale: grade 1 (<25%) indicates minimal to no improvement; grade 2 (25%-50%), moderate improvement; grade 3 (51%-75%), marked improvement; and grade 4 (>75%), near total improvement.

During treatment, the patients experienced mild pain. Moderate to severe postprocedure erythema and edema typically resolved within 24 to 48 hours. No additional adverse effects were observed. Based on independent clinical assessment by comparison with baseline photographs,



**Figure 1.** Becker's nevus on the right chest of patient 1 before (A) and after (B) 6 treatments with fractional resurfacing.



**Figure 2.** Becker's nevus on the right cheek of patient 2 before (A) and after (B) 5 treatments with fractional resurfacing.

both patients achieved grade 4 improvement, indicating that greater than 75% of the pigment had faded by the 1-month follow-up (Figures 1B and 2B). This improvement was maintained at the final follow-up visit, which was performed at 6 months for patient 1 and at 3 months for patient 2. There was no improvement in hypertrichosis.

#### COMMENT

Becker's nevus (pigmented hairy epidermal nevus)<sup>5</sup> is characterized by the presence of a light or dark brown

patch with a sharply outlined but irregular border.<sup>6,7</sup> In male patients, the lesion may develop increased hairiness after puberty.<sup>7</sup> Histopathologically, the melanin content of the keratinocytes is increased, whereas the number of melanocytes is normal or only slightly increased. The basal cell layer is hyperpigmented, and melanophages may be present in the papillary dermis.<sup>7</sup> Becker's nevus is fairly common: a study of 19 302 adolescents and men aged 17 to 26 years revealed a prevalence of 0.52%.<sup>8</sup> Becker's nevus is a benign condition, and there have been no reports of malignant transformation.

**Table. Treatment Settings<sup>a</sup>**

Treatment Session	Patient 1		Patient 2	
	Energy Level, mJ	Total Density, MTZs/cm <sup>2</sup>	Energy Level, mJ	Total Density, MTZs/cm <sup>2</sup>
1	8	2000	10	2500
2	8	2000	10	2500
3	8	2500	10	3048
4	8	2500	10	3048
5	6	2000	10	3048
6	10	2500	NA	NA

Abbreviations: MTZs, microscopic treatment zones; NA, not applicable.

<sup>a</sup>A 15-mm spot size was used.

Fractional resurfacing creates hundreds to thousands of dense MTZs while sparing surrounding tissue.<sup>9-12</sup> The epidermis and dermis are coagulated but only within the MTZs. A density of 2500 MTZs/cm<sup>2</sup> at 10 mJ results in approximately 25% cross-sectional area of thermal damage. As a result, epidermal repair is rapid because of the relatively small area of injury and short migratory paths for keratinocytes. Twenty-four hours after fractional resurfacing, the continuity of the epidermal basal layer is restored.<sup>13</sup> Complete epidermal regeneration is obtained by day 7.<sup>13</sup>

The 1550-nm wavelength, which targets tissue water, penetrates to a depth of approximately 1000  $\mu$ m into the skin (absorption coefficient penetration, approximately 9.6 cm<sup>-1</sup> in water at 1550 nm).<sup>14</sup> By adjusting the optical focal length and/or the energy of the laser, high local radiant exposure can be achieved at various intradermal depths. Thus, different compartments of various depths can be arbitrarily selected as the targets of photothermolysis. The stratum corneum remains intact during exposure to 1550-nm irradiation because it contains less water.<sup>13</sup> This dramatically reduces the risk of infection compared with more complete ablative techniques.

Only a limited number of the keratinocytes within the lesion are removed in a single treatment session (limited to the MTZs). This results in rapid and complete epidermal healing between treatment sessions. With multiple treatment sessions, however, thermal damage over the whole treatment area can be achieved. Fractional resurfacing may improve Becker's nevus by removing acanthotic and pigmented epidermis.

Laser treatment of Becker's nevus has included ablative and Q-switched techniques. Ablative lasers, such as the 2940-nm erbium:YAG lasers, target tissue water and remove the entire epidermis and varying thicknesses of the dermis. Patients frequently experience posttreatment edema, erythema, burning, and crusting. Erythema can last several months.<sup>2</sup> Pigmentary changes, acne flares, herpes simplex infection, scars, and milia formation may also occur with ablative techniques.

Q-switched lasers, such as the 694-nm Q-switched ruby, 1064-nm Q-switched Nd:YAG, and 755-nm Q-switched alexandrite lasers, selectively damage epidermal and dermal melanin without removing the entire epidermis. This modality decreases the adverse effects associated with treat-

ment. There has also been a report of using the long-pulsed ruby laser for Becker's nevus to decrease both pigmentation and hair density.<sup>4</sup> With Q-switched lasers, complete clearing of the lesions is rarely achieved, and many treatment sessions are necessary.<sup>1</sup>

These 2 cases demonstrate marked lightening of a Becker's nevus on the chest and face after a series of fractional resurfacing treatments. Fractional resurfacing is a promising new treatment modality for Becker's nevus. No adverse effects were observed, and the safety profile appears to be fairly broad.<sup>15</sup> Additional controlled studies are warranted to better understand the efficacy of fractional resurfacing for the treatment of Becker's nevus and to determine optimal treatment settings.

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