

Laser Skin Treatment in Non-Caucasian Patients



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KEYWORDS

• Laser • Skin • Resurfacing • Ethnic • Fitzpatrick • Hispanic • African American • Asian

KEY POINTS

- Ethnic skin presents a unique challenge for laser skin rejuvenation because of higher density of larger melanosomes, thicker collagen bundles, and increased fibroblast responses.
- Lasers may be safely used in patients with dark skin tones by choosing fractional technologies with longer wavelengths, lower fluences, and longer pulse durations.
- The risks of laser therapy include scarring, postinflammatory hyperpigmentation, and hypopigmentation.
- Developing careful treatment plans based on patient goals and maintaining careful attention to pre-procedural and postprocedural management strategies can minimize the risk of complications.
- In the hands of an experienced laser surgeon, laser resurfacing in dark skin types may improve the appearance of fine wrinkles and even skin tone, texture, and pigmentation.

INTRODUCTION

In the last decade, there has been an increase in the use of lasers for facial skin rejuvenation. Owing to improved technologies, patients are able to confront dermatologic concerns in an office-based setting with outpatient procedures. Conditions such as photoaging, acne vulgaris, and dyschromia can be treated with laser therapy, with improved risk profiles and decreased recovery times. Although the demand for facial rejuvenation and cosmetic procedures continues to increase among all ethnic populations and skin types, not all patients and skin types are the same and there is no one-size-fits-all treatment algorithm. In addition, the complications of therapy vary between skin types, and careful attention must be paid to these reaction patterns and specific treatment options.

Skin types and colors are divided into 6 phototypes, Fitzpatrick skin types I through VI, with I being the fairest and VI being the darkest (**Table 1**).¹ Within a single ethnicity, there may be variable phototypes, and it is important to tailor the treatment to the patient. The number of melanocytes is consistent throughout all ethnicities. Melanocytes derive from neural crest cells and transfer melanosomes, which contain melanin, into keratinocytes. The color of skin depends on the density, size, and activity of melanosomes, as darker skin has a higher density of larger melanosomes.² In addition, darker skin types, Fitzpatrick types V and VI, have thicker and more compact skin layers with thicker collagen bundles, which increase the epidermal barrier and reduce skin sensitivity (**Fig. 1**).^{3,4} This barrier delays skin damage from the environment and ultraviolet

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Table 1
Anatomy of skin types

Fitzpatrick Skin Type	Skin Characteristics	Sun Exposure
I	Pale white skin; blonde or red hair; blue eyes; freckles	Burns easily, never tans
II	White fair skin; blonde or red hair; blue, green, hazel eyes	Burns easily, tans minimally with difficulty
III	Cream white skin; any hair or eye color	Burns moderately, tans moderately and uniformly
IV	Moderate brown skin, Mediterranean	Burns minimally, tans moderately and easily
V	Dark brown skin, Middle Eastern	Rarely burns, tans profusely
VI	Deeply pigmented dark brown to black	Never burns, tans profusely

Adapted from Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. Arch Dermatol 1988;124:870.

radiation and aging in darker phototypes when compared with lighter skin types. Due to these histologic differences, dark skin is at increased risk for injury due to incidental laser absorption by melanin, problems with postinflammatory hyperpigmentation, and decrease in melanin production leading to hypopigmentation.

Although there are many types of lasers, the fundamental principle is the same: all lasers treat the skin by targeting a specific chromophore. The main chromophores of the skin are hemoglobin, melanin, and water. In general, resurfacing lasers are designed at specific wavelengths that use water as a chromophore to cause targeted thermal damage in the dermis to promote new collagen formation and skin tightening.⁵ Other targetable chromophores include melanin, which has a broad, but

gradually decreasing, absorption coefficient from 250 to 1200 nm. The selection of a laser with a longer wavelength can allow for targeting of deep melanin or tattoo pigmentation in darker skin types.⁴

Other variables important to lasers include the thermal relaxation time, pulse duration, and energy fluence (**Table 2**). The thermal relaxation time is the time required for a tissue to cool to half the temperature to which it was heated. Heating the tissue for time longer than the thermal relaxation time can cause thermal damage to surrounding tissue. In dark-skinned individuals, it is important to select a pulse duration longer than the thermal relaxation time of the epidermis but shorter than the target chromophore to avoid epidermal blistering, crusting, pigmentation changes, and scarring.⁴ The fluence is the joules per square

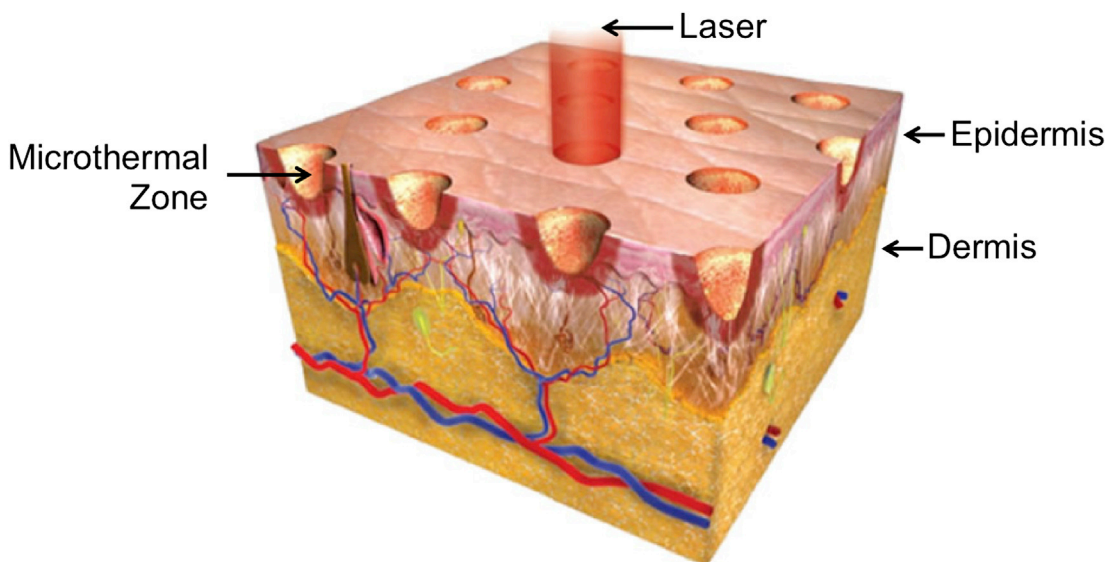


Fig. 1. Layers of the skin. The skin is divided into the epidermis, dermis, and hypodermis. Dark-skinned individuals have increased numbers of larger melanocytes, more compact skin layers, and thicker collagen bundles.

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