

# Cosmetic Concerns in Patients With Skin of Color, Part 2: Approaches to Treatment

Marcelyn K. Coley, MD; Andrew F. Alexis, MD, MPH

Skin of color is characterized by a diverse group of pigmented individuals of various ethnic backgrounds. With an increase in nonwhite individuals seeking cosmetic solutions to their skin concerns, there is a greater need to understand and address these concerns appropriately. Moreover, numerous disfiguring complications may occur following cosmetic procedures when the nuances of treating pigmented skin are not taken into consideration. Part 1 of this article, published in July, discussed common cosmetic concerns in patients with skin of color. Part 2 of this article reviews therapeutic approaches to those skin concerns and highlights special considerations for patients with skin of color.

**W**ith more than 10 million surgical and nonsurgical cosmetic procedures performed in 2008, an increasing proportion of cosmetic procedures are being performed in the United States on patients with skin of color. According to the American Society for Aesthetic Plastic Surgery,<sup>1</sup> nonwhite individuals have undergone approximately 20% of all cosmetic procedures performed in 2008. Multiple modalities are being used to address cosmetic concerns and aging in skin of color, including dyspigmentation, such as postinflammatory hyperpigmentation (PIH) and melasma, as well as oily skin, acne scarring, photodamage, and rhytides. Trends indicate a

preference for less invasive treatments, with a growing demand for minimally invasive procedures. Treatment, however, may be challenging as one must proceed with caution to minimize potential complications in skin of color.

## MANAGING HYPERPIGMENTATION

The mainstay in treatment of hyperpigmentation is hydroquinone (HQ), a phenolic compound that acts by inhibiting tyrosinase, thereby blocking melanin synthesis. In the United States, HQ 2% is available over-the-counter, whereas more effective formulations of 4% are available by prescription only. It may also be compounded as high as 10% at the expense of increased irritation.<sup>2</sup> Applied directly to affected dark areas twice daily, HQ should be applied with care to avoid the unaffected surrounding skin. Imprecise application may result in a halo effect. Whether alone or compounded with tretinoin, topical steroids, or both, HQ has shown positive results.<sup>3</sup> Overzealous use or abuse of HQ, however, can lead to the rare but serious complication of exogenous ochronosis.<sup>4,5</sup> Other side effects may include irritant and allergic contact dermatitis and colloid milia.<sup>6,7</sup> Because of these drawbacks, cosmetic companies have actively pursued development of other agents to lighten the skin (Table 1).<sup>8-10</sup>

*Dr. Coley is Clinical Research Fellow, and Dr. Alexis is Director, both at the Skin of Color Center, Department of Dermatology, St. Luke's-Roosevelt Hospital Center, New York, New York.*

*Dr. Alexis is a consultant for Estée Lauder Inc, and a speaker for Galderma S.A., Medicis Pharmaceutical Corporation, sanofi-aventis US LLC, and Stiefel Laboratories, Inc.*

*Correspondence: Andrew F. Alexis, MD, Skin of Color Center, Department of Dermatology, St. Luke's-Roosevelt Hospital Center, 1090 Amsterdam Ave, Suite 11B, New York, NY, 10025 (andrew.alexis@columbia.edu).*

## Skin-Lightening Agents

### Tyrosinase Inhibition

Aloesin

Arbutin

Azelaic acid

Kojic acid

Licorice extract

Magnesium-L-ascorbyl-2-phosphate

N-acetylglucosamine

Paper mulberry extract

Vitamin C

### Inhibition of Melanosome Transfer

Niacinamide

Soybean trypsin inhibitor

### Skin Turnover Acceleration

$\alpha$ -Hydroxy acids

Linoleic acid

Retinol

### Azelaic Acid

Azelaic acid is a nonphenolic compound that is approved by the US Food and Drug Administration for the treatment of acne, but has been used off-label for hyperpigmentation due to its inhibitory effect on tyrosinase. It has been reported to have some effect on hyperpigmentation disorders, such as melasma and PIH. Azelaic acid can inhibit DNA synthesis and mitochondrial activity, which explains its *in vitro* cytotoxic effects on abnormal melanocytes (ie, those that express hyperactivity or abnormal proliferation).<sup>11</sup> There is no effect on normal skin, freckles, solar lentigines, or nevi<sup>11</sup>; therefore, azelaic acid can be applied once daily to the hyperpigmented areas as well as to normal skin. One study comparing the efficacy of azelaic acid 20% and HQ 4% in the treatment of melasma found no significant differences between the 2 agents.<sup>12,13</sup> However, in author Dr. Andrew F. Alexis' experience, azelaic acid is best used as a second line agent because clinical responses to treatment appear to be less than those seen with HQ 4% formulations.

### Kojic Acid

Kojic acid, a hydrophilic fungal derivative, acts by inhibiting the production of free tyrosinase. Its efficacy has

been reported to be similar to that of HQ. Kojic acid is available commercially in concentrations of 1% to 4%. It also has the potential for causing allergic and irritant contact dermatitis and erythema.<sup>14</sup>

### Arbutin

Arbutin, a plant-derived derivative of HQ, has been used for PIH. It is found in bearberry, cranberry, and pears, and is available in the United States in a 3% concentration. Its effect appears to be dose dependent, and has been found to be less cytotoxic to melanocytes than HQ. A study by Boissy et al<sup>15</sup> demonstrated deoxyarbutin to be more effective than HQ or arbutin. However, no controlled trials have been published at this time.

### Topical Retinoids

Topical retinoids, such as tretinoin, are effective as monotherapy, or in conjunction with HQ or other depigmenting agents that can improve efficacy. However, as a monotherapy, it typically requires a 20- to 40-week treatment period.<sup>12,16</sup>

### Sunscreen

An important but often overlooked aspect of managing hyperpigmentation patients with skin of color is the use of sunscreen. In general, sunscreens are used to prevent sunburn, limit photodamage, and decrease the risk for skin cancers.<sup>17</sup> Many African Americans and other groups with skin of color may not consider sunscreen an important aspect in their skin care due to their lower risk for developing skin cancer. However, in treating disorders of hyperpigmentation, sunscreens may help prevent exacerbation of hyperpigmentation from UV exposure. Broad spectrum sunscreens (minimum SPF 15 with both UVA and UVB protection) in combination with sun avoidance and protective clothing, are recommended in the treatment of melasma and PIH.<sup>18</sup> UV blockers, which include titanium dioxide and zinc oxide, offer excellent protection against UVA and UVB.<sup>10,17</sup> Traditionally, these have been unpopular with patients with skin of color due to their tendency to have a chalky appearance on dark skin; however, many are now available in more cosmetically acceptable, micronized formulations.<sup>10,17</sup>

Pigmentary disorders resistant to traditional topical treatments may benefit from adjunctive in-office procedures such as chemical peels, microdermabrasion, and laser- and light-based therapies, which will be discussed later. In all cases of hyperpigmentation, however, the patient must be informed that it may take months of treatment before successful results are obtained; therefore, continuing the prescribed treatment is necessary for the best outcomes.

## APPROACH TO DERMATOSIS PAPULOSA NIGRA

Generally, treatment for dermatosis papulosa nigra (DPN), a benign neoplasm, is sought for aesthetic reasons, although some lesions may become irritated or pruritic. There may be feelings of anxiety, fear of cancer, or professional concerns related to the appearance of DPN.<sup>19</sup> Treatment options include light electrodesiccation, curettage, cryotherapy, and snip excision for pedunculated lesions. In Dr. Alexis' experience, light electrodesiccation is the safest and most effective treatment option for small DPNs, and are best left to fall off spontaneously (rather than using curettage postelectrodesiccation) in order to further minimize epidermal injury. Intralesional lidocaine is useful for treatment of fewer or larger lesions. However, in more widespread involvement, topical anesthetics may be advantageous, with satisfactory levels of anesthesia for most patients when applied 30 to 60 minutes prior to the procedure.<sup>20</sup>

Lasers, such as the 532 diode,<sup>21</sup> and more recently the long-pulsed 1064-nm Nd:YAG,<sup>22</sup> have been successful in the treatment of DPN. Schweiger et al<sup>22</sup> reported 2 cases of middle-aged African American females with long-standing histories of DPN. In both cases, each lesion was treated with a double pulse from the Nd:YAG laser using a 3-mm spot size, a fluence range of 145 to 155 J/cm<sup>2</sup>, and a pulse duration of 20 ms. At 2-month follow-up, the treated areas had resolved without dyschromia in approximately 90% and 70% of lesions treated in the 2 cases, respectively. No scarring was observed. Further studies will be necessary in the future to support these reports. It is recommended that patient satisfaction be confirmed by treating a test area prior to proceeding to the full treatment area.

Potential pigmentary alteration is the most common adverse effect with any of the previously mentioned treatments, either hypopigmentation or hyperpigmentation. In order to prevent pigment alteration, special care should be taken to minimize injury to normal skin (beneath and adjacent to the lesion). Hypopigmentation can be particularly problematic after cryosurgery because melanocytes are sensitive to freezing damage.<sup>23</sup>

## REJUVENATION IN SKIN OF COLOR

It is generally accepted that patients with darker complexions show noticeable signs of aging later than patients with fair complexions. For this reason, invasive antiaging procedures, such as laser resurfacing and rhytidectomies, are not performed as frequently in patients with skin of color as compared to white individuals. Nevertheless, nonwhite individuals accounted for approximately 20% of all cosmetic procedures in 2008, an increase from

1997 by 5%.<sup>1,24</sup> Minimally invasive cosmetic procedures are becoming more popular with botulinum toxin injections, laser hair removal, and dermal fillers as the most commonly performed nonsurgical cosmetic procedures in 2008.<sup>1</sup>

### Botulinum Toxin

The cosmetic use of botulinum toxin type A (BTX-A) injections has been recognized as an effective and efficient treatment of dynamic wrinkles for nonwhite individuals. Overall, there has been more than a 30-fold increase in botulinum toxin injections since 1997.<sup>1,24</sup> Though darker skinned patients have fewer wrinkles than their fairer contemporaries, BTX-A treatments are performed safely and effectively in patients with skin of color.<sup>25</sup> In darker skinned patients, dynamic wrinkles are predominantly found in the upper face, especially the glabellar area. All patients appear to respond similarly to BTX-A injections, independent of skin color. There has been a recent phase IV clinical trial evaluating the efficacy of BTX-A in African American women with Fitzpatrick skin types V and VI. An analysis of the comparative efficacy and safety among subjects receiving 20 U or 30 U found no statistically significant differences between the 2 doses.<sup>25</sup> These results were consistent with results from prior studies assessing efficacy and safety of BTX-A in white women.<sup>26</sup>

Injection-related hyperpigmentation, hypopigmentation, or both may occur in darker skinned patients, but is unexpected after injections. One study examining depigmentation in 26 African American patients who received repeated periocular injections of BTX-A found no evidence of periocular cutaneous depigmentation.<sup>27</sup>

### Dermal Fillers

Soft tissue fillers are gaining popularity with all ethnicities. Midface aging in darker skin warrants filler correction of nasolabial folds and expression lines. The thicker and more fibrous nature of dermis in patients with skin of color predisposes them to a more pronounced fibroblastic response during wound healing, which may promote hypertrophic scarring and keloid formation. Therefore, patient selection is important for successful outcomes. Detailed histories and physical exams help to determine patients most prone to adverse effects such as dyspigmentation and abnormal scarring. When injecting into the face in patients with skin of color, it is important to minimize skin injury, which could lead to pigment alteration. As such, a linear threading injection technique is generally preferred over serial puncture in order to minimize the number of needle punctures used. An initial, small test injection with a watch period of a few weeks may be considered in those patients thought to be high risk, though this is generally not required.

Many complications are technique related in both white and nonwhite individuals. If fillers are injected too superficially or into thin skin, which may occur in the periorbital areas, a bluish appearance may occur in the skin. For some darker skinned patients, injection site dyschromia may occur but generally resolves spontaneously within several weeks. No reports of keloid formation or hypertrophic scars postinjection have been found. Despite the trend for more patients with skin of color desiring cosmetic procedures, until recently, data evaluating the use of fillers in skin of color were limited due to few nonwhite participants enrolled in clinical trials. For this reason, the US Food and Drug Administration approved the use of various hyaluronic acid (HA) products on the condition that they would conduct postmarketing studies of additional patients with Fitzpatrick skin types IV through VI to specifically assess the likelihood of keloid formation, pigmentary changes, or hypersensitivity in this population.<sup>28,29</sup> In a follow-up, postmarketing clinical trial of 150 African American participants (Fitzpatrick skin types IV–VI) treated with HA for nasolabial folds, 9% developed PIH (14/150). Fifty percent of adverse events lasted up to 6 weeks after initial implantation. Studies of other HA fillers have also demonstrated safety and efficacy in patients with skin of color. In addition, other dermal fillers, including calcium hydroxylapatite<sup>30</sup> and poly-L-lactic acid<sup>31</sup> have also been used safely and effectively in darker skinned groups.

## RESURFACING PROCEDURES

### Chemical Peels

Chemical peels have been used for treatment of melasma, PIH, pseudofolliculitis barbae, acne, scarring, and general rejuvenation. The primary indication for chemical peeling in Fitzpatrick skin types III to VI is for dyschromias.<sup>32</sup> In Fitzpatrick skin types I and II, chemical peels are more commonly used for the management of photoaging, including lentigines and fine rhytides. Chemical peels, when limited to peeling agents for superficial depth such as salicylic acid and glycolic acid, can be safely performed on darker skin types.<sup>32</sup> Medium depth to deep peels are generally not recommended for Fitzpatrick skin types IV to VI as they may result in severe complications, such as dyspigmentation and hypertrophic scarring. Liquid salicylic acid solution 20% to 30% applied to the face for 3 to 5 minutes, or a 20% to 70% buffered glycolic acid solution left in place for 2 to 4 minutes, have been shown to be safe and effective.<sup>32</sup> A pilot study by Grimes<sup>33</sup> revealed a moderate to significant clinical improvement in 9 of 11 subjects with PIH or melasma, Fitzpatrick skin types V and VI, who were treated with a series of salicylic acid peels. Pretreatment with HQ 4% for 2 to 4 weeks is

recommended by some authors to reduce postpeel hyperpigmentation in patients with skin of color.<sup>32,33</sup> A series of 3 to 6 treatments every 2 to 4 weeks is typically performed based on the severity of the areas to be treated.

### Microdermabrasion

Microdermabrasion works by 2 basic premises: (1) superficial abrasion of the skin with fine, sharp crystals (eg, aluminum oxide, salt, or sodium bicarbonate) via positive or negative flowing pressure; (2) a closed-loop vacuum suction device to remove the crystals, along with dead skin, oil, and surface debris.<sup>34</sup> Slow movement with the handpiece, along with a higher number of passes, increases the depth of microdermabrasion.<sup>34</sup> This modality of resurfacing has relatively superficial results and has been safely performed on all skin types. As with other resurfacing procedures, care must be taken to minimize the extent of epidermal injury with microdermabrasion in order to prevent pigmentary complications.

### Lasers

Laser resurfacing can be divided into ablative and nonablative surgery. Via destruction of the epidermis, the primary goal of ablative resurfacing is to improve texture, tone, and overall quality of the skin. In Fitzpatrick skin types I to III, the CO<sub>2</sub> and Er:YAG lasers have been effective in improving photoinduced rhytides, dyschromia, and scarring.<sup>35</sup> While these ablative lasers have also been proven effective in darker skin types, they carry a greater risk for transient or permanent dyspigmentation. As many as 66% to 100% of patients with Fitzpatrick skin types IV to VI will develop some degree of hyperpigmentation in contrast to up to 40% in Fitzpatrick skin types I to III.<sup>36</sup> Given the considerable risk for dyschromia and keloids, ablative resurfacing in darker skin types is generally not recommended.

Nonablative resurfacing refers to laser treatment of the dermis while preserving the epidermis. Commonly used nonablative laser systems include the Q-switched 1064-nm Nd:YAG laser,<sup>37,38</sup> 1320-nm Nd:YAG laser,<sup>39,40</sup> 1450-nm diode laser,<sup>40</sup> 1540-nm Er:glass laser,<sup>41</sup> and the Er:doped 1550-nm fractional laser.<sup>42</sup> Published experience with these lasers is largely in Fitzpatrick skin types I to III, but there is growing experience in darker skin types, especially with regards to the 1550-nm Er:doped fractional laser. The majority of darker pigmented individuals present for improvement of dyschromia, whereas a minority present for rhytides, textural irregularities, enlarged pores, and general tissue laxity. It is important that no oral isotretinoin be used at least one year prior because there is a reportedly higher risk for abnormal postoperative healing and scarring.<sup>34</sup> Topical

retinoids should be stopped one week prior to minimize further irritation.

### Intense Pulsed Light

Recently, Kono et al<sup>43</sup> compared the use of intense pulsed light (IPL) with a long-pulsed dye laser for facial skin rejuvenation in 10 Asian patients with Fitzpatrick skin types III and IV. Although both systems were effective, the long-pulsed dye laser more effectively treated lentigines, but there was only minimal improvement in rhytides noted with either system. A new advance is the photo-pneumatic IPL system that utilizes a pneumatic system to stretch the skin while light is being emitted on the skin. This system helps to allow evaporative cooling and dispersion of the epidermal pigment to minimize absorption by melanin.<sup>36</sup> Currently, it is available in a 580-nm filter for safer use in darker skin types. More studies are needed to further establish the safety of this and other IPL lasers across the spectrum of darker skin types.

### Radio Frequency

Radio frequency uses an electric current that is applied to the skin, transforming increased ionic energy into heat generation in the dermis. This causes collagen denaturation and contraction. Further improvement continues months later,<sup>44</sup> resulting in overall improvement in wrinkles and skin laxity. Melanocytes are relatively protected in darker pigmented individuals because there is no light transmitted with this method. However, appropriate surface cooling is necessary to prevent epidermal damage and melanocyte destruction. Further research studies are needed in darker Fitzpatrick skin types IV to VI.

### Fractional Lasers

Fractional lasers can be used to treat epidermal pigmentation, melasma, and rhytides, as well as textural alterations, such as acne scars or surgical scars.<sup>45</sup> Early data show that PIH is less common with this modality when lower treatment densities are used in pigmented skin.<sup>45,46</sup> Pretreatment with HQ 4% is often recommended to reduce the risk for PIH in patients with skin of color. While fractional nonablative lasers can be safely used on Fitzpatrick skin types IV to VI, the safety of fractional ablative (CO<sub>2</sub>) lasers has yet to be established in patients with skin of color.

## MANAGEMENT OF UNWANTED HAIR

Various modalities for masking or removing excessive or unwanted hair exist dependent upon patient preferences and goals for short- or long-term hair removal. Whether for medical or cosmetic indications, potential problems arise with hair removal techniques, and associated

adverse effects are seen dependent on the modality used. Methods of hair removal include shaving, tweezing, waxing, sugaring, threading, chemical depilatories, mechanical epilation, electrolysis, lasers, and nonlaser light sources. In addition, eflornithine hydrochloride cream 13.9% is approved in the United States for treatment of unwanted facial hair in women. It functions through irreversible inhibition of skin ornithine decarboxylase, an enzyme in hair cell division, resulting in a reduced rate in hair growth.<sup>47-49</sup>

### Laser-Assisted Hair Removal in Patients With Skin of Color

Laser-assisted hair removal is the most recent advance in permanent hair reduction. The demand for removal of unwanted hair continues to increase. Laser-assisted hair removal was the second most common nonsurgical cosmetic procedure performed in the United States in 2008.<sup>1</sup> Studies have shown safe and effective use of laser epilation in darker skin types, in particular Fitzpatrick skin types IV to VI, using longer wavelength lasers, including the diode (800–810 nm)<sup>50,51</sup> and long-pulsed 1064-nm Nd:YAG.<sup>50,52-54</sup> Also effective in hair reduction in various Fitzpatrick skin types (I–V) is IPL, but when compared to long-pulsed Nd:YAG was associated with higher risk for hyperpigmentation in the darkest patients and also requires more treatment sessions.<sup>55</sup> Therefore, the 810-nm diode and the long-pulsed 1064-nm Nd:YAG lasers are preferred for patients with skin of color.

Ross et al<sup>53</sup> reported the use of 1064-nm Nd:YAG coupled with contact cooling as an effective treatment option for pseudofolliculitis barbae in Fitzpatrick skin types IV to VI, documenting significant reduction in hair and subsequent papule formation. Posttreatment biopsies showed evidence of severe thermal damage to the bulb of the hair follicle with preservation of the epidermis, supporting the concept that longer wavelengths penetrate the skin more effectively, causing less thermal damage to the epidermis.<sup>53</sup> Weaver and Sagaral<sup>54</sup> also documented a decrease in the quantity of papules, pustules, and hairs after 2 treatments in patients with active pseudofolliculitis barbae using the long-pulsed 1064-nm Nd:YAG laser on Fitzpatrick skin types V and VI. At 3-month follow-up, the mean papule/pustule percentage reduction was 75.9% as compared with the control at 28.6%. The most common side effects observed included transient hyperpigmentation, transient hypopigmentation, mild erythema, and itching.

Some important considerations for patients with skin of color include pretreatment with an HQ cream 1 to 2 weeks prior in those considered prone to PIH. For added epidermal protection in darker skin, longer-pulsed durations and



optimal cooling is recommended. Contact cooling (eg, a sapphire tip or a chilled, copper-plated handpiece) is preferred for skin of color, given the risk for dyschromia secondary to cryogen sprays, which has been reported in darker skinned patients.<sup>56</sup> Posttreatment ice packs to the treated areas help to minimize thermal injury to the epidermis. Treatment sessions are repeated at 1- to 3-month intervals, with the best results after 4 to 6 sessions. Direct sun avoidance and use of a broad spectrum sunscreen is strongly advised before, during, and after treatment series.<sup>56</sup>

### CONCLUSION

Aesthetic procedures are becoming increasingly desirable among darkly pigmented groups. When treating cosmetic concerns in patients with skin of color, special considerations are necessary to prevent dyschromias and scarring. The inherent properties of skin structure and function in patients with skin of color requires a rather cautious and conservative approach to treatment. However, taking into account these precautions as well as ethnic variations in aesthetic concerns, cosmetic dermatologists can treat patients of all skin types safely and effectively. Continuing research will hopefully bring a broader range of effective treatment options for patients with skin of color.

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