

A SUPPLEMENT TO

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SKIN IN THE GAME: WHY INTEGRATED  
SKINCARE IN PATIENTS WITH SKIN  
OF COLOR MATTERS

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## Skincare in Skin of Color: A Comprehensive Approach to Preprocedure, Intraprocedure, and Postprocedure

*Based on a Medscape Online Activity*

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**Target Audience**

This activity is intended for plastic surgeons, aesthetic medicine specialists, dermatologists, nurses, nurse practitioners, physician assistants, pharmacists, and other clinicians who treat skin conditions or specialize in skin care.

**Goal Statement**

The goal of this activity is for learners to be better able to include integrated skincare into their treatment approaches for patients with skin of color.

**Learning Objectives**

Upon completion of this activity, participants will:

- **Have increased knowledge** regarding the data on integrated skincare
- **Have greater competence** related to recommending integrated skincare regimens for patients with diverse skin tones

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# Skincare in Skin of Color: A Comprehensive Approach to Preprocedure, Intraprocedure, and Postprocedure

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## ABSTRACT

Hyperpigmentation, uneven skin tone, textural changes, and dull skin are common cosmetic concerns in skin of color. Other signs of aging, including fine lines, deeper wrinkles, and skin laxity, also occur but may present in later decades. In-office procedures such as laser treatments, energy devices, toxins, fillers, and chemical peels are useful options for addressing the most common cosmetic concerns in skin of color patients. Skincare can play an important role in improving cosmetic outcomes when used in conjunction with in-office procedures. With the availability of these approaches, clinicians can now integrate in-office procedures with skincare strategies to offer patients with skin of color a comprehensive treatment plan that meets their needs.

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## Importance of Assessing Skin of Color in the Clinic

Race and ethnicity are influenced by several factors, including geographic, social, and cultural influences.<sup>1,2</sup> Skin conditions often present differently in patients with darker skin, and these differences can impact treatment options and clinical outcomes.<sup>3,4</sup> Due to the unique presentation of certain dermatologic conditions in skin of color, skin tone should be considered when making clinical assessments and therapeutic decisions for this population.

## Skin Color Approximation Scales in Use

The most widely used scale to classify skin color is the Fitzpatrick skin classification scale. The original Fitzpatrick Skin Type (FST) scale included skin types I to IV and was developed to help determine appropriate doses of ultraviolet (UV) light therapy for patients with psoriasis.<sup>5</sup> Skin types I to IV were defined by the self-reported ability to tan or burn. Later, the FST was expanded to include types V (brown) and VI (dark).<sup>6,7</sup>

A newer scale, the Skin Color and Ethnicity scale, expands on the FST by further breaking down skin types IV and V into IVa and IVb, and Va and Vb, respectively (Figure 1).<sup>8</sup> In this newly proposed scale, other characteristics are used to help define skin types, including freckling, fine wrinkles, and the presence of truncal nevi. For example, in this new scale, wrinkling is classified as more prominent in skin type IVa compared with skin type IVb. In another example, the scale describes skin type Va as having minimal truncal nevi compared with skin type Vb as having no truncal nevi.<sup>8</sup> This scale also aims to better define the risk of postprocedure scarring and postinflammatory hyperpigmentation in different skin types, and may be useful in selecting certain cosmetic and surgical procedures.

## Biological and Physical Characteristics Unique to Skin of Color

Skin color can influence the risks and outcomes of many cosmetic procedures. The risk of postinflammatory hyperpigmentation and scarring generally increases in darker skin types.<sup>9</sup> Skin color is largely dictated by the distribution of melanosomes

**FIGURE 1.** Skin type and tanning ability according to the Updated Fitzpatrick Classification Scale.<sup>8</sup>

I	II	III	IVa	IVb	Va	Vb	VI
<ul style="list-style-type: none"> <li>Burns frequently, rarely tans</li> <li>Freckling</li> <li>Wrinkles</li> <li>Deep lines</li> <li>Truncal nevi</li> <li>No palmar/plantar nevi</li> <li>No restrictions with lasers or peels including deep peels</li> <li>Rare keloid tendency</li> <li>Postinflammatory erythema more likely than PIH</li> </ul>	<ul style="list-style-type: none"> <li>Occasionally burns, can tan</li> <li>Freckling</li> <li>Wrinkles</li> <li>Deep lines and solar elastosis</li> <li>Truncal nevi</li> <li>No palmar/plantar nevi</li> <li>No restrictions with lasers or peels, including deep peels</li> </ul>	<ul style="list-style-type: none"> <li>Tans more than burns</li> <li>Freckling</li> <li>Fine wrinkles</li> <li>Etched in lines in the upper face</li> <li>IGH on the chest and legs</li> <li>Truncal nevi</li> <li>No palmar/plantar nevi</li> <li>Care with peels and lasers</li> </ul>	<ul style="list-style-type: none"> <li>Tan, rarely burns</li> <li>Freckling</li> <li>Fine wrinkles</li> <li>Etched in lines in the upper face</li> <li>Fewer truncal nevi</li> <li>Labial lentigos</li> <li>Occasional palmar/plantar nevi</li> <li>Care with medium peels</li> <li>Cautions with lasers</li> <li>Beware of keloidal scarring</li> </ul>	<ul style="list-style-type: none"> <li>Tans</li> <li>Freckling</li> <li>Etched in lines in the upper face</li> <li>Minimal truncal nevi</li> <li>Labial lentigos</li> <li>Palmar/plantar nevi</li> <li>Cautions with medium peels</li> <li>Cautions with lasers</li> <li>Beware of keloidal scarring</li> </ul>	<ul style="list-style-type: none"> <li>Tans easily</li> <li>Etched in lines in the upper face</li> <li>Minimal truncal nevi</li> <li>Labial lentigos</li> <li>Palmar/plantar nevi</li> <li>Cautions with medium peels</li> <li>Warning with lasers</li> <li>Beware of keloidal scarring</li> </ul>	<ul style="list-style-type: none"> <li>Tans easily</li> <li>Features of VI but may have reactive dyschromia like a Va</li> <li>May have etched in lines in the upper face</li> <li>No truncal nevi</li> <li>Labial lentigos</li> <li>Palmar/plantar nevi</li> <li>Warning with medium peels</li> <li>Warning with lasers</li> <li>Beware of keloidal scarring</li> </ul>	<ul style="list-style-type: none"> <li>Tans easily</li> <li>Reactive dyschromia likely</li> <li>May have etched in lines in the upper face</li> <li>No truncal nevi</li> <li>Palmar/plantar nevi</li> <li>Warning with medium peels</li> <li>Warning with lasers</li> </ul>

IGH, idiopathic guttate hypomelanosis.

Coleman W, et al. Updating the Fitzpatrick classification: the skin color and ethnicity scale. *Dermatol Surg.* 2023;49(8):725-731.

within melanocytes and keratinocytes. In darkly pigmented skin, melanosomes are large and individually dispersed within cells. In lightly pigmented skin, the melanosomes are small and grouped.<sup>10,11</sup> This biological phenomenon gives rise to the color we visualize on a person's skin.

Although many physiological properties of skin have been shown to be similar between the different racial/ethnic groups, there are some differences that have been consistently reported in the literature. For example, ceramides have been reported to be lower in patients of African descent compared with other racial/ethnic groups (Whites, Hispanic Americans, Asians).<sup>12-14</sup>

In addition to these differences, some structural differences in the skin between different racial/ethnic groups have been described. While the skin of black and white subjects has been reported to have equal thickness, the stratum corneum in black skin appears to have a greater number of layers that are more compact and cohesive.<sup>15</sup>

This finding aligns with the observation that more tape stripping, a technique used to remove the stratum corneum, is required for black subjects compared with white subjects.<sup>16</sup> A higher degree of stratum corneum compactness may reduce skin fragility and may contribute to the delayed visible signs of aging often observed in black individuals compared with those with lighter skin.<sup>14</sup>

### Aesthetic Challenges and Concerns in Patients With Skin of Color

One of the biggest challenges for patients with skin of color is hyperpigmentation, and one of the most common causes of hyperpigmentation is postinflammatory hyperpigmentation (PIH). Skin injuries, such as those arising from acne, insect bites, scratches, and burns, are frequent causes of PIH and

are characterized by the appearance of dark spots and patches on the skin.<sup>17,18</sup> In-office procedures such as specific laser treatments and chemical peels also carry a risk of PIH in darker skin types.<sup>14,17</sup> In general, the risks of pigmentary alterations and scarring are significantly higher in the skin of color population. For this reason, risks and benefits should be carefully considered for elective procedures in patients with skin of color.

Another common cause of hyperpigmentation in skin of color is photoaging. Uneven skin tone, dull skin, and lack of radiance/glow are common complaints in skin of color patients. Although studies suggest that certain signs of aging are delayed by up to 10 years in black subjects, wrinkles/deep expression lines, periorbital and perioral subcutaneous volume loss, and skin laxity may become more prominent in skin of color in the later decades of life.<sup>14,19,20</sup>

Patients with skin of color are also prone to developing hypertrophic scarring, or keloids, which is thought to be related to robust fibroblast activity.<sup>21,22</sup>

## Agents Available for Maintaining Skin Health in Skin of Color

### *Strategies for Addressing Hyperpigmentation*

Hydroquinone is a tyrosinase inhibitor and is often considered the gold standard in the management of hyperpigmentation. It is most frequently used for the short-term management of melasma and PIH. However, hydroquinone is not recommended for long-term use due to rare side effects, including exogenous ochronosis.<sup>14,23</sup>

Over the last several decades, several tyrosinase inhibitors that are alternatives to hydroquinone have been introduced. These include agents such as resorcinol, kojic acid, licorice root, and cysteamine.<sup>14,24-27</sup> Other agents, such as niacinamide, work via a different mechanism to decrease hyperpigmentation by inhibiting melanosome transfer. Soy also inhibits melanosome transfer by blocking protease-activated receptor-2 (PAR-2) signaling.<sup>14,25,28,29</sup>

Many cosmeceuticals now contain combinations of ingredients aimed at treating hyperpigmentation. Combining products or ingredients is often helpful in achieving the best results when treating hyperpigmentation.

### *Anti-Aging Approaches*




Anti-aging therapies that may be considered for patients with skin of color include agents such as antioxidants, peptides, glycation inhibitors, and retinoids. Topical retinoids address many signs of photoaging, including fine lines and textural changes. In addition, topical retinoids have the added benefit of improving hyperpigmentation.<sup>14,17,25</sup> Glycation inhibitors are an emerging class of agents that include several natural compounds, such as polyphenols, polysaccharides, terpenoids, vitamins, and alkaloids.<sup>30,31</sup> These compounds are actively being studied to prevent the toxic accumulation of intracellular biomolecular complexes known as advanced glycation end-products (AGEs), which are implicated in the pathophysiology of aging and other chronic metabolic conditions (eg, cardiovascular disease, diabetes).<sup>30,31</sup>

### *Guarding Skin Against Environmental Stressors*

Sunscreen is particularly important for patients of color to prevent hyperpigmentation and protect against other unwanted skin changes observed from chronic exposure to UV radiation. For patients with skin of color, a tinted sunscreen that closely matches the patient's skin tone is often recommended to prevent the white cast that can be observed when mineral sunscreens are applied to darker skin.<sup>32</sup> Patients may opt to use nanoparticle-based sunscreens such as those with zinc oxide or titanium oxide; these formulations result in a relatively transparent final product that may be compatible with some patients with skin of color.<sup>32,33</sup> Applying serums or moisturizers that contain antioxidants and metal-chelating agents prior to sunscreen may also be used to improve protection against free radicals produced from the sun's UV light. These agents can also protect against environmental toxins such as cigarette smoke and particulate matter.<sup>32,34</sup>



**FIGURE 2.** The integrated approach to managing common aesthetic concerns in patients with skin of color.<sup>39-48</sup>

A. Case 1: 36-Year-Old Caucasian Woman	B. Case 2: 37-Year-Old Asian Woman	C. Case 3: 42-Year-Old Black Woman
 <ul style="list-style-type: none"> <li>▪ Aesthetic concern: would like to address some visible signs of aging</li> <li>▪ Recommended treatment: you elect to use injectable fillers + neuromodulators</li> <li>▪ Skincare adjunct: topical retinoid, topical antioxidant, sunscreen</li> </ul>	 <ul style="list-style-type: none"> <li>▪ Aesthetic concern: would like to address melasma</li> <li>▪ Recommended treatment: you elect to use energy-based device</li> <li>▪ Skincare adjunct: topical skin brighteners, topical antioxidants, sunscreen</li> </ul>	 <ul style="list-style-type: none"> <li>▪ Aesthetic concern: would like to address her uneven skin tone</li> <li>▪ Recommended treatment: you elect to do a chemical peel</li> <li>▪ Skincare adjunct: daily skincare post-chemical peel, topical skin brighteners, sunscreen</li> </ul>

(A) Reproduced from Kurtti A et al<sup>47</sup> with permission. (B) Masub N et al. The vascular component of melasma: a systematic review of laboratory, diagnostic, and therapeutic evidence. *Dermatol Surg*. 2020;46(12):1642-1650. (C) Reproduced from Sadick N et al<sup>48</sup> with permission.

### *Integrated Skincare: A Multipronged Approach to Patient Management*

Integrated skincare merges the use of clinically proven cosmeceuticals with professional aesthetic procedures to give patients a comprehensive solution for their particular aesthetic concerns.<sup>35</sup> Several in-office procedures are often used to address the common cosmetic concerns of skin of color patients. These include laser treatments, energy devices, toxins, fillers, and chemical peels.<sup>36,37</sup> The skincare agents highlighted above may be particularly helpful in patients with skin of color, for preprocedure and postprocedure management. Adjunctive skincare may help to decrease the risk of unwanted sequela such as hyperpigmentation. In addition, adjunctive skincare may help to maximize cosmetic outcomes with in-office procedures. (Figure 2).<sup>14,38-47</sup>

Adjunctive skincare recommendations include the addition of hydroquinone or other agents that target hyperpigmentation. These skin-brightening agents may help reduce the risk of procedure-related adverse events, while simultaneously targeting underlying pigmentary issues.<sup>14</sup> Other recommendations include stopping retinoids before chemical peels or other procedures that can disrupt the skin barrier. This practice may help to avoid adverse events, such as irritation or deep desquamation.<sup>14,48</sup> It is important that clinicians carefully select appropriate adjunctive skincare, timing, dosing, and formulation to optimize nonsurgical outcomes in patients.<sup>14</sup>



## KEY TAKEAWAYS

Hyperpigmentation, uneven skin tone, textural changes, and dull skin are common cosmetic concerns in skin of color. Other signs of aging, including fine lines, deeper wrinkles, and skin laxity, also occur, but may present in later decades of life.<sup>14,17-19</sup> Cosmeceuticals to address hyperpigmentation, antioxidants, metal-chelating agents, and glycation inhibitors may be useful in combating these signs of aging.<sup>14,17,25,30-33</sup> Elective cosmetic procedures such as chemical peels, toxins, fillers, lasers, and energy devices are also effective treatment options to address cosmetic concerns in patients with skin of color; however, it is important to note that some of these procedures carry different risks in this population. Adjunctive treatment with cosmeceuticals can help to reduce unwanted side effects and improve overall outcomes of cosmetic procedures.<sup>14</sup> Dermatologists should consider available strategies to combine cosmeceuticals with in-office procedures to provide the best outcomes for patients with skin of color.

## DISCLOSURES

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## REFERENCES

- Massie JP, Cho DY, Kneib CJ, et al. A picture of modern medicine: race and visual representation in medical literature. *J Natl Med Assoc.* 2021;113:88-94.
- Lewis C, Cohen PR, Bahl D, et al. Race and ethnic categories: a brief review of global terms and nomenclature. *Cureus.* 2023;15:e41253.
- Narla S, Heath CR, Alexis A, et al. Racial disparities in dermatology. *Arch Dermatol Res.* 2023;315:1215-1223.
- Taylor SC. Skin of color: biology, structure, function, and implications for dermatologic disease. *J Am Acad Dermatol.* 2002;46:S41-S62.
- Santiago S, Brown R, Shao, et al. Modified Fitzpatrick scale-skin color and reactivity. *J Drugs Dermatol.* 2023;22:641-646.
- Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. *Arch Dermatol.* 1988;124:869-871.
- Ly BC, Dyer EB, Feig JL, et al. Research techniques made simple: cutaneous colorimetry: a reliable technique for objective skin color measurement. *J Invest Dermatol.* 2020;140:3-12.e1.
- Coleman W, Mariwalla K, Grimes P. Updating the Fitzpatrick classification: the skin color and ethnicity scale. *Dermatol Surg.* 2023;49:725-731.
- Sangha AM. Dermatological conditions in skin of color: managing atopic dermatitis. *J Clin Aesthet Dermatol.* 2021;14(Suppl 1):S20-S22.
- Iwuala C, Taylor SC. Structural and functional differences in skin of color. *Clin Exp Dermatol.* 2022;47:247-250.
- Rawlings AV. Ethnic skin types: are there differences in skin structure and function? *Int J Cosmet Sci.* 2006;28:79-93.
- Sugino K, Imokawa G, Maibach HL. Ethnic difference of varied stratum corneum function in relation to stratum corneum lipids. *J Dermatol Sci.* 1993;6: Abstract 569.
- Alexis AF, Woolery-Lloyd H, Williams K, et al. Racial/ethnic variations in skin barrier: implications for skin care recommendations in skin of color. *J Drugs Dermatol.* 2021;20:932-938.
- Quiñonez RL, Agbai OM, Burgess CM, et al. An update on cosmetic procedures in people of color. Part 1: scientific background, assessment, preprocedure preparation. *J Am Acad Dermatol.* 2022;86:715-725.
- Weigand DA, Haygood C, Gaylor JR. Cell layers and density of Negro and Caucasian stratum corneum. *J Invest Dermatol.* 1974;62:563-568.

16. Chu M, Kollias N. Documentation of normal stratum corneum scaling in an average population: features of differences among age, ethnicity, and body site. *Br J Dermatol*. 2011;164:497-507.
17. Davis EC, Callender VD. Postinflammatory hyperpigmentation: a review of the epidemiology, clinical features, and treatment options in skin of color. *J Clin Aesthet Dermatol*. 2010;3:20-31.
18. American Academy of Dermatology Association (AAD). How to fade dark spots in darker skin tones. Available at: <https://www.aad.org/public/everyday-care/skin-care-secrets/routine/fade-dark-spots>. Accessed February 13, 2024.
19. Humphrey S, Manson Brown S, Cross SJ, et al. Defining skin quality: clinical relevance, terminology, and assessment. *Dermatol Surg*. 2021;47:974-981.
20. Alexis AF, Grimes P, Boyd C, et al. Racial and ethnic differences in self assessed facial aging in women: results from a multinational study. *Dermatol Surg*. 2019;45:1635-1648.
21. Huang C, Murphy GF, Akaishi S, et al. Keloids and hypertrophic scars: update and future directions. *Plast Reconstr Surg Glob Open*. 2013;1:e25.
22. Nangole FV, Agak GW. Keloid pathophysiology: fibroblast or inflammatory disorders? *JPRAS Open*. 2019;22:44-54.
23. Lazar M, De La Garza H, Vashi NA. Exogenous ochronosis: characterizing a rare disorder in skin of color. *J Clin Med*. 2023;12:4341.
24. Philipp-Dormston WG, Echagüe, Pérez Damonte SH, et al. Thiamidol containing treatment regimens in facial hyper-pigmentation: an international multi-centre approach consisting of a double-blind, controlled, split-face study and of an open-label, real-world study. *Int J Cosmet Sci*. 2020;42:377-387.
25. Searle T, Al-Niami F, Ali FR. The top 10 cosmeceuticals for facial hyperpigmentation. *Dermatol Ther*. 2020;33:e14095.
26. Maeda K. Mechanism of action of topical tranexamic acid in the treatment of melasma and sun-induced skin hyper-pigmentation. *Cosmetics*. 2022;9:108.
27. Moolla S, Miller-Monthrope Y. Dermatology: how to manage facial hyperpigmentation in skin of colour. *Drugs Context*. 2022;11:2021-11-2.
28. Leyden J, Wallo W. The mechanism of action and clinical benefits of soy for the treatment of hyperpigmentation. *Int J Dermatol*. 2011;50:470-477.
29. Woolery-Lloyd H, Kammer JN. Treatment of hyperpigmentation. *Semin Cutan Med Surg*. 2011;30:171-175.
30. Song Q, Liu J, Dong L, et al. Novel advances in inhibiting advanced glycation end product formation using natural compounds. *Biomed Pharmacother*. 2021;140:111750.
31. Twarda-Clapa A, Olczak A, Bialkowska AM, et al. Advanced glycation end-products (AGEs): formation, chemistry, classification, receptors, and diseases related to AGEs. *Cells*. 2022;11:1312.
32. Skin of Color Society. A guide to sunscreen selection. Available at: <https://skinofcolorsociety.org/patient-dermatology-education/guide-sunscreen-selection/>. Accessed February 13, 2024.
33. Jesus A, Mota S, Torres A, et al. Antioxidants in sunscreens: which and what for? *Antioxidants (Basel)*. 2023;12:138.
34. Charitakis A, Assi S, Yousaf S, et al. Overcoming skin damage from pollution via novel skincare strategies. *Curr Pharm Des*. 2022;28:1250-1257.
35. Ding Y, Zhang C, Xiang LF. Application of integrated skincare in medical aesthetics: a literature review. *J Eur Acad Dermatol Venereol*. 2023. [Epub ahead of print]. doi:10.1111/jdv.19606.
36. Desai M, Gill J, Luke J. Cosmetic procedures in patients with skin of color: clinical pearls and pitfalls. *J Clin Aesthet Dermatol*. 2023;16:37-40.
37. Amechi M, Halpin J. Considerations for laser therapy, microneedling, and chemical peels when treating patients with skin of color. *Plast Aesth Nurs (Phila)*. 2023;43:14-21.
38. Waibel JS, Mi QS, Ozog D, et al. Laser-assisted delivery of vitamin C, vitamin E, and ferulic acid formula serum decreases fractional laser postoperative recovery by increased beta fibroblast growth factor expression. *Lasers Surg Med*. 2016;48:238-244.
39. Wang JV, Friedman PM, Rodeberg D, et al. Enhancing skin uptake of topical antioxidants with 1,440-nm nonablative fractional diode laser pretreatment. *Dermatol Surg*. 2022;48:927-931.
40. Machado BHB, et al. Comparative study on the outcome of periorbital wrinkles treated with laser-assisted delivery of vitamin C or vitamin C plus growth factors: a randomized, double-blind, clinical trial. *Aesthetic Plast Surg*. 2021;45:1020-1032.
41. Machado BH, Frame J, Zhang J, et al. Treatment of scars with laser-assisted delivery of growth factors and vitamin C: a comparative, randomised, double-blind, early clinical trial. *Aesthetic Plast Surg*. 2021;45:2363-2374.
42. Bruce S, Roberts W, Teller C, et al. The effects of a daily skincare regimen on maintaining the benefits obtained from previous chemical resurfacing treatments. *J Drugs Dermatol*. 2016;15:1145-1150.
43. Huang A, Nguyen JK, Austin E, et al. Facial rejuvenation using photodynamic therapy with a novel preparation of ALA and hyaluronic acid in young adults. *Arch Dermatol Res*. 2020;312:567-573.
44. Kim J, Kim J, Lee YI, et al. Effect of a topical antioxidant serum containing vitamin C, vitamin E, and ferulic acid after Q-switched 1064-nm Nd:YAG laser for treatment of environment-induced skin pigmentation. *J Cosmet Dermatol*. 2020;19:2576-2582.
45. Dayan SH, Bacos JT, Ho TV, et al. Topical skin therapies in subjects undergoing full facial rejuvenation. *J Cosmet Dermatol*. 2019;18:798-805.
46. Kurti A, Charles C, Jagdeo J, et al. Combination facial aesthetic treatment in millennials. *J Drugs Dermatol*. 2022;21:37-42.
47. Sadick N, Edison BL, John G, et al. An advanced, physician-strength retinol peel improves signs of aging and acne across a range of skin types including melasma and skin of color. *J Drugs Dermatol*. 2019;18:918-923.
48. Quiñonez RL, Agbai OM, Burgess CM, et al. An update on cosmetic procedures in people of color. Part 2: neuromodulators, soft tissue augmentation, chemexfoliating agents, and laser hair reduction. *J Am Acad Dermatol*. 2022;86:729-739.

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