

# SKIN & AGING™

PRACTICAL AND CLINICAL ISSUES FOR TODAY'S DERMATOLOGIST



## Advances in **ROSACEA** TREATMENTS

Although the etiology remains unclear, newer combination therapies are giving clinicians more options to manage rosacea.

Superficial Chemical Peeling:  
Minimal Effort, Maximum Results

Aesthetic Interventions:  
Sebaceous Hyperplasia

Psoriasis Review

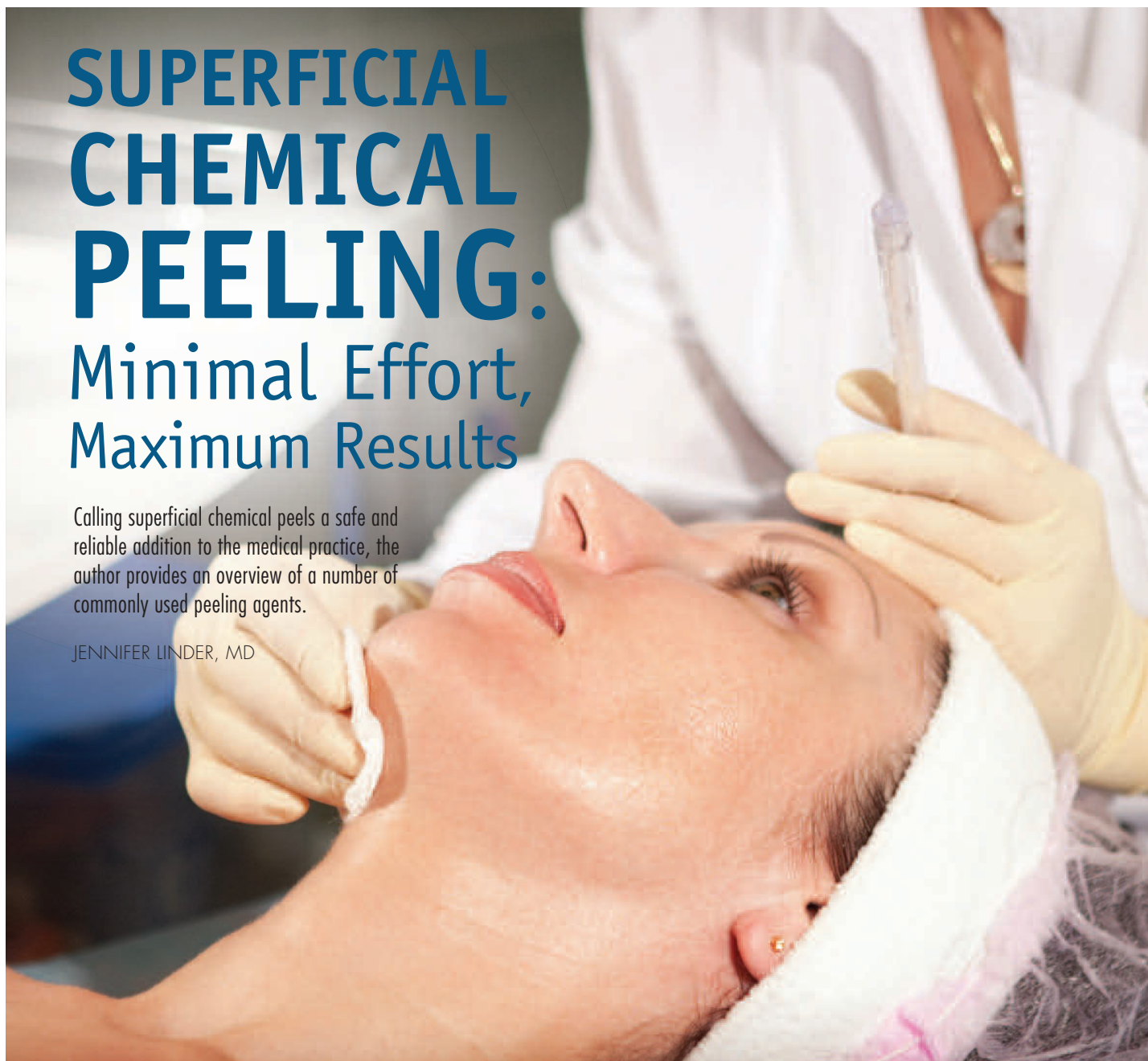
**BOARD REVIEW**  
In this Issue  
on page 15

# SUPERFICIAL CHEMICAL PEELING:

## Minimal Effort, Maximum Results

Calling superficial chemical peels a safe and reliable addition to the medical practice, the author provides an overview of a number of commonly used peeling agents.

JENNIFER LINDER, MD



The topical application of acids is one of the most dependable and widely recognized methods of improving the overall health and appearance of the skin. The goal of a chemical peel is to regulate and enhance the cellular turnover process, a complex system that ultimately leads to the shedding of cornified cells. Over the years, it has been established that chemical peels provide added clinical benefits to the medical practice because of their ability to provide patients with the results they desire. While many aesthetic medicine practices offer medium and deep peels, superficial chemical peels are a versatile

addition to increase the practice's bottom line and enhance treatment results, with no downtime.

#### DETERMINING PEEL DEPTH

Chemical peel depth ranges from very superficial to deep. Very superficial chemical peels affect the stratum corneum and stop penetration at the granular layer. Superficial peels can penetrate through the stratum corneum to the basal layer. Medium depth peels are typically performed by a physician or under the supervision of a physician and can penetrate down to the papillary dermis. Deep peels should be performed by

a physician and can reach the reticular dermis, causing deep wounding.

Peel depth is determined by several factors, including type and percentage of acid, patient skin type and thickness, pre-treatment and patient history of exfoliating treatments. All patients have different factors that will contribute to how a peel solution will work for their skin. For example, thick skin and increased sebum production may impede penetration of a peel solution. Conversely, skin with an impaired barrier function may experience accelerated depth of penetration. Type and percentage of the acid is the



Depth of penetration

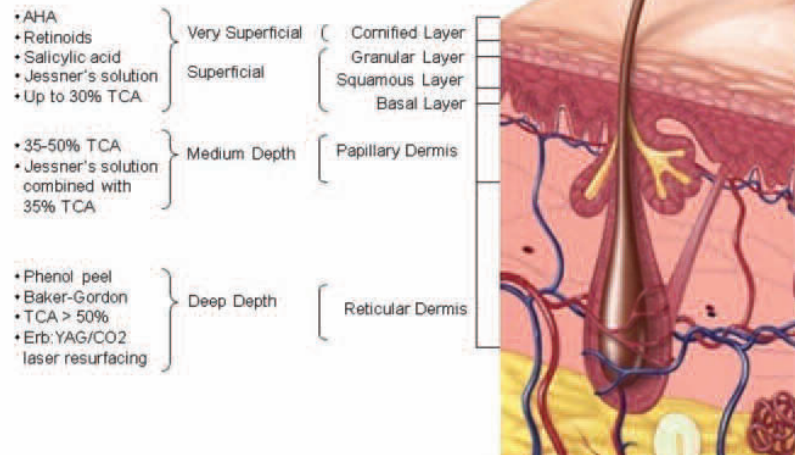


Figure 1: Depth of penetration of chemical peels.

merous studies have shown that all chemical peel solutions stimulate collagen and glycosaminoglycan production, regardless of depth of penetration.<sup>1</sup> Additionally, topically applied products are able to absorb more effectively when the skin is properly exfoliated, allowing for accelerated results. Trichloroacetic acid, alpha hydroxy acids, salicylic acid, modified Jessner's solutions, retinoids, and blended acid peels are currently the most commonly utilized superficial peeling agents in the industry.

TRICHLOROACETIC ACID (TCA)

Trichloroacetic acid (TCA) is a practical and versatile solution used in chemical peeling. TCA was first studied in the mid 1900s and was found to be safer and more predictable than deeper peeling

ently causes live tissue protein denaturation upon application.

Topical treatment with TCA stimulates collagen production and smoothes surface texture. It is ideal for the correction of rhytids, keratoses, dyschromias and scarring.<sup>4</sup> TCA also reduces hyperpigmented keratinocytes.<sup>5</sup> Percentages for superficial use range from 6% to 30%. A 6% TCA will produce a very superficial exfoliation (limited to the stratum corneum) with minimal tissue coagulation, while a 30% TCA will produce varying amounts of necrosis of the epidermal keratinocytes.<sup>6</sup> This versatility is what makes TCA a mainstay in any office offering skin rejuvenation. TCA, in general, is appropriate for all Fitzpatrick skin types; however, percentages higher than 10% should be avoided unless the

primary determiner of depth and control (See Figure 1).

Superficial peels are better suited for mild to moderate textural imperfections, rhytids, dyschromia and acne lesions. Patients who desire monthly treatments are viable candidates for superficial chemical peels because their lower level of exfoliation permits repeat treatments with quick re-epithelialization times.

COMMONLY USED SUPERFICIAL PEELING AGENTS

In addition to maintaining healthy cellular turnover rates, each of the most commonly used superficial peeling agents provides ancillary benefits. Nu-

*Numerous studies have shown that all chemical peel solutions stimulate collagen and glycosaminoglycan production, regardless of depth of penetration.<sup>1</sup>*

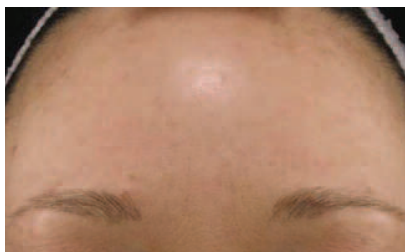
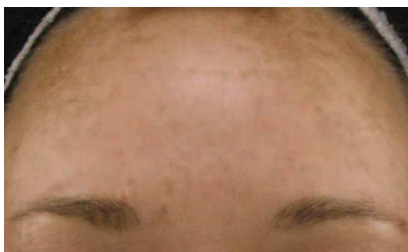
agents, such as phenol. TCA is a synthetically derived peeling agent made of acetic acid and chlorine. It has become a popular option for superficial and medium-depth peels because there is no risk of systemic toxicity.<sup>2,3</sup> TCA is considered a chemical cauterant, as it inher-

patient is thoroughly prepped with dyschromia-controlling products.

Costs associated with straight acid TCA peels tend to remain constant despite the percentage. Broadly speaking, TCA in the superficial ranges cost \$35 for a 60ml bottle. Keeping in mind that application tech-



## CHEMICAL PEELING



Figures 2A and 2B: Before (left) and 4 months after (right) receiving five blended 10% TCA and 20% lactic acid peels with a 10% retinol and 20% lactic acid booster treatment.



Figures 3A and 3B: Before (left) and 2 months after (right) receiving one modified and enhanced Jessner's treatment with 14% lactic acid, 14% salicylic acid and 3% kojic acid.

niques vary, each 60ml bottle should provide approximately 15 to 20 treatments.

### ALPHA HYDROXY ACIDS (AHA)

Alpha hydroxy acids (AHA) include lactic, glycolic, citric, malic, mandelic and tartaric acids. Lactic and glycolic acid are the most studied AHA for topical use. AHA offer many ancillary benefits, including humectant moisturizing qualities, inhibition of *Propionibacterium acnes* bacterial proliferation, reduction of hyperkeratinization and slowing of the melanogenesis process.<sup>7</sup> Some studies suggest that AHA have the ability to promote collagen synthesis in the skin while desquamating the corneocyte cohesions just above the granular layer.<sup>8</sup>

Alpha hydroxy acids prove to be another versatile peeling agent. AHA, in general, are considered very superficial and percentages range vastly from 10% up to 70%.<sup>9</sup> These acids are typically safe for Fitzpatrick skin types I to VI. Since AHA are derived from sugars found in fruit carboxylic acids, they are nontoxic, making them an easy addition to any plastic surgeon, dermatologist or other skin health professional's arsenal

of treatment options.<sup>2</sup> AHA are hydrophilic by nature, and have the ability to penetrate the epidermal layers. In some cases, they can reach the superficial dermal layers, depending on the percentage and patient skin condition, by breaking up the keratinocyte cohesions.<sup>2</sup> The stratum corneum is reduced, cellular turnover is increased and collagen and elastin production is stimulated.<sup>10</sup>

In addition to the many ancillary benefits, each AHA has a detailed specification for use. Glycolic acid is best for oilier skin types due to its degreasing properties. Concentrations of glycolic acid typically range from 20% to 70%.<sup>2</sup> It has also shown to be effective in the treatment of hyperpigmentation and as a prepping agent prior to a deeper peel, such as a high percentage TCA. Historically, glycolic acid peels have also been used to correct rhytids, sallow complexions, textural abnormalities and lentigenes, amongst other dyschromia-related disorders.<sup>11</sup> The small molecular structure of glycolic acid allows for hastened epidermolysis, making it more aggressive and dehydrating in comparison to other forms of AHA.

Lactic acid is indicated for patients with dry or dehydrated skin, dyschromias or sensitive skin conditions. Lactic acid's comparatively larger molecule also allows it to penetrate slowly, which reduces treatment-induced inflammation. Its antimicrobial and anti-inflammatory properties make it effective in the treatment of acne and sensitive skin conditions. Lactic acid's mechanism of action is to dissolve the intercellular desmosomes to promote exfoliation. By nature, this AHA is hydrophilic, a humectant and a natural constituent found in muscle fiber. Similar to glycolic acid, lactic acid percentages range from 10% to 70%.<sup>12</sup>

The cost of a straight acid AHA will vary from one manufacturer to the next. Generally speaking, an AHA will cost \$30 to \$90 depending upon the percentage desired, based on a 60ml bottle. The average number of treatments per bottle will fluctuate due to the preferred application method; however, 15 to 20 treatments may be obtained from a single 60ml bottle.

### SALICYLIC ACID

Salicylic acid is a keratolytic and lipophilic substance that is considered to be the sole member of the beta hydroxy acid family to be used topically. Salicylic acid has the ability to dissolve follicular impactions, reducing acne lesions. Also suitable for sensitive skin conditions and rosacea, salicylic acid provides notable anti-inflammatory exfoliation benefits.<sup>13</sup> Studies suggest that salicylic acid is also beneficial when treating post-inflammatory hyperpigmentation, mild to moderate photodamage, lentigenes and abnormal surface texture.<sup>14</sup> This is a favorable option for Fitzpatrick skin types I to VI.<sup>15</sup> Although available in higher percentages, salicylic acid is typically applied in 20% to 30% formulations. The probability of salicylic poisoning rises as the percentage and layers increase, making superficial percentages ideal for use.<sup>15,16</sup> Different from AHA, salicylic acid does not need to be neutralized; however, it is recommended to remove the salt-crystal residue with a mild soap and lukewarm water.<sup>15</sup>

Profitability of salicylic acid is comparable to that of straight AHA peels. Although pricing may fluctuate, on average a 60ml bottle of salicylic acid ranges from \$30 to \$50, depending on the strength. One can expect to perform approximately 15 to 20 treatments per bottle, as the method of application may differ from one individual to another.

#### MODIFIED JESSNER'S SOLUTION

The modified Jessner's solution was the first blended acid chemical peel. The original formula is a combination of 14% lactic acid, 14% salicylic acid and 14% resorcinol — an effective keratolytic — in an alcohol base. The original use of a Jessner's-like solution can be dated back to the 1940s; however, the solution used today was popularized in the 1950s by Dr. Max Jessner.<sup>16</sup>

This solution offers marked improvements in acne, dyschromias and the extrinsic signs of aging. Because the peel stimulates the dermal layers to produce collagen and fibroblasts, mild to moderate rhytids can be treated.<sup>16</sup> The modified Jessner's solution is often administered because of its ease of use, extremely low risk of toxicity and uniform peel depth.<sup>16,17</sup> This peel solution is recommended for Fitzpatrick skin types I to VI.<sup>7</sup>

The cost of a modified Jessner's solution is relatively low, making it a favorable option for office use. On average, a 60ml bottle of a modified Jessner's solution is between \$65 and \$100. As mentioned previously, the number of treatments per bottle will depend upon the desired application method, but one can expect 15 to 20 treatments per 60ml bottle.

#### RETINOIDS

Retinoids include all forms of vitamin A. The forms used most often in professional products are retinoic acid, retinaldehyde and retinol. Retinoic acid is typically compounded using a 0.3% solution with ethanol alcohol. Retinol and retinaldehyde are both produced synthetically but have the capacity to convert to retinoic acid within the skin. Percentages of retinol and retinaldehyde vary up to 10% in topical products.



Figures 4A and 4B: Before (left) and 4 months after (right) receiving five 10% TCA and 20% lactic acid peels with a 10% retinol booster treatment.



Figures 5A and 5B: Before (left) and 3 months after (right) receiving one 6% TCA and 12% lactic acid peel.

These agents assist in cellular turnover and regulation of abnormal desquamation, while reducing the incidence of corneocyte cohesion.<sup>18</sup> Science also suggests that retinoids have the capacity to reduce the activation of matrix metalloproteinase enzymes, such as collagenase.<sup>8,19</sup> Retinoids are melanogenesis inhibitors that stimulate the production of collagen and discourage hyperkeratinization within the follicle.<sup>19,20</sup> They are also safe for all Fitzpatrick skin types I to VI, although retinoic acid may induce significant amounts of topical irritation. If surface irritation is a concern, retinol is an effective alternative.<sup>20</sup>

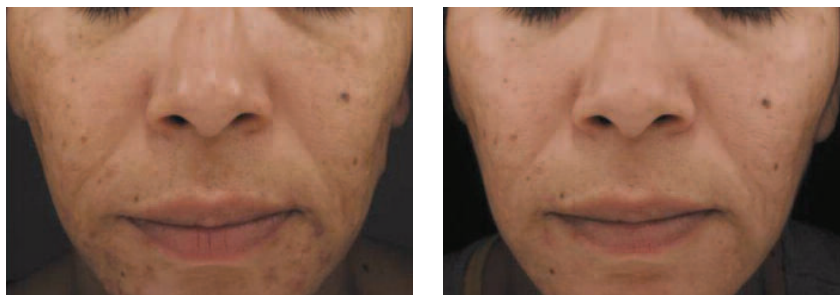
Retinoic acid tends to be an expensive solution to compound. Although pricing may vary, a 60ml bottle of compounded 0.3% retinoic acid is approximately \$120. Since compounded retinoic acid does not dry on the skin like other peel solutions; one layer per treatment offers satisfactory results. Generally speaking, a 60ml bottle should provide 25 or more treatments.

#### BLENDED ACID CHEMICAL PEELS

Blended acid chemical peels create favorable changes within the skin without inducing large amounts of inflammation, limiting complications. A multitude of ingredients can be combined to treat many skin conditions and all Fitzpatrick skin types, making these peels an all-inclusive treatment option. Blended peels typically offer a combination of the aforementioned acids, as well as melanogenesis inhibitors, hydrating agents, and anti-inflammatory and antioxidant ingredients. These types of ingredients help to enhance the exfoliating benefits of superficial chemical peels by targeting specific skin concerns, including acne, rosacea, hyperpigmentation and visible aging for accelerated results.

Peel blends have been administered for well more than 20 years; however, recently there has been a noticeable spike of interest in the industry. This level of treatment can be a lucrative addition for a practice, as blended peels can be performed quickly and safely by an aestheti-

## CHEMICAL PEELING



Figures 6A and 6B: Before (left) and 3 months after (right) after receiving six modified and enhanced Jessner's treatments with 14% lactic acid, 14% salicylic acid, 2% hydroquinone and 3% kojic acid.

cian, medical assistant or nurse.<sup>21,22</sup> The treatments are more controlled than straight acid chemical peels, and therefore do not need to be administered by the physician. In addition, patients seemingly are becoming more interested in no-downtime procedures that improve the skin gradually.

This type of treatment simultaneously induces exfoliation while also infusing the skin with added beneficial ingredients. These added ingredients often make it unnecessary to neutralize the acid, which can also be advantageous. Straight AHA peels, for example, require neutralization.<sup>23,24</sup> If not neutralized, the acid could potentially collect in the upper portions of the skin and cause surface irritation or burns. Neutralization, while necessary in this instance, can release more free carboxylic groups and reduce the pH of the skin even further, increasing stimulation and inflammation. By using several acids blended together, each can be used at a lower percentage, thereby maximizing outcomes and minimizing the risk of pooling in the epidermis and other side effects.<sup>24</sup>

Blended acid peels tend to increase profitability because the patient can safely tolerate monthly treatments, increasing repeat business. Generally speaking, a 60ml bottle of a blended acid peel will cost \$65 to \$75. Depending on the layers needed and the application techniques, a 60ml bottle can provide up to 20 to 30 treatments.

### CONCLUSION

Superficial chemical peels are a safe and reliable addition to the medical practice. Each of the aforementioned peeling agents provides unique benefits

and each has a place within the industry. By offering a multitude of chemical peeling solutions, including blended acids and various percentages of different acids, providers and their staffs are able to enhance treatment plans for more comprehensive outcomes. Although straight acid peels will not become obsolete in a physician's office, blended acid peels tend to provide ancillary benefits with little to no downtime to the patient. This variety and opportunity for treatment customization encourages optimal patient outcomes and profitability for the physician. **n**



Jennifer Linder, MD

*Dr. Linder, a board-certified dermatologist and fellowship-trained Mohs skin cancer surgeon, is a volunteer Clinical Instructor in the Department of Dermatology at the University of California, San Francisco. Dr. Linder is currently in private practice in Scottsdale, AZ.*

**Disclosures:** Dr. Linder is Chief Scientific Officer, PCA SKIN, is National Instructor, Dermik Aesthetics (Sculptra), and National Instructor, Allergan Facial Aesthetics.

### References

1. Eskild LW, Hansson V. Vitamin A functions in the reproductive organs. In: Blomhoff R, ed. *Vitamin A in Health and Disease*. New York, NY: Marcel Dekker; 1994:531-559.
2. Mangat D, et al. Current chemical peels and other resurfacing techniques. *Facial Plast Surg*. 2011; 21:35-49.
3. Stagnone G J, Orgel MG, Stagnone JJ. Cardiovascular effects of topical 50% trichloroacetic acid and Baker's phenol solution. *J Dermatol Surg* 1987; 13:999-1002.

4. Harmon CB, et al. Trichloroacetic acid. In: Tosti A, et al. eds. *Color Atlas of Chemical Peels*. New York, NY: Springer-Verlag; 2006:59-68.
5. Perez-Bernal A, Munoz-Perez MA. Management of facial hyperpigmentation. *Amer J Clin Dermatol*. 2000; 1:261-268.
6. Collins PS Trichloroacetic acid peels revisited. *J Dermatol Surg Oncol*. 1989; 15:933-40.
7. Inan S, et al. Histopathological and ultrastructural effects of glycolic acid on rat skin. *Acta Histochemica* 2006; 108:37-47.
8. Clark CP. Office-based skin care and superficial peels: The scientific rationale. *Plast Reconstr Surg*. 1999; 104:854-64.
9. Leu D, Yoo SS. Epidermal and color improvement in ethnic skin: Microdermabrasion and Superficial Peels. In: Alam M, et al, eds. *Cosmetic Dermatology for Skin of Color*. New York, NY: McGraw-Hill, Inc.; 2009:29-33.
10. Vanscott E, and Yu R. Hyperkeratinization, Corneocyte Cohesion, and Alpha Hydroxy Acids. *JAAD*. 1984; 11:867-79.
11. Ditre CM. Alpha hydroxy acid peel. In: Rubin MG, Dover JS, Alam M, eds. *Chemical Peels*. Philadelphia, PA: Elsevier Saunders; 2006: 27-45.
12. Brody HJ. *Chemical Peeling*. St. Louis: Mosby Year Book; 1992.
13. Grimes PE. The safety and efficacy of salicylic acid chemical peels in darker racial-ethnic groups. *Dermatol Surg*. 1999; 25:18-22.
14. Maya V. Salicylic acid peels. *Ind J Dermatol, Venerol, Leprol*. 2004; 17: 136-138.
15. Grimes PE. Salicylic acid peels. In: Rubin MG, Dover JS, Alam M, eds. *Chemical Peels*. Philadelphia, PA: Elsevier Saunders; 2006: 47-55.
16. Fulton Jr JE. Jessner's Peel. In: Rubin MG, Dover JS, Alam M, eds. *Chemical Peels*. Philadelphia, PA: Elsevier Saunders; 2006: 57-71.
17. Rubin MG. *Manual of Chemical Peels: Superficial and Medium Depth*. Philadelphia: J.B. Lippincott; 1995.
18. Varani J, Warner RL, Gharaee-Kermani M et al. Vitamin A antagonizes decreased cell growth and elevated collagen-degrading matrix metalloproteinases and stimulates collagen accumulation in naturally aged human skin. *J Invest Dermatol*. 2000; 114:480-486.
19. Griffiths C, et al. Restoration of collagen formation in photodamaged human skin by tretinoin (Retinoic Acid). *The NEJM* 1993; 323: 530-535.
20. Draelos ZD. Retinoids in cosmetics. *Cosmet Dermatol*. 2005; 18:3-5.
21. Roberts WE. Chemical peeling in ethnic/dark skin. *Dermatol Ther*. 2004; 17:196-205.
22. Zakopoulou N, Kontochristopoulos G. Superficial chemical peels. *J Cos Der.*, 2006; 5:246-253.
23. Draelos ZD. Glycolic acid and other superficial peels. In: Lowe NJ, ed. *Textbook of Facial Rejuvenation: The Art of Minimally Invasive Combination Therapy*. London, England: Martin Dunitz; 2002: 49-59.
24. Dewandre L. The Chemistry of peels and a hypothesis of action mechanisms. In: Rubin MG, ed. *Chemical Peels*. Philadelphia, PA: Elsevier Saunders; 2006: 1-12.