

CHEMICAL PEELS: A METHOD TO REJUVENATE THE SKIN

Learning objectives

At the conclusion of this learning activity, participants should be able to;

- Discuss the mechanism of chemical peeling.
- Identify the different types of chemical peeling.
- Identify the complications of peeling.

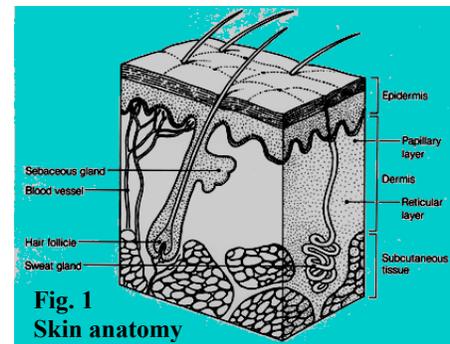
Overview

The demand for facial skin rejuvenation has seen recent, unprecedented growth. As people have become more aware about their cosmetic appearance, there has been a greater demand for newer technologies for treating aged and actinically damaged facial skin. Despite various methods available, the use of chemical peeling agents continues to be the gold standard. Chemical peeling is a procedure where a chemical exfoliating agent is applied to the skin to destruct portions of epidermis and/or dermis with subsequent regeneration and rejuvenation of the tissues. It is mostly used for cosmetic improvement of skin or for treatment of some skin disorders.

The use of chemical peeling agents continues to be the gold standard for rejuvenating skin.

Classification of chemical peels

Chemical peels are divided into 3 categories depending upon the depth of the wound created by the peel. Superficial peels penetrate the epidermis only, medium-depth peel damages the entire epidermis and papillary dermis, and deep peels create a wound to the level of the midreticular dermis (fig. 1). The depth of the peel is depends on the chemicals applied and their concentration, mode of application, and skin type and its condition.



What are the chemical agents commonly used for peeling?

Molecules found in chemical peels are either alcohols that contain a carboxyl (-COOH) and hydroxyl (-OH) groups or regular acids. It has been suggested that according to their chemical properties, substances used in chemical peels are classified as metabolic, caustic, and toxic.

- **α -Hydroxyl acids (AHAs)** are weak acids that induces peeling by either metabolic or caustic effect. At low concentration (<30%) they reduce sulfate and phosphate groups from the surface of corneocytes, decreasing corneocyte cohesion and hence inducing exfoliation of the epidermis.

- **Trichloroacetic acid (TCA)** is a much stronger acid than AHA. It produces its effect because of the acidic properties. It gets neutralized by coagulating skin proteins as the acid penetrates the skin. The higher the concentration or the amount of the acid applied, the more intense is the destructive effect.
- **Phenol** is an aromatic hydrocarbon with properties of weak acid. Its activity on the skin is carried out through its direct toxicity to cell proteins and membranes and enzymatic inactivation.

Evaluation of the patients before the peel

- Take detailed history about the general health status; medications, such as oral isotretinoin; smoking; previous cosmetic procedures, such as surgical lifts or fluid silicone injections; recurrent herpetic outbreaks; keloid formation; etc.
- Determine skin type based on Fitzpatrick's skin type scale (table 1). Skin preparation with bleaching creams and early reintroduction of these products in the immediate postpeel period to avoid post-inflammatory hyperpigmentation in dark phenotypes.
- Evaluation of the skin is also important because oily skin may require priming with topical retinoids or/and AHA to insure even penetration of the peeling solution.
- Educate the patient about the effects of peeling, the need to regularly apply sunscreen in the immediate postpeel period and of the possibility to use makeup to conceal postpeel redness to resume normal daily activities immediately after the procedure.

Table 1. Fitzpatrick classification scale for skin type		
Skin Type	Skin Color	Characteristics
I	White; very fair; red or blond hair; blue eyes; freckles	Always burns, never tans
II	White; fair; red or blond hair; blue, hazel, or green eyes	Usually burns, tans with difficulty
III	Cream white; fair with any eye or hair color; very common	Sometimes mild burn, gradually tans
IV	Brown; typical Mediterranean caucasian skin	Rarely burns, tans with ease
V	Dark Brown; mid-eastern skin types	very rarely burns, tans very easily
VI	Black	Never burns, tans very easily

Let us discuss the different types of peels

A. Superficial peels

Indication: Mild photoaging, melasma, comedonal acne, postinflammatory erythema, improve skin texture and superficial dyschromias (fig. 2). As it only has a superficial action it is appropriate to all skin phototypes. Asians and patients with inflammatory skin conditions, such as rosacea or seborrhoeic dermatitis, are more sensitive to skin irritation induced by AHA and hence should be treated with lower concentrations.

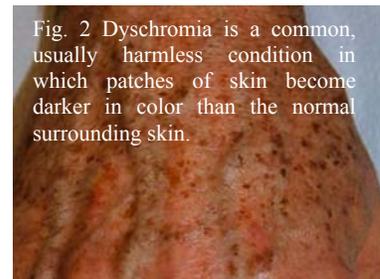


Fig. 2 Dyschromia is a common, usually harmless condition in which patches of skin become darker in color than the normal surrounding skin.

Agents used: 70% glycolic acid, 10% to 20% TCA; Jessner's solution (resorcinol, 14g; salicylic acid, 14g; lactic acid, 14mL; ethanol, 100mL); tretinoin; 5-fluorouracil (5-FU); and salicylic acid..

➤ **α -Hydroxy acid peel**

Glycolic acid is the most common AHA used. It has the smallest molecular weight of all AHAs and penetrates the skin easily. Glycolic acid peels are commercially available as free acids, partially neutralized (higher pH), buffered, or esterified solutions.

Glycolic acid peels do not affect wrinkles or deep pigmentations

Indication: Patients with mild skin damage and dyschromia who is seeking for minimal recovery time and is willing to go through a long serial treatment (6 months approximately) to achieve the desirable results. Glycolic acid peels do not affect wrinkles or deep pigmentations.

Action: Glycolic acid peels have keratolytic, anti-inflammatory, and antioxidant effects and act by thinning the stratum corneum, promoting epidermolysis, dispersing basal layer melanin, and increasing collagen genes expression.

Procedure

Start with low concentration of the acid (20%-30%) and increase its concentration and application time during the subsequent sessions. The treatment schedule includes a monthly peeling session and topical glycolic acid home care products ranging from 8% to 15% concentrations.

Combination therapy

- Glycolic acid with 5-fluorouracil: Effective to treat actinic keratosis.
- Glycolic acid with microdermabrasion, dermal infusion, and blue light: Combination of superficial peels with gentle mechanical dermabrasion is used to increase treatment efficacy and to achieve treatment goals in a shorter time. AHA peel decreases corneocyte cohesion, making the abrasion more efficient.

➤ **Salicylic acid peel**

Salicylic acid is a β -hydroxyl acid and has keratolytic properties. It causes exfoliation without producing inflammation. The commercially available formulations of salicylic acid peel are 20% or 30% in ethanol or 50% in ointment.

Indications: Inflammatory and non-inflammatory acne vulgaris, pigmentations, and mild sun damage.

Procedure: The treatment regimen includes 6 peels 2 to 4 weeks apart. The results are usually observed after 3 peels. After cleansing and defatting of the skin, the solution is applied using cotton-tipped applicator or gauze sponge and left for 3 to 5 minutes according to the skin reaction. The patient usually experiences burning sensation and mild anesthesia. A white precipitate of the salicylic acid appears after 1 minute, and this should not be confused with a real frosting. After 3 to 5 minutes, the solution is thoroughly washed off the face. Salicylism or salicylic acid intoxication is a rare complication of salicylic acid peels.

➤ **Tretinoin (retin A) peel**

Tretinoin peel uses a high-concentration tretinoin (1%-5%) in propylene glycol. It has a characteristic canary-yellow hue, which colors the skin while being applied.

Indication: Treatment of actinic changes, melasma, and poikiloderma of Civatte. It should be avoided in pregnant or lactating women.

Procedure: The application of the solution is completely painless, and it should be kept on the skin at least for 6 hours. As it decomposes on exposure to UV light, this peeling should be performed in the late afternoon or evening.

B. Medium-depth peels

Indication: Dyschromia, multiple solar keratosis, and textural changes of the skin.

Agents used: Trichloroacetic acid peels

➤ **Trichloroacetic acid (TCA) peels**

35% TCA is used for medium-depth peel. Concentrations higher than 35% are not recommended as it causes scarring.

Action: The mechanism of action of medium-depth peels includes restoration of keratinocyte polarity and increase in collagen type I content.

Procedure: Trichloroacetic acid solution is compounded in a weight-to-volume preparation. To prepare a 35% solution, dissolve 35 g of TCA crystals in a small amount of water and add water to a total volume of 100 mL. Trichloroacetic acid is stable at room temperature and not light-sensitive. It is sometimes performed under intravenous sedation, but in most cases, a combination of oral sedative such as lorazepam or diazepam and analgesic, such as tramadol, is sufficient.

Cotton q-tips (fig. 3) are dipped in a small container containing the peeling solution and applied to the desired areas. It is painted systematically until white frost appears. The degree of the frosting correlates with the depth of solution penetration. As frosting develops, cool the area using wet cold compresses. After-peel care includes continuous wetting of the skin. During the next days, the patient may expect to feel tightening and swelling of the skin together with gradual darkening of skin color. On day 3 or 4, the skin starts to crack, and desquamation begins. At this stage, moisturizing cream can be applied. Full re-epithelization is completed after 5 to 7 days. At this stage, the patient is advised to wear camouflage makeup and resume normal daily activities. Blunt moisturizer and high-level sun protection are recommended for the next 2 to 3 weeks.



Fig. 3 Cotton q-tips

C. Deep peels

Indications: Dyschromia, fine and coarse wrinkles, premalignant skin tumors, and acne scars.

Agents used: A combination of croton oil and phenol in various concentrations, sepiisol, water, vegetable oils (glycerin, olive, sesame).

➤ **Phenol-based peel**

Procedure: It is carried out under full cardiopulmonary monitoring with intravenous hydration throughout the procedure. Intravenous sedation or regional blocks make the procedure pain-free. Before the peeling, meticulous degreasing of the skin is performed using oil-free acetone-soaked gauze sponges.

For application of the peeling solution, cotton-tipped applicators are used. The usual end point is ivory-white to gray-white color of skin. Immediately after the face is covered with the solution, waterproof zinc oxide nonpermeable tape is applied to the skin. After 24 hours, the tape mask is removed, and the skin exudate is cleaned by sterile saline. The face is covered with bismuth subgallate antiseptic powder for 7 days. Other options include occlusive moisturizers, antibiotic ointments, and biosynthetic occlusive dressings. On the eighth day, wet soaking with tap water while standing in the shower is used to soften the powder mask and to remove it. The erythema gradually subsides over a period of about 2 months.

Complications of chemical peels

The list of potential complications of chemical peels includes;

Complication	Remarks
Pigmentary changes	Reactive hyperpigmentation can occur after any depth of chemical peels and is usually seen more in dark complexion people. After phenol peels, hypopigmentation is seen usually.
Infection	Bacterial and fungal complications in chemical peels are rare. Toxic shock syndrome has been reported in some cases.
Milia	Milia or epidermal cysts appear in up to 20% of patients after chemical peels, usually 8 to 16 weeks after the procedure. Electrosurgery is a simple and effective means to treat this postpeel complication.
Acneiform dermatitis	Acneiform eruption after chemical peels is not rare and usually appears immediately after reepithelialization. Short-term systemic antibiotics together with discontinuation of any oily preparations will usually provide satisfactory relief.
Scarring	Scarring is the most dreadful complication. The most common location is in the lower part of the face. Topical antibiotics and potent steroid preparations should be introduced as soon as this diagnosis is made.
Cardiotoxicity	It is the most important potential complication exclusive to phenol-based peels. Cardiac arrhythmias have been recorded in up to 23% of patients when full-face peel was performed in less than 30 minutes.

Suggested reading

- ⇒ C.M. Ditre, Glycolic acid peels, *Dermatol Ther* 13 (2000), pp. 165–172.
- ⇒ C.M. Ditre, T.D. Griffin and G.F. Murphy et al., Effects of alpha hydroxyl acids on photoaged skin: a pilot clinical, histologic and ultrastructural study, *J Am Acad Dermatol* 34 (1996), pp. 187–195.
- ⇒ H.S. Lee and I.H. Kim, Salicylic acid peels for the treatment of acne vulgaris in Asian patients, *Dermatol Surg* 29 (2003), pp. 1196–1199.
- ⇒ Jon E. Mendelsohn. Update on Chemical Peels. *Otolaryngologic Clinics of North America*, Volume 35, Issue 1, February 2002, Pages 55-72.
- ⇒ L. Dewandre, Chemical peels, Elsevier Saunders, Philadelphia (2006), pp. 1–12.
- ⇒ Sara Friedman, Jonathan Lippitz. Chemical Peels, Dermabrasion, and Laser Therapy. *Disease-a-Month*, Volume 55, Issue 4, April 2009, Pages 223-235.

TEST QUESTIONS

1. **Superficial chemical peels penetrate the _____.**
 - A. Epidermis
 - B. Epidermis and papillary dermis
 - C. Midreticular dermis
 - D. All the above

2. **All are chemical peeling agents except;**
 - A. α -Hydroxyl acids
 - B. Trichloroacetic acid
 - C. Phenol
 - D. **Monounsaturated fatty acid**

3. **Glycolic acid peels act by all the following mechanism except;**
 - A. Keratolytic
 - B. **Increase in collagen type I content**
 - C. Anti-inflammatory
 - D. Antioxidant

4. **Most important potential complication of phenol-based peels is _____.**
 - A. **Cardiotoxicity**
 - B. Pigmentary changes
 - C. Infection
 - D. Milia

5. **The most common location of scarring due to chemical peeling is in the _____.**
 - A. Upper part of the face
 - B. **Lower part of the face**
 - C. Forehead
 - D. Neck

