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## Latest Advances in Chemical Peels

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**Abstract**

Chemical peeling remains the mainstay of dermatological procedures for rejuvenation and superficial resurfacing with indications ranging from acne, rosacea, melasma and various other facial melanoses, acne and post-traumatic scars and photoaging. Scientific research to develop new peel molecules or combinations to enhance efficacy and minimize adverse effects is ongoing. In this short review, we discuss some recent advances in the therapeutic armamentarium of chemical peels appropriate for the skin of color. Lipohydroxy acids (LHA), polyhydroxy acids (PHA), combination peels consisting of hydroquinone, acetic acid, glutathione as the most active component have been developed and delivering good results in various indications. Home-based peels based on PHAs like lactobionic acid or peel-impregnated pads are another novelty addition to the chemical peel kit of a dermatologist. It is important for all dermatologists and physicians practising chemical peels to be aware of these new peel formulations and their protocols to deliver efficacious and safe outcome to their patients.

**Keywords:** Chemical Peel; Recent Advances; Lipohydroxyacid; Polyhydroxyacid; Glutathione; Acetic Acid; Hydroquinone.

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### Introduction

Chemical peeling is one of the oldest, popular and most common aesthetic procedure used by dermatologists globally for various skin disorders, ranging from pigmentary dyschromias, acne, scars of various origins, textural abnormalities, and photoaging. and most widespread used aesthetic procedures worldwide [1]. Owing to research devoted to the enhancement of efficacy as well as safety of new peel molecules and approaches, novel therapeutic peel systems and innovative approaches are gaining popularity. Thus, it has become imperative for every dermatologist and aesthetic practitioner to at least be aware of the latest advances in this field. Knowledge of recent developments in chemical peels is not only the key to expand the procedural armamentarium of the dermatologist; additionally, it has become essential to be able to properly guide the new generation of well-informed patients whether the new peel that 'they desire' for themselves is indeed suitable for their skin type or not.

### Lipohydroxyacids (LHA)

Since the evolution of peeling as an aesthetic procedure, alpha hydroxy acids (AHA) such as glycolic acid (GA), lactic acid (LA), mandelic acid (MNA), and beta hydroxy acids (BHA) like salicylic acid (SA) have been the mainstay of chemical peeling. The latest addition to the club is that of lipo-hydroxy acid (LHA).

LHA is basically a derivative of SA with an added fatty chain rendering its molecular weight higher and lipophilicity greater than its parent molecule [2,3].

The unique properties of LHAs are: 1) producing detachment of individual corneosomes from adjacent corneocytes by acting at the corneosome/corneocyte interface breaking the intercellular desmosomes 2) stimulation of epidermal cell renewal and extracellular matrix (ECM) regeneration, and 3) pH being similar to that of the normal skin (5.5) thereby obviating the need of neutralization [2-4].

Compared to SA, the penetration of LHA is slower and results in cell by cell that more closely mimics the physiological desquamation than the SA or other

AHA and BHA-induced global exfoliation. Although LHA results in stratum corneum thinning, it enhances dermal thickening. In study by Pieard G et al. the dermal stimulatory effect of LHA was reported comparable to that of tretinoin [2]. The highly lipophilic LHA also possesses robust comedolytic activity, making it an excellent peeling agent for active acne. This property has been demonstrated in at least two studies; by Uhoda E et al. and Draelos ZD et al [3,4].

Thus, LHA can be used with good cosmetic benefit for photoaging, fine lines, solar lentiginos, melasma, PIH, and comedonal acne. The pre-peel priming and post peel care are similar to that of conventional peeling agents. LHA solution is available in 5% and 10% concentrations and 1-3 coats are applied with a cotton-tipped applicator over the entire face. No neutralization is needed. LHA peel sessions can be repeated as early as after a week, although fortnightly sessions are preferred [1,3].

#### Hydroquinone-Based Combination Peels

In cases of stubborn and refractory hyperpigmentation including melasma, and other facial melanoses, newer peel systems have now incorporated hydroquinone (HQ) 1.5-2% in addition to a concoction of multiple low concentration peeling acids like GA, TCA, MA etc [5]. They are relatively stronger, and tend to produce frosting effect within 1-2 minutes of application [Figure 1]. Thus, the leave-on time should be gradually and carefully increases, depending on the patient's skin tolerance. If done carefully and followed up with post-peel sun-screens and moisturization, results in hyperpigmentation can be quite gratifying.

#### Acetic Acid-Based Peels

Black vinegar or acetic acid, derived from fermentation of black rice contains large amounts of organic materials, minerals, essential amino acids and additionally has a high antioxidant activity. Furthermore, acetic acid at concentrations as low as 1-5% has shown to eradicate bacteria growing in biofilms, like *Propionibacterium acnes* [6]. Black Peel is a proprietary organic peel based on black vinegar. Its additional contents, namely SA and jasmonic acid have exfoliative and anti-inflammatory properties [7]. Potassium Iodide in Black Peel induces fast wound recovery and additionally provides anti-fungal effect. Black Peel is thus effective for not just acne [Figure 2], PIH, melasma, ageing skin, but is also a promising agent for nail peeling for onychomycosis. Nail peeling with GA-70% has already been reported to

be of benefit in various nail disorders including onychomycosis [8].

#### Glutathione Peel

Glutathione is tripeptide composed of three amino acids, glycine, glutamic acid and cystine. It is a strong antioxidant that protects the cells from oxidative stress and free radical induced toxic injuries [9]. It is administered systemically for liver disorders, although off late it is being given intravenously as a skin lightening agent, albeit amidst raging controversies [10]. Glutathione has in one recent trial also been tested as a topical agent for attaining modest skin lightening [11].

The rising popularity of this molecule, despite lack of evidence backing has resulted in its formulation as a component of a proprietary combination peel system, known as the *PERPECT PEEL* [12]. This proprietary peel with a pH range of 1.3-1.5 has been categorized as a medium-depth peel and consists of Glutathione, Kojic acid, TCA, Retinoic acid, Phenol, Salicylic acid, Vitamin C. Thus, the effect is expected to be pleiotropic with pigment reduction, anti-oxidant effect, superficial epidermal exfoliation, and hydration.

#### Special Application Protocol

No pre-peel conditioning is required. It can be used on all skin types. Peel once applied can be left on face for 4 to 6 hours and then can be washed off (self-limiting peel). The patient should be cautioned about enhanced skin sensitivity after the peel, which may last for upto a week. In refractory melasma or acne with PIH and/or scars, monthly sessions may be undertaken for 3-4 sessions. For general skin-glow maintenance, the peel may be done once in 3-4 months.

#### 5-Fluorouracil Peel for Arms and Actinic Keratosis

5-Fluorouracil (5-FU) is an antineoplastic antimetabolite, available as 5% or 2% solution. It blocks the methylation reaction of deoxyuridylic acid to thymidylic acid. And interferes with the synthesis of deoxyribonucleic acid (DNA) and to a certain extent of ribonucleic acid (RNA), thereby resulting in cell death. This effect is more on the cells that grow faster (e.g. tumour cells of actinic keratosis) and take up fluorouracil at higher rate. Systemic absorption with topical application is minimal.

When 5-FU is applied to a lesion, it is followed by erythema, vesiculation, desquamation, erosion and

reepithelialisation. Bagatin E et al found 5-FU topical peel to be helpful in clearance of actinic keratosis lesions. Additionally, it had an excellent overall effect on improvement of photodamaged skin [13] They concluded 5 fluorouracil superficial pulse peel to be safe, well tolerated, very effective and highly inexpensive therapeutic option for treatment of multiple, diffuse actinic keratosis lesions. Guimaraes CO et al in their studies also observed that 5 fluorouracil peels are safe and effective in in treatment of photodamaged skin [14].

5-FU solution should be strictly avoided and kept away from pregnant and lactating women, mucosal surfaces and those with known hypersensitivity to the chemical.

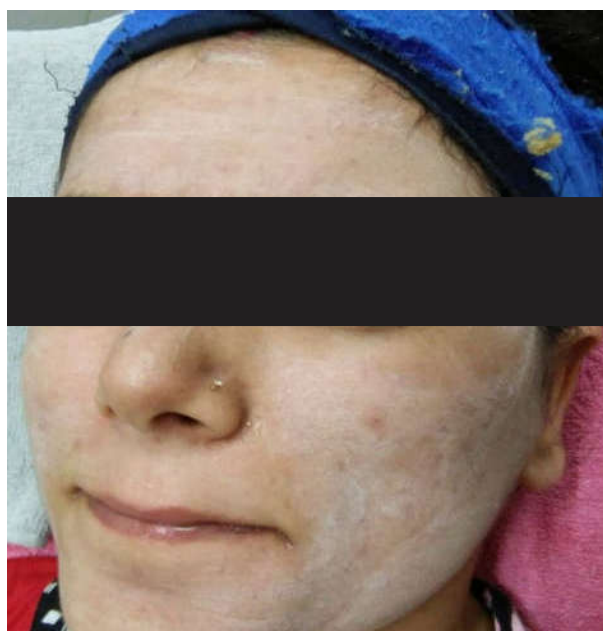


Fig. 1: Immediate frosting on the entire face within a minute of application of glycolic-citric-hydroquinone-kojic acid peel



Fig. 2: Nodulocystic acne in a 24-yr old Indian girl (a) baseline, and (b) 2 weeks after the 4th session with acetic acid-based black peel session. Note the dramatic clearance of acne, pigmentation and scarring



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### Poly-Hydroxy Acids as Home-Use Peeling Agents for Sensitive Skin

Polyhydroxy Acids (PHA) are a special type of AHA that provide very gentle exfoliation, with minimal to no irritation, and also reinforce skin barrier function directly and through their strong humectant property, making them the preferred peeling agents for sensitive skins such as rosacea, atopic dermatitis, and eczema [15].

In addition to gentle exfoliation, PHAs provide anti-inflammatory and antioxidant benefits. They can be used by patients themselves at home. Some common PHAs are *lactobionic Acid*: (humectant, antioxidant and soothing agent), *galactose*, *gluconolactone* (exfoliation, antioxidant and anti-inflammatory properties). PHAs such as gluconolactone lightly exfoliate to reinstate feel without irritation, while improving clarity and diminishing the look of lines and wrinkles (15,16).

### Home-Use Peel-Impregnated Pads for Maintenance

The so-called professional peels, which are typically performed at a skin clinic/center by and/or under the direct supervision of a trained Dermatologist consist of high concentrations of single/multiple peel, e.g. GA 50%, TCA 30%, SA 30% etc.

They have to be used with utmost recommended care by the treating dermatologist, followed by meticulous post-peel care that the patient must follow to get the best outcome and avoid any complications.

However, after completion of a pre-defined 'course' of professional peel sittings (e.g. 6-10 peels done at 2-3 weeks interval), the desired effect is achieved in majority of cases. In such cases, home maintenance is needed.

Further, in patients who for any reason are unable to take regular sessions of professional peels, the only option is that of use of recently available peel-impregnated pads. These pads are impregnated with a specific concentration of the peeling agent, e.g. GA 10% or GA 20%, and are meant to be used 2-3 times per week by the patient at home, as per a company recommended protocol.

The pad is gently rubbed against a thoroughly cleansed face, ensuring optimum pressure to release the peeling agent at a uniform rate, and left over for 10-15 minutes followed by rinse off with plain water. Post-peel care should include a gentle moisturising cream and meticulous use of sunscreen as before.

### Conclusion

Newer peeling agents, combinations and formulations have expanded manifold the options available to the treating dermatologist to choose the most suitable peel for a particular skin type and condition. However, it is important to be conversant not only with the advantages of the new peels, but also, the special precautions and post-peel care to ensure best patient outcome without any complications.

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