Facial Chemical Peels

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Grand Rounds Presentation
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Egypt - first evidence of exfoliants use
- Sun-damaged skin was a sign of lower rank in society
- Sour milk contain lactic acid, an alpha-hydroxy acid commonly used today

Turks - use fire to produce a thermal exfoliation
History

- 1882 P.G Unna, German dermatologist described resorcinol, salicylic acid, phenol, trichloroacetic acid
- 1903 Mackee began using phenol for acne scarring (Chairman of dermatology at NYU)
- 1961 Baker and Gordon presented a peel formula with one patient with a 3 month follow up, became the standard formula
- 1966 Baker published results in 250 patients
Aging

- Define as the process of system's deterioration (*Hanbook of the Biology of Aging* 2006)
- Facial skin changes is one of the most apparent examples of aging
Histology

Actinic changes - photochemical effects of solar radiation exposure

- Disorderly arrangement of epidermis
- Degeneration of the elastic network
- Mottled pigmentation
- Lymphocytic infiltration
- Decrease in collagen
- Flattening of the dermal-epidermal junction
- Epidermal cell atypia
- Increased melanocytes, but they were unevenly distributed and contained variable amounts of melanin
Peel Skin Histology

- Chemical burn of the epidermis and the outer dermis
Peel Skin Histology

- First 2 to 5 days - Regenerates from follicular and eccrine duct epithelium
Peel Skin Histology

Fresh, orderly, organized epidermis
Peel Skin Histology

- At 2 weeks - new collagen formation begins and may continue up to 1 year
  - New bands of dermis 2- to 3-mm-thick
  - Thin, compact, parallel collagen bundles arranged horizontally along the epidermal-dermal matrix
Peel Skin Histology

Other changes

- Melanocytes contain fine, evenly distributed melanin granules
- Impaired melanin synthesis with a generalized bleaching effect
- Decrease lymphocytic infiltration
Treat cutaneous lesions

- Replace atypical keratinocytes with normal epidermal cells
- Kligman concluded that chemical peel reduced the development of new neoplasms
- Litton decreased the rate of appearance of precancerous and early cancerous lesions after a phenol chemical peel
"The ideal patient is a thin-skinned female with fair complexion and fine rhytids."

Skin type and the amount of photodamage present

Fitzpatrick classified the skin types
  - Color and acute solar radiation response

The Glogau classification based on the degree of photoaging
# Fitzpatrick Classification

<table>
<thead>
<tr>
<th>Type</th>
<th>Color</th>
<th>Tanning response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>White</td>
<td>Always burns, never tans</td>
</tr>
<tr>
<td>II</td>
<td>White</td>
<td>Usually burns, tans less than average</td>
</tr>
<tr>
<td>III</td>
<td>White</td>
<td>Sometimes burns mildly, tans about average</td>
</tr>
<tr>
<td>IV</td>
<td>Brown</td>
<td>Rarely burns, tans more than average and with ease</td>
</tr>
<tr>
<td>V</td>
<td>Dark brown</td>
<td>Very rarely burns, tans very easily</td>
</tr>
<tr>
<td>VI</td>
<td>Black</td>
<td>Never burns, tans very easily</td>
</tr>
</tbody>
</table>

- Fitzpatrick skin type I and type II are good candidates
- Type III and greater - increased risk pigment complications
# Glogauau classification

<table>
<thead>
<tr>
<th>Group</th>
<th>Classification</th>
<th>Skin characteristics</th>
<th>Peel</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Mild</td>
<td>Little wrinkling or scarring and no keratoses</td>
<td>Superficial</td>
</tr>
<tr>
<td>II</td>
<td>Moderate</td>
<td>Early wrinkling, mild scarring, and sallow color with early actinic keratoses</td>
<td>Medium</td>
</tr>
<tr>
<td>III</td>
<td>Advanced</td>
<td>Persistent wrinkling, discoloration with telangectasias and actinic keratoses</td>
<td>Medium</td>
</tr>
<tr>
<td>IV</td>
<td>Severe</td>
<td>Wrinkling—superficial to deep actinic keratoses ± skin cancer</td>
<td>Medium to Deep</td>
</tr>
</tbody>
</table>
Aesthetic Indications

- Rhytids
- Spotty hyperpigmentation
- Superficial acne scarring
Therapeutic Indications

- Actinic keratoses
- Superficial basal cell carcinomas
- Lentigo maligna lentigines
- Melasma (discoloration of skin caused by pregnancy)
Contraindications

Relative Contraindications
- Darker skin type (Fitzpatrick IV-VI)
- History Keloid
- History of herpes infections
- Cardiac abnormalities
- A history of diabetes mellitus or previous facial irradiation
- Unrealistic patient expectations
- Telangiectasias
- Anticipation of inadequate photo protection

Absolute Contraindications
- Significant hepatorenal disease
- HIV-positive patient
- Significant immunosuppression
- Emotional instability or mental illness
- Ehlers-Danlos syndrome
- Scleroderma or collagen vascular diseases
- Accutane treatment (within 6–12 months before)
Patient Preparation

- History of herpes infections
  - Prophylaxis with Valtrex or Acyclovir for 2 wks

- Skin preparation
  - Vitamin A derivative therapy 4 weeks before the procedure
    - Speeds epidermal healing
    - Thins stratum corneum
    - Increases the depth of a chemical peel
  - Stop sun exposure - 2 months before the procedure
Chemical Peel Depths

- **Superficial**
  - Epidermal loss

- **Medium**
  - Injury to superficial dermis

- **Deep**
  - Mid-dermal injury
Chemical Peel

- Frosting - keratin protein denaturation
  - Level I - erythema with streaky surface whitening
  - Level II - white-coated frosting with erythema showing through
  - Level III - solid white enamel frosting with little or no background of erythema (penetration through the papillary dermis)
Superficial Peels

- Necrosis of the epidermis
- Healing time from 1 to 4 days
- Improve pigmentary irregularities
- Improve minor surface changes
- Fresher appearance to facial skin
Superficial Peels

- **Different Solutions**
  - 10% to 20% Trichloracetic acid (TCA)
  - Jessner’s solution (resorcinol, 14 g; salicylic acid, 14 g; lactic acid, 14 mL; ethanol, 100 mL)
  - Glycolic acid (50% to 70%)

- **Level I frostung**

- **Postoperative**
  - Mild cleanser, moisturizers and sunscreens

- Glycolic acid can be used to peel skin of all skin types with minimal risk
Medium Peel

- Necrosis of the epidermis & inflammation within the papillary dermis
- Improvement of skin texture in moderate photodamaged skin (grade II Glogau)
- Removes of epidermal or superficial lesions
  - Actinic keratoses
  - Repair mild rhytides
  - Improve pigmentary dyschromias
  - Improve depressed scars
Trichloracetic acid (TCA)

- TCA approaching 50% or higher were used to achieve injury to the superficial dermis.
- At this concentration TCA is unreliable and associated with a higher incidence of complications (pigmentary dyschromia, textural change, and even scarring).
- Combination of products improves the absorption of the lower concentration of TCA without the associated complications:
  - Solid CO2 freezing with trichloracetic acid 35%
  - Jessner's solution + 35% TCA
  - Glycolic acid 70% plus 35% TCA
Medium Peel

- **Brody**
  - First developed solid CO2 applied with acetone to the skin
  - Freezing technique break the epidermal barrier for a more even and complete penetration

- **Monheit**
  - Jessner's solution destroyed the epidermal barrier by breaking up individual epidermal cells

- **Coleman**
  - 70% glycolic acid before the application of 35% TCA.
  - Results similar to that of Jessner's solution

- **Deeper penetration of the 35% TCA and a more even application of the peeling solution**

- **Phenol 88% by itself will give a medium-depth peel**
Patient Preparation

- Vigorous cleaning and degreasing are necessary for even penetration
  - Septisol and acetone
  - Debrided of stratum corneum and excessive scale

- A splotchy peel is usually the result of uneven penetration of peel solution because of residual oil or stratum corneum
Medium Peel

- TCA is painted evenly
  - Forehead to temple to cheeks and finally to the lips and eyelids
  - Eyelids within 1 to 2 mm of the lower eyelid margin

- Amount of TCA delivered is dependent on:
  - Number of applications
  - Degree of saturation
  - Pressure applied to the skin
  - Contact time
Medium Peel

- White frost appears complete on the treated area within 30 seconds to 2 minutes.

- Before re-treating an area one should wait at least 3 to 4 minutes before determining for asymmetry.

- Eyelid skin and bony prominences have a high propensity for scarring (limited to a level II frosting).

- An assistant standby with sterile eye wash in case agent spills into the eye.
Jessner's TCA peel for moderate photoaging skin, Glogau level II.

- **A**, Preoperative view demonstrating rhytides, lentigenes, keratoses, and sallow skin.
- **B**, Jessner's solution applied to face.
- **C**, Full application 35% TCA with a level III frosting.
- **D**, Four days after chemical peel.
- **E**, Six months after chemical peel.
Medium Peel

- Dark crusts peels off on day 5 to 7 then erythema appears and soon fade
- Repeat medium-depth chemical peel should not be performed for at least 1 year
- There is improvement of collagen thickness progressing over a 6- to 13-month period
Deep Chemical Peel

- Glogau III and IV photoaging skin
  - Deeper grooves and wrinkles
- Deep peels are usually performed using the Baker-Gordon solution
  - Phenol 88% 3 mL, Septisol 8 drops, Croton oil 3 drops, Distilled water 2 mL
- Septisol acts as a surfactant which results in more even penetration
- Croton oil is epidermolytic enhancing the absorption of phenol
Deep Chemical Peel

- Phenol >80%
  - Keratin protein binds to the phenol creating large molecules preventing further penetration of the peel solution

- Phenol <50%
  - Produce deeper penetration and more destruction than desired
Tape Occlusion

- Occlusion of the peeling solution with tape increases its penetration creating injury to the mid-reticular dermis.
Deep Chemical Peel

- Face is divided into six aesthetic subunits
  - Forehead, perioral region, bilateral cheeks, nose, and periorbital region
  - 15-minute time interval between units

- White frost that is carried 2 to 3 mm across the vermilion border

- Lower eyelids need to be treated to within 1 to 2 mm of the ciliary margin

- Upper eyelid above supratarsal fold
Deep Chemical Peel

- Erythema may take months to resolve
- Evaluated in 3 to 4 days to observe the amount of wound healing and residual crusting
- Sun avoidance 6 weeks and minimize sun exposure for up to 6 months (Sunscreen with an SPF of 3)
- Splotchy hyperpigmentation (2 – 6 weeks)
  - Retin A, hydroquinone and triamcinolone may provide an improvement
Deep Chemical Peel
Phenol Toxicity

- Cardiotoxic & eliminated hepatic and renal
- Monitored setting
  - Cardiac status, pulse-oximetry, and blood pressure
- Volume loading with intravenous fluids before, during, and after phenol peeling
- Botta advocates force diuresis (furosemide given 10 min before phenol)
- Waiting as much as 20 to 30 minutes between unit
- Recognize
  - First - CNS stimulation,
    - Tremors, hyperreflexia, and hypertension.
  - Later - CNS depression, respiratory failure, hypotension, and cardiac arrhythmias ensuing rapidly.
**Sequelae**
- Pigmentary changes
- Persistence of rhytids
- Prolonged erythema
- Hypertrophic subepidermal healing
- Milia
- Skin pore prominence
- Increased prominence of telangiectasias
- Darkening and growth of preexisting nevi

**Complications**
- Skin infection
  - Herpes simplex virus
  - Pseudomonas organisms
  - Staphylococcus/Streptococcus organisms
  - Candida organisms
- Ectropion
- Cardiac arrhythmias
- Renal failure
- Facial scarring
Hyperpigmentation
Hypopigmentation
Herpes outbreak
Candida infection
Pseudomonal infection
Scarring
Conclusion

- Chemical peeling is a technique that removes superficial lesions and improves the texture of skin.
- Careful patient selection and education are crucial to both the patient's final result and his or her satisfaction.
- Learning the technique is a small part of the process; postoperative care and close patient follow-up are equally important.
- Clinical and histological changes are long-lasting (15 to 20 years) and may be permanent for some patients.
- A complication can also be permanent!
References

Deborshi R. Ablative Facial Resurfacing Dermatologic Clinics. 23(3), July 2005
Langsdon, P. Comparison of the Laser and Phenol Chemical Peel in Facial Skin Resurfacing.