

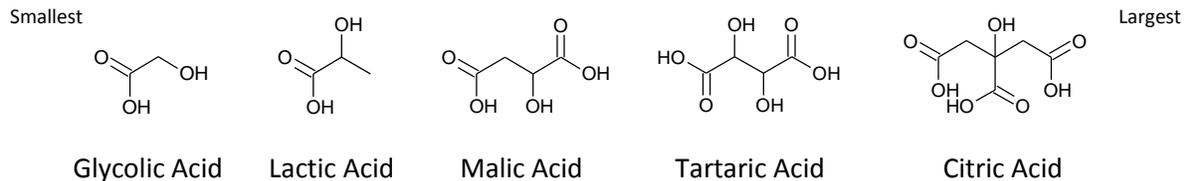
## Glycolic Acid Exfoliation

**$\alpha$ -hydroxy acids**, or **alpha hydroxy acids (AHAs)**, are a class of chemical compounds that consist of a carboxylic acid (-COOH) substituted with a hydroxyl group (-OH) on the adjacent carbon. They may be either naturally occurring or synthetic. AHAs are well-known for their use in the cosmetics industry to reduce wrinkles, signs of aging, and to improve the overall look and feel of the skin. They are used most effectively as professional “peels” available in a physician’s office. Peels available in beauty and health spas and in home kits, contain a much lower concentration than products available to physicians. These spa and home peels do not reach the underlying dermal skin layer and therefore are almost totally ineffective.

## Medical Cosmetic Applications of Glycolic Acid Peels

Let’s consider the biology of skin aging. Human skin has two principal components, the epidermis and the underlying dermis. Skin aging, while certainly affecting the epidermis involves primarily the dermis and is caused by intrinsic and environmental factors.

Alpha-hydroxy acids (AHAs) are a group of organic compounds which have been used for millennia to improve the complexion. AHAs are derived from *food* products including lactic acid (from sour milk), malic acid (from apples), citric acid (from citrus fruits), tartaric acid (from grape wine), and—the one used at NIAM— glycolic acid (from sugar cane). For any topical substance to be effective, it must penetrate into the skin where it can act on living cells. One characteristic that is important in determining compound's ability to penetrate the skin is the size of the molecule. *Glycolic acid* is the smallest possible AHA and therefore penetrates the skin most easily; this largely accounts for the effectiveness of this substance in cosmetic applications.



## Epidermal effect

AHAs have a healthy effect on keratinization; which is clinically detectable by the formation of a new stratum corneum. It appears that AHAs modulate this formation through diminished cellular cohesion between corneocytes at the lowest levels of the stratum corneum. Formulated from sugar cane, this peel creates a mild exfoliating action. Glycolic acid peels work by loosening up the horny layer and exfoliating the superficial top layer. This peel also stimulates collagen growth.

## Dermal effects

AHAs with greater bioavailability, especially glycolic acid, appear to have deeper dermal effects. Glycolic acid, lactic acid and citric acid, on topical application to photodamaged skin, have been

shown to produce increased amounts of mucopolysaccharides and collagen and increased skin thickness without detectable inflammation, as monitored by skin biopsies.

### **Alpha hydroxy acids at different concentrations**

In low concentrations, 5 - 10% as is found in many over the counter products, glycolic acid reduces cell adhesion in the top layer of the skin. This action promotes exfoliation of the outermost layer of the skin accounting for smoother texture following regular use of topical GA. This relatively low concentration of glycolic acid lends itself to daily use as a monotherapy or a part of a broader skin care management for such conditions as acne, photo-damage, wrinkling as well as melasma. Care needs to be taken to avoid excessive irritation as this may result in worsening of melasma or other pigmentary problems. Because of its safety, glycolic acid at concentrations below 10% can be used daily those individuals with very sensitive skin.

In higher concentrations, between 10 and 50%, its benefits are more pronounced but are limited to temporary skin smoothing. This is a useful concentration to use as it can prepare the skin for more efficacious glycolic acid concentrations (50 – 70%).

At higher concentrations, 50-70% applied for 3 to 8 minutes under the supervision of a physician, glycolic acid promotes slitting between the cells and can be used to treat acne or photo-damage (such as mottled dyspigmentation, melasma or fine wrinkles). The benefits from such short contact application (chemical peels) depend on the pH of the solution (the more acidic the product, or lower pH, the more pronounced the results), the concentration of GA (higher concentrations produce more vigorous response), the length of application and prior skin conditioning such as prior peels with Glycolic acid at lower concentrations. Although single application of 50 - 70% GA will produce beneficial results, multiple treatments every 2 to 4 weeks are required for optimal results. It is important to understand that glycolic acid peels are chemical peels with similar risks and side effects as other peels. Some of the side effects of AHAs chemical peeling can include hyper-pigmentation, persistent redness, scarring as well as flare up of chronic herpes infections.

### **Safety**

AHAs are generally safe when used on the skin as a cosmetic agent using the recommended dosage. The most common side-effects are mild skin irritations, redness and flaking. The severity usually depends on the pH and the concentration of the acid used. Although quite rare, there have been reports of more severe side-effects including blistering, burning and skin discoloration, although they are usually mild and go away a day or two after treatment.

The FDA has also warned consumers that care should be taken when using AHAs after an industry-sponsored study found that they can increase photosensitivity to the sun.