

New Age Attitude Toward AHAs

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Solutions for wrinkles, pigmentation, acne and sagging skin continue to be sought out and coveted by the aging boomer generation with no end in sight. The maturing face has the right to maximize its beauty and allure, as well as erase the signs of aging with proven modalities for optimal clinical results. With countless surgical and noninvasive options available, the esthetician or medical professional can find selecting the perfect clinical remedy a significant challenge.

Up until the past few years, the primary weapon of choice has been invasive cosmetic surgery procedures such as blepharoplasty (eye lift), rhytidectomy (face lift), endoscopic brow lift, lower eyelid surgery, facial implants, laser skin resurfacing, Botox* and collagen, including the new generation of injectable fillers.

However, given these surgical age management options, news from the American Society for Aesthetic Plastic Surgery publicized that of the 11.5 million cosmetic procedures performed in 2005, 80% were nonsurgical.

Who is spearheading this revolution for noninvasive anti-aging demands? The answer could lie in the fact that there is a stronger emphasis on health and longevity with today's aging population now more educated to the good, bad and ugly part of invasive surgical procedures and challenging the traditional methods of surgery. This new age attitude has created a major demand for more unorthodox remedies without undergoing anesthesia, needles and the knife. Due to this phenomenon, dermatologists, plastic surgeons, medical spas and skin care clinics have established a timely resurgence of alpha hydroxy acid peels and products, rediscovering their benefits and anti-aging abilities.

Meet the AHAs

Alpha hydroxy acids (AHAs) are a family of natural compounds representing a fascinating group of substances that belong to a category of cosmeceuticals. In the past two decades they have been widely used in a variety of skin care products for moisturizing, keratolytic and anti-aging effects. These compounds include AHAs, beta hydroxy acids (BHAs), combinations of hydroxy acids and polyhydroxy acids.

AHAs are organic carboxylic acids characterized by a hydroxy group in the alpha position. They are hydrophilic because of their aliphatic and linear structure. AHAs are found naturally in a variety of species including foods and plants (citric, malic, tartaric and glycolic); animals (cells and body fluids); and microorganisms such as bacteria, fungi, viruses and algae. AHAs are involved in many metabolic processes and participate in essential cellular pathways such as the Krebs cycle and serine biosynthesis.

How they work

In the epidermis, AHAs have been reported to decrease stratum corneum (SC) cohesiveness, increase thickness of the viable epidermis and deposition of hyaluronic acid; they also induce a reversal of basal cell atypia, which causes the production of atypical skin cells.

AHAs amplify the number and secretion of lamellar bodies that are basic for barrier function in the epidermis. At higher concentrations, used mainly in clinical peeling solutions, AHAs induce epidermolysis, a renewal of the epidermal barrier. AHAs restore normal skin proliferation and are classified as antioxidants. These interesting compounds increase the rate of skin cell renewal and provide cells with a favorable environment for more normal function and probably stimulate epidermal proliferation by improving energy and redox status of keratinocytes.

AHAs applied topically are able to reduce the thickness of hyperkeratotic stratum corneum (HSC) by reducing corneocyte cohesion at lower levels of the SC. This permits efficient clinical control of dry skin, ichthyoses, follicular hyperkeratosis and other conditions characterized by retention of the SC.

In dermatologic and cosmetic use, the clinical benefits of AHAs are extremely profound: retexturization; improved skin tone and translucency; softer, smoother skin; fewer lines and wrinkles; reduction of acne lesions; and fading of age spots

Facial wrinkles have been modified drastically with topical AHAs when applied in a professional peeling procedure and are re-emerging as one of the most promising noninvasive anti-aging approaches for a quick and efficacious result. AHA peeling continues to evolve, and more physicians are offering AHA skin care management in conjunction with Botox and facial fillers because of the immediate results.

The AHA acid test

AHAs perform best at a low pH; therefore, pH is of great importance for achieving a therapeutic outcome. The suggested pH range is between 3 and 5; however, lower levels are very effective but have to be monitored carefully since the lower the pH, the more rapid the erythema produced in the skin.

The acidity depends partly on the concentration of the hydroxy acid and is determined by electrostatic, inductive and steric effects and hydrogen bonding. Besides hydroxy acid concentration, free acid content is another important factor. At pH 3 there is a greater absorption through the skin than at pH 7, as at pH 3 the concentration of free acid is higher. The higher the AHA concentration, the deeper the effect of the solution. Several enzymes such as phosphatases, lipases and transforming growth factor B have maximum activity at pH 5 or lower, and it is possible that an acid environment may activate these mechanisms.

Naturally occurring topical retinoids such as vitamin A (all-trans retinol) and its metabolites (tretinoin) are well-known agents for treatment of mature, changing and photodamaged skin. Retinoids' long-term application shows benefits similar to those assessed with AHAs.

Glycolic acid

Glycolic acid is the most well-known of the AHAs. Mainly derived from bio-identical chemical constituents, the natural source is best extracted from the sugar cane plant. Glycolic acid has the smallest molecular size, containing only two carbons. This characteristic allows glycolic acid the greatest ability of all the AHAs to penetrate more rapidly, be absorbed deeper and be utilized by the skin.

Glycolic acid loosens or dissolves glue-like substances holding the outer layer of cells together to the underlying epidermis. These thick, piled-up, clinging cells are responsible for the appearance of dry, rough, scaly skin and brown spots caused by age and sun damage. When the "glue" is loosened, the thick, microdamaged SC is sloughed away, and the newly exposed skin is healthier, exhibits a smoother texture with refined pores and retains an elevated level of moisture content.

Unfortunately, glycolic acid has received bad press in past years, and the negative press is likely a result of a lack of information and ignorance that can be associated with the "sky is falling" way of thinking. The facts conclude that when individuals use these ingredients for a long period of time, they anecdotally have reported an increase in sensitivity to UV light. Many studies have been performed to assess whether topical glycolic acid can enhance photodamage, and it recently has been found that glycolic acid does make the skin more sensitive to UV light, with lowered minimal erythema dose and enhanced formation of sunburn cells. It is for this reason application of an inorganic sunscreen is imperative during daylight hours, as it would be in any sensible skin care protocol, regardless of the ingredient used.

If this condition occurs with a client, suspend the use of AHAs for 10 days. If the client has sustained any UV-induced irritation, this condition will be reversed within seven days after discontinuing use. Reintroduce AHAs slowly, restrict sun exposure, and ensure the use of antioxidant and anti-aging peptide complexes and a meticulous sun protection program.

In addition to the aforementioned, guide clients' use of AHAs with the natural circadian rhythm of the skin, and have them apply this constituent at night only.

A medical spin on this amazing ingredient substantiates that glycolic acid has been shown to be protective against UV-induced skin cancer, reduction of skin tumor incidence, a 55% reduction of tumor multiplicity and a 47% decrease in the number of cancers larger than 2 mm. This inhibitory action is accompanied by a decreased expression of some UV-induced proteins that regulate the cell cycle such as proliferating cell nuclear antigen, cyclin D1, cyclin E, and cyclin dependent kinase 2 and 4.¹ These results medically suggest glycolic acid may play an important inhibitory role on UV-induced tumorigenesis.

Owing to the above mentioned mechanisms, the clinical effects of glycolic acid can't be ignored with the documentation substantiating how the skin's firmness, elasticity, wrinkle reduction and pigmentation morbidity is improved.

Lactic acid

An AHA that has increased in popularity in recent years because of the multiplicity of uses, including with skin of color, is lactic acid. Lactic acid comes from natural sources of sour milk and tomato juice. This acid has a larger molecule than glycolic acid, three carbons, and has been used in topical preparations for decades because of its buffering properties and water-binding capacity to the skin.

Lactic acid has been used for correction of disorders associated with hyperplasia and retention of the SC, such as dandruff, callus, keratosis and verrucae (viral warts). In addition, lactic acid is effective for treatment of acne skin due to its penetration in the sebaceous follicle ducts with subsequent lowering of pH and decrease in formation of fatty acids.

The choice made by an esthetician or physician of the correct AHA peel for a diagnosed condition, skin type and desired result is critical to successful treatment. Among the many chemical peel formulations available, the lactic acid peel offers superior exfoliation, hydration and skin brightening all in one procedure. Lactic acid is still the most flexible of all peeling solutions, because it is more attuned with the skin's natural substances and is identified by the body as compatible.

According to research done by the author involving data on turnover and irritation, lactic acid's long-term benefits increase firmness 35%, hydration 23%, smoothness 23%, wrinkles 55% and collagen 210%. It contains NMF, or natural moisturizing factor, which is known to hold onto water at the skin's surface by binding hydration in place and assisting the skin proteins to better absorb moisture. NMF consists primarily of amino acids, a component of the important peptide chains.

Clinical studies, also researched by the author, on topically applied lactic acid have demonstrated its excellent exfoliation properties and exceptional capacity for treating hyperpigmentation, while increasing moisture retention. Lactic acid speeds development, growth and transit of epithelial cells, while lactates stimulate ceramide biosynthesis, producing a more resilient lipid barrier and resistance to drying influences affecting the SC.

Stay skin-conscious

The skin is where all facial rejuvenation begins, and this cannot be overlooked when selecting an AHA type. Human skin is a highly specialized form of connective tissue. It contains several differentiated cell types: melanocytes, fibroblasts, keratinocytes, immunocompetent cells (Langerhans cells), migrating mononuclear cells and mastocytes, to mention the most important cell types in the skin.

In addition to these various cell types, skin also contains connective tissue that is rich in extracellular matrix (ECM). The macromolecular components of the ECM are mainly responsible for the rheological properties of the skin—its mechanical resistance and also its suppleness and elasticity. Other physiologically important functions include

hydration, thermoregulation and regulation of the skin's permeability. All these functions depend on differentiated cells, as well as on the composition of the ECM.

Aging is accompanied by a slowing down of cell proliferation as shown by the morphometric evaluation of the number of epidermal cell layers and of dermal fibroblasts in aging skin. This age-related cell loss and function is one of the major challenges for the esthetician.

AHA skin peels performed by a trained esthetician can benefit the cell proliferation of the skin, therefore enhancing the integrity of the skin's internal structure and external texture. AHA peels have been substantiated to increase the synthesis of collagen, proteoglycans and glycosaminoglycans such as hyaluronan, a high molecular weight polysaccharide that can retain a large volume of water. Its molecular weight is on the order of several million.

AHAs helping you

In conclusion, finding the correct clinical solution to address the negative effects of facial aging requires the esthetician to seek education and search for scientific solutions. AHAs have a 50+-year history of substantiated proof, and the goal of any age-management procedure is to achieve clinical success by reducing wrinkles, increasing firmness via collagen stimulation, smoothing the skin, alleviating pigmentation morbidity and elevating hydration. AHAs can accomplish this and much more.

REFERENCES

1. AO Barel, HI Maibach and M Payne, eds., Handbook of Cosmetic Science and Technology, 2nd edition, Taylor & Francis Group, Boca Raton, FL (2005)