

Alpha Lipoic Acid

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Alpha Lipoic Acid (ALA) is also called thioctic acid. In the 1950s ALA was first identified as a component involved in cell energy production. In the 1960s scientific interests mainly focused on its therapeutic applications such as treating diabetes, liver cirrhosis, glaucoma, hepatitis and other diseases. ALA exists in plants and animal tissues. Foods such as red meats provides most of the ALA.

ALA is a vitamin-like substance but is not classified as a vitamin because only a small amount can be synthesised by the human body. Some nutritionists recommend regular supplementation with 100mg of ALA for extensive health benefits.

Recently ALA is gaining popularity in the skin care industry. To appreciate this advancement, it is important to understand the chemistry and skin benefits of ALA.

Lets first look at the chemical structure of ALA. The molecular weight of ALA is 206.32 which is slightly bigger than vitamin C (176.12) and smaller than vitamin E (430.69). ALA has two optical isomers: *d*-form and *l*-form (*d*=dextro; *l*=levo refers to the direction of rotation - chirality). Natural sources usually provide the *d*-form and synthetic methods produce *dl*-form (*dl* is the mixture of *d* and *l* forms).

ALA is soluble in most organic solvents (or fat) but practically insoluble in water. It appears to be a misconception that alpha-lipoic acid is "the universal antioxidant because it is soluble in both fat and water". All water insoluble vitamins such as vitamin A, B, D, E etc., do not form a water soluble salt or ester. In contrast, ALA can form water soluble sodium salt (replace the hydrogen atom at the right end with sodium atom) due to its lower hydrophobicity (less water repelling) structure. ALA can react readily with sodium hydroxide to form ALA sodium salt at ambient temperature. In cosmetic formulations, it is possible to make ALA and ALA sodium salt co-existing in one product so that skin may receive both lipophilic ALA and hydrophilic ALA sodium salt simultaneously. In this case, the concept of "the universal antioxidant" would become "true".

Most other organic antioxidants contain a carbon to carbon double bond (C=C), which is unstable but can donate electrons neutralising free radicals. Alpha Lipoic Acid does not contain any C=C bond but

possesses a unique disulfide link (-S-S-). The disulfide link is responsible for ALA's antioxidant function but it is weaker than C=C. As a result, ALA is a weaker antioxidant than those with C=C bonds such as vitamin A, C and E. On the other hand, ALA is a more stable antioxidant which can be kept in a cosmetic formulation for considerably longer time than the other antioxidants.

Many amino acids contains sulphur and disulfide links (-S-S-) which holds the peptides well. The disulfide link makes ALA more bio compatible. Plus the lipophilic feature with a small molecular weight, allows ALA to be readily absorbed by the skin. Hence the topical delivery of ALA is quite efficient.

One of the basic skin benefits of ALA is antioxidation or free radical scavenging, ALA is capable of neutralising a wide variety of free radicals such as singlet oxygen, superoxides, peroxy and hydroxyl radicals etc. Since the sodium salt of ALA is water soluble, it can access hydrophilic skin tissue sites to perform antioxidation. It is wise to include ALA sodium salt for this extra benefit.

Technically, once an antioxidant neutralises a free radical it usually loses its anti-oxidation ability. In living systems, however, antioxidants can be regenerated often with the help of other antioxidants. Glutathione, for example, can regenerate vitamin C. Vitamin C can in turn regenerate vitamin E. Similarly, ALA can help regenerate a variety of antioxidants including glutathione, vitamin C, E and co-enzyme Q10.

Although ALA is a relatively weaker antioxidant, it can scavenge free radicals quite well via the antioxidant regeneration mechanism. This further implies that ALA could work more effectively with the existence of other antioxidants ALA could regenerate.

Free radical attacks causes damage to physiological structures, such as lipids, protein and DNA. Studies show that ALA plays a good role in the repair of oxidatively damaged skin tissue. Hence, ALA not only scavenges harmful free radicals but also can repairs the skin damage caused by free radicals.

ALA's unique function is to involved in skin metabolism. That is why ALA can be found mostly in a specialised

component of cells - mitochondria where free fatty acids are converted to energy (ATP) for metabolism. Hence, ALA is known as co-factor or co-enzyme for energy production. After ageing the cell metabolism become weaker and slower so that skin develops visible lines. ALA can help increase energy production and cell's metabolism so as to retard the skin ageing process.

Metals such as arsenic, chromium, lead and mercury are very toxic to the human body. Cosmetic chemists often time utilise chelating agents such as EDTA (ethylenediaminetetraacetic acid) in cosmetic products to scavenge these toxic metal ions by forming insoluble complexes. Research and studies have revealed that ALA can bind to these toxic metals, pulling them out of circulation and facilitating their excretion, thereby preventing damage to body tissue. ALA's metal chelation ability can be used to prevent the skin from penetration of toxic metals but also can detoxify the toxic metals in the body.

ALA is known to treat diabetes effectively because it prevents and reverses attachment of sugar or glucose to proteins (a process called glycation). Similar to common salt, sugar also cause collagen to "cross-link" after attaching to the proteins of collagen. The "cross-link" makes skin stiff and inflexible. The topical application of ALA can prevent "sugar toxicity" to skin and keep skin soft and resilient.

A few studies indicate that ALA might help to repair the damage after irradiation exposure. Just like ALA can repair the damage caused by free radicals, ALA can very likely help repair the skin damage after sun exposure. The ALA's sun protection benefit needs further research and study.

In summary, alpha lipoic acid is a unique antioxidant with multiple skin benefits and provides a new dimension for anti-ageing technology.

Currently there are a few ALA skin care products available on the market. In general, these products deliver alpha-lipoic acid topically and are beneficial to skin health. However, the actual performance or degree of skin benefits largely depend upon the state of art in the formulation.

Rejuvi A Renewal complex

A new dimension for Rejuvi Anti-Ageing Technology. It contains concentrated alpha-lipoic acid - a super antioxidant, DMAE (dimethylamonoethanol) - an antioxidant membrane stabiliser. DMAE boosts the effect of other antioxidants resulting in increased skin smoothness, brightness and line reduction. As well as a combination of glucosamine HCl, algae extract and yeast extract. This combination can activate both epidermal and dermal cells resulting in improved cell renewal as well as an increased production of hyaluronic acid and collagen. Rejuvi "a" Renewal Complex combines the above three exciting anti-ageing factors to offer you a wonderful skin rejuvenation.

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