



Combining HA with Sodium Succinate

Dr Reza Mia discusses the benefits and presents a case study on the outcomes of using hyaluronic acid with sodium succinate

As most aesthetic practitioners are aware, injecting hyaluronic acid (HA) into the skin stimulates the restoration of the dermis by increasing the amount of collagen – through fibroblast stimulation – in the skin, which promotes improved water retention to volumise the skin at various levels.¹ HA is made up of repeating disaccharide units and is part of the family of glycosaminoglycans.² HA also directly attracts water into the skin to further increase skin turgor and hydration.² This reduces the visible signs of ageing, such as fine lines and loose skin.³ The effect of the accumulation of free radicals and the inhibition of several metabolic processes must be kept in mind as these factors promote skin ageing and lead to the hyposynthesis of collagen and elastin.⁴ However, the use of HA alone may not reduce many of the effects of ageing. Sodium succinate can provide an antioxidant effect by actively blocking free radicals and stimulating sluggish metabolic processes in the skin, therefore aiming to reduce the signs of ageing.⁴ This article will demonstrate how the combination of HA and sodium succinate, using specific injection techniques, can effectively act against the three mechanisms of skin ageing.

Mechanisms of ageing

The dermis ages in three crucial ways:

- 1. Dehydration and volume loss:** decreasing levels of HA in the skin result in decreased water retention, which contribute to a loss of volume and the exacerbation of wrinkles and other signs of ageing.
- 2. Deceleration of metabolic processes:** this leads to slower regeneration of collagen and elastin in the skin and accelerated ageing.
- 3. Accumulation of free radicals:** results in deterioration in the colour and texture of facial skin, causing premature ageing by damaging the cells and their DNA.⁴

Combining HA and sodium succinate

It has been suggested in an in vitro trial, when combined, HA and sodium succinate act synergistically to stimulate fibroblast cells to increase (in both number and metabolic activity) with greater effect when compared to HA mono-component therapy.⁵ The

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effect on the metabolic processes can include strengthening cellular respiration, normalising ion transport, increasing protein synthesis and increasing energy production, through the stimulation of the Krebs cycle in mitochondria.⁵ The Krebs cycle is essential for cellular respiration; taking place in the mitochondria, the cycle converts pyruvate (from glycolysis) to produce nicotinamide adenine dinucleotide (NADH) and adenosine triphosphate (ATP) through a number of reactions and intermediate molecules – succinate is one such molecule forming the complete chain in the cycle.⁶ This should then translate to the restoration of cells, an increase in skin elasticity, firmness and tightness, improved colour and texture, as well as a reduction in the signs of ageing and fatigue.⁴

Treating the three signs of ageing

The effects of the combination on the previously mentioned mechanisms of ageing can be summarised as below:

- 1. Dehydration and volume loss:** HA aims to increase the collagen structure and density in the skin, partly through functional hypertrophy, thereby increasing hydration and volume.⁵
- 2. Deceleration of metabolic processes:** the succinic acid stimulation of the Krebs cycle aims to reverse this deceleration and increase both the number of fibroblasts as well as their metabolic processes. This in turn can result in an increased output of cystine, arginine, lysine, glycine, methionine, threonine, collagen, elastin and phenylalanine.⁵
- 3. Accumulation of free radicals:** the antioxidant effect of the combination aims to counteract the free radical accumulation and protect the cells from damage by the free radicals.⁵

Clinical studies

Studies have suggested that using HA with sodium succinate can increase skin tightness, reduce sagging and moisturise the skin.^{4,5} In these studies, increased skin elasticity was observed in participants treated with mono-component HA products, whereas in skin treated with a HA product that included sodium succinate, a significant improvement in overall skin quality was observed due to an increase in its turgor and elasticity, improved hydration and colour correction. Results in older patients were more visible, and accelerated healing of skin defects were seen at skin biopsy sites after treatment in

Techniques

The techniques used to achieve successful results are based on multiple intradermal injections of HA with sodium succinate. The full range of injection techniques is extensive, however some examples are explained below.

Figures 1 and 2 show examples of the facial injection techniques. **Figure 1** illustrates the method used to create adjacent areas of rejuvenated tissue that interact with each other to produce a tightening and lifting effect. This is used when treating indications such as increased nasolabial fold depth or mid-face volume deficiency. **Figure 2** illustrates the method used to treat crow's feet in the periorbital region.

The combination process can be applied to the body, as well as the face. Hands, neck, décolletage, arms, legs, abdominal skin and breasts are just some of the areas that may be treated using the combination. **Figure 3** depicts a technique used to increase the density of abdominal skin to tighten the area following weight loss. **Figure 4** portrays an uneven technique where greater emphasis is placed on the upper area of the breast in order to tighten the skin to a greater extent than the skin on the lower aspect of the breast.

The patterns used are determined by an assessment of the patient's skin, which separate them into tired, wrinkled, muscular and deformational ageing phenotypes.³ Whilst many patients can be categorised under more than one type of ageing, most are likely to be categorised predominantly under one type, which would guide the choice of treatment.



Figure 1: Facial injection techniques to create tightening and lifting effect

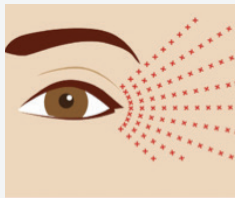


Figure 2: Facial injection techniques to treat crow's feet

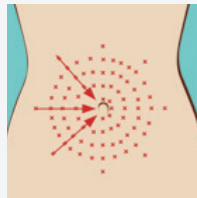


Figure 3: Techniques to increase the density of abnormal skin following weight loss

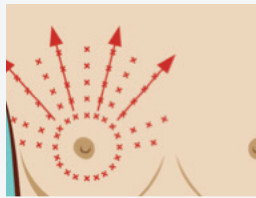


Figure 4: Techniques to tighten and lift the skin around the breast

all study patients when compared with the same biopsy areas before treatment. A recent study indicated that the treatment has a more noticeable impact in comparison with mono-component HA products.⁴ Semi-quantitative histological analysis of skin biopsies in all patients also suggested the greater influence of HA and sodium succinate on the structure of the dermis and capillary network of the skin. The number of fibroblasts appeared to increase by 300% versus the 200% increase shown with products containing only HA. An increase of



Figure 5: Patient A before, during and after treatment using hyaluronic acid and sodium succinate in the lateral periorbital region.



Figure 6: Patient B falls under the wrinkled ageing phenotype. Images depict before and after treatment using hyaluronic acid and sodium succinate in the periorbital, glabellar, cheek, jowl and nasolabial fold regions.

up to 100% above baseline amino acid levels is seen as well.^{4,5}

Tired ageing

The tired ageing type consists of loose, saggy skin under the eyes, dark periorbital circles, crow's feet, reduced skin tone and density, deep nasolabial folds and wrinkles along the border of the lower jaw.

Wrinkled ageing

The wrinkled ageing type consists of more superficial skin wrinkles on the forehead, cheeks, chin, glabellar area, temporal zone, preauricular area and the periorbital region. Here there is a distinct absence of the heavy, droopy skin seen in the other phenotypes.

Muscular ageing

The muscular ageing type occurs as a result of highly active facial muscles, which increase the appearance of the general facial contours, dynamic wrinkles, sagging cheeks and hypertrophy of facial muscles.

Deformational ageing

The deformational ageing type, on the other hand, includes general ptosis of the soft tissues, jowls, bags under the eyes, marionette lines, degradation of the facial contours, eyebrow ptosis and eyelid ptosis.

In practice

Through combining HA with sodium succinate, and incorporating the proper injecting techniques, patients treated at my practice have seen positive results. While treating cheeks, jowls, nasolabial folds, crow's feet, forehead, buttock, shoulder, chest and neck areas, I have noted improved results in the firmness, hydration, density, tone, pigmentation and texture of the skin. Patients have also noted an improvement in the appearance of acne scars and stretch marks, which reportedly feel smoother to the touch. I have also seen a visible improvement in these areas. Although the HA and sodium succinate combination can produce added benefits to a variety of different areas, there are certain areas that would benefit more from other methods that should be considered instead. In my opinion, platelet rich plasma (PRP) is better suited for use on the lower eyelid closer to the medial border where HA-containing products might result in a puffy, oedematous result. Stretch marks and hypertrophic scars with severe collagen deficiency would also benefit from alternating treatment with products containing a higher percentage of HA.

Complications

As with any injectable product, extra care should be taken with any patient taking chronic medications that might increase the tendency to bleed or bruise. Patients with known sensitivity or allergy to HA or succinic acid should be tested before using the product and general precautions should be taken, as one would with any injectable HA-containing product. The product should not be injected routinely in

the medial aspect of the tear trough as this could result in excessive oedema. Only experienced medical practitioners should inject in this area and limited quantities should be used. Aftercare may include simple steps, such as sitting down facing an air conditioner to soothe the skin, elevating the face by sleeping on two or three pillows when the face has been injected and avoiding sources of heat such as saunas, fireplaces and showers. Where bruising has been observed or is expected, I have personally found that products that contain Arnica have aided in reducing the time taken for the bruising to resolve. I have also observed that an inflammatory response leads to better subjective results and longevity of those results. Therefore, anti-inflammatories should be avoided. It has been shown that mechanical stimulation of the fibroblasts by HA leads to an increase in their activity⁷ and thus, at least theoretically, inflammation has a positive effect on the amount of collagen induced by the product if it is accepted as a further source of mechanical stimulation.

Conclusion

The addition of succinic acid to a HA-injectable range has, in my opinion provided medical aesthetic practitioners with a useful tool to use in our arsenal against the signs of ageing. The clinical trials have produced favorable results, which I have been able to see myself in practice. Although the patients in these studies and images were treated exclusively with one HA and succinic acid product, patients in clinical practice would be treated with a range of products and treatments to provide synergistic effects, which one product alone could not provide. I have used HA and succinic acid in combination with other treatments such as PRP, dermal fillers, botulinum toxin, energy devices, chemical peels and other treatments to produce healthy, natural results in patients based on their individual needs.



Dr Reza Mia graduated from the University of Witwatersrand with a medical degree and later received an MBA from the University of Liverpool. Dr Mia has participated in global studies assessing dermal filler techniques and specifics in the scientific development, manufacturing and service provision in antiageing therapy, aesthetic medicine, rejuvenation, correction and restoration of the skin.

Disclosure: Dr Mia is the key opinion leader for Institute Hyalual South Africa, the manufacturer of Hyalual and Xela Rederm.

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