



body language

The UK Journal of
Medical Aesthetics
and Anti-Ageing
www.bodylanguage.net

NATURE MEETS SCIENCE

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Nature meets science

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Both nature and science can be drawn upon to benefit the efforts of the skincare industry. Plant-derived natural ingredients can be combined with ingredients developed in the lab and scientific methods can be used to determine the best ways to combine these botanicals.

A growing body of research informs us which botanicals may be combined together, their pH requirements, concentration limits and other formulation requirements. Scientific methods may then be used to test the end-product and verify its effectiveness.

The term “cosmeceuticals” refers to techniques used to combine ingredients for topical skincare products and the field merges knowledge from both pharmaceuticals and cosmetics. Benefits to the consumer include effective topicals suitable for both home and professional use.

Natural ingredients

In addition to expecting instant, dramatic improvements in their skin’s appearance, consumers also strongly favour the use of “naturals” in their products. Employing nature and science to develop topical products has become quite fruitful—combining botanical ingredients with those developed in the laboratory has yielded some effective products. But there are other, more clinical benefits of using “naturals”.

Often, the chemistry of plant actives meshes more smoothly with human receptors than synthetics do. Since plants and animals both evolved on planet Earth, many receptors are similar or identical and many of their adaptive mechanisms are shared.

Earth’s organisms, including plants, are also quite efficient in developing enzyme systems and biochemical pathways that are used for more than one purpose. Therefore a plant ingredient may be se-

lected for its ability to resurface the skin but may also be anti-inflammatory and strongly antioxidative.

A good example is white willow bark replacing the beta hydroxy acid, salicylic acid. The salicin in white willow bark extract is as effective as the synthetic but is friendlier to the skin, also providing antioxidant and anti-inflammatory benefits.

Another example would be choosing a plant source of Vitamin E containing more beneficial substances in addition to the Vitamin E or alpha tocopherol. It took years to determine that the tiny amounts of tocotrienols in natural Vitamin E were so beneficial, but they were. It is likely that botanically-sourced Vitamin E contains other helpful molecules with activity yet to be discovered.

But consumers often think that anything described or labelled as “natural” is good, remaining unaware that substances found in the natural world can be quite harmful. Simply including a natural substance in a formula fails to ensure that it is either benign or helpful.

The close therapeutic to toxic ratio of digitalis leaf, for instance, reminds us that not all things natural are safe. Digitalis was once used to treat congestive heart failure, initially in teas and later in pharmaceuticals. The vinca alkaloids are also useful as chemotherapeutic drugs because they are highly toxic.

However, about ten years ago, US medical literature reported a case of a critical heart block occurring in a young person who was taking only vitamins. Persistent investigation traced the problem to an Eastern import in which the desired supplement had been harvested in a field in which foxglove (*Digitalis purpurea*) also grew.

Both plants were harvested and small amounts of digitalis contaminated the supplement capsules and were ultimately ingested, causing the toxicity. The sup-

plement was “cosmetic grade” and so the manufacturer was not required to verify its contents.

Pharmaceutical-grade

Still, numerous botanical ingredients—some in use since Egyptian and Ayurvedic times—can benefit skincare. Unfortunately, many key principles of using natural ingredients are often ignored due to expense and/or lack of knowledge.

Whenever possible, only “pharmaceutical-grade” rather than “cosmetic grade” botanicals should be used. This ensures that they are of the same purity and quality as those used in medicines. A Certificate of Analysis is then provided by the supplier that assures random periodic monitoring and that mass spectrometry has been utilised to verify the purity of contents.

The buyer will not necessarily know, however, if pharmaceutical-grade ingredients were used, as the same name will be printed on the bottle. So, ultimately, the buyer must trust the company making the end-product. Cheaper ingredients may contain insecticides, other unwanted botanicals, random impurities or even heavy metals.

An entire body of research literature exists, generally unknown to the medical community, in which researchers evaluate raw materials used in cosmetics and personal care products. These scientists use the same methods of evaluation as other research scientists.

Formulators access this compendium to learn which ingredients are proven to affect skin, peak activity by concentration, and other chemical requirements such as pH and solubility. Investigation is published for both botanicals and synthetics.

Improvements in Vitamin C

The inclusion of Vitamin C in skincare products began a revolution in the indus-

try. Benefits of topical Vitamin C include anti-ageing effects, collagen synthesis, free radical protection and lightening and brightening. Formulating with Vitamin C during these first few decades was difficult and required a pH below 3.5, specific concentrations between 15% and 20%, and redox considerations, since many substances were pro-oxidant and chemically interacted with the Vitamin C.

A Vitamin C preparation might itself become unstable, oxidising in the bottle and losing effectiveness prior to skin application.

Through research, however, the second carbon in the ring was discovered to be problematic. A carbohydrate moiety was then added to this position. This modification yielded a Vitamin C that was easier to combine with other ingredients and it improved topical results for the user. Two natural substances—a sugar and Vitamin C—were then combined and this not only solved the formulating difficulties with Vitamin C, but the resulting molecule proved to be equal or superior in every way to plain Vitamin C.

The improved natural substance could be used throughout a wide pH range, could be combined with other actives, including pro-oxidants such as copper, induced collagen synthesis for longer time periods, was equivalent at lightening, remained active in skin for longer times and retained all of its antioxidant ability.

Growth factors and botanicals

Growth factors are peptides—protein chains composed of amino acid building blocks. Short peptide chains that penetrate skin have been shown to exhibit activity which is bio-identical to human growth factors. Some of these benefits include encouraging collagen synthesis, repairing wounds and stimulating stem cell activity; all helping to produce healthier, younger-appearing skin.

One patient who was distressed by the appearance of her post-revision mastectomy plus reconstruction scar began product application containing botanical antioxidants, laboratory-derived peptide growth factors and wound healers ten weeks after her revision procedure (Fig. 1). Prior to ten weeks post-operatively, no topicals were used. She applied product only to the medial portion of her scar.

A product containing botanicals and growth factors can provide instant, intermediate and long-term benefits (Fig. 2). In addition to including other cutting-edge technology, the product's hyaluronic acid

is freeze-dried and formed into spheres that nestle in wrinkles. The spheres absorb transpired skin water, which is usually wasted through trans-epidermal water loss, and instantly plump wrinkles. Other ingredients in the formula begin the longer-term processes of strengthening the dermal-epidermal junction and encouraging collagen synthesis.

Antioxidant and anti-inflammatory activity


Antioxidants quench excess inflammation, which is detrimental to skin and accelerates ageing. In one example, an irritant was applied to the subject's skin both with and without later application of a topical product (Fig. 3).

The product was verified by lab analysis to exhibit strong antioxidant activity. The skin biopsy illustrates prevention of inflammation with product use. The product contained Vitamin C technology described earlier as well as other anti-inflammatory botanicals, including *Olea europaea* but no corticosteroids.

Botanically sourced alpha hydroxy acids

Alpha hydroxyl acids, used for years as exfoliants, may be botanically sourced from sugar cane, maple, bilberry and citrus. When appropriately formulated, these naturals give equivalent or better results compared to synthetics, with less downtime for the patient, including less irritation and other side effects.

A case study followed a five-month regime of plant-based actives used for resurfacing, shortening epidermal turnover time and other benefits (Fig. 4). The primary product used was a botanically-based AHA peel. Post-procedure peeling was avoided by immediate lysis and gentle debridement of devitalised stratum corneum which was also achieved using botanical ingredients.

Combining the best of high-tech ingredients with botanicals is at the forefront of exceptional skincare. Consumers remain favourable to choosing products containing natural-world ingredients and science has given us superior formulating techniques and ways of evaluating their effectiveness. Exceptional results with less downtime provide advantages for both the client and the aesthetician. 

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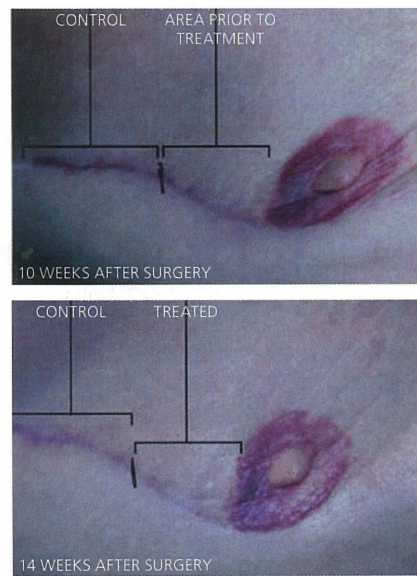


Fig. 1 Topical application of growth factors and botanical antioxidants to mastectomy scar



Fig. 2 The effects of a product containing botanicals, growth factors and freeze-dried hyaluronic acid

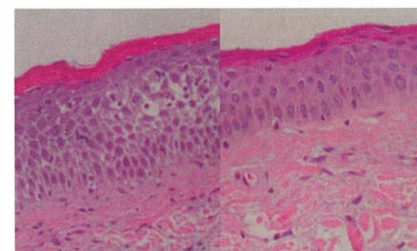


Fig. 3 Skin biopsy showing prevention of inflammation—after an irritant was applied to the skin, results shown with and without later application of a topical antioxidant product