

Dermonutrition and skin care: the Essensis® case

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Abstract: The skin is an outward sign of inner health and well being. Providing protection is certainly one of the most important function of the skin functions. As a protective barrier, the skin must prevent water loss and protect against pathogen and foreign substances entering the body. One of the primary layers that provide this protection is the stratum corneum (SC). Lifestyle changes such as ageing, and environmental factors, in particular cold weather, can impair the functioning of this barrier through alterations to the composition of the lipids which make up the SC. Under such circumstances, transepidermal water loss levels may be elevated and the natural moisture barrier may be more susceptible to irritation or to the development of dry skin. It is now well established that good skin condition is dependent upon nutrients in the diet. Interestingly some nutritional factors could help to improve skin barrier such as fatty components (fatty acids, vitamin E) that helps to improve the natural moisture barrier of the skin and or keratinocyte cellular differentiation which in vitro improve SC barrier function. Essensis is a fermented dairy product specifically formulated with borage oil, green tea extract and vitamin E to improve skin barrier function as part of a healthy diet. Essensis addresses the healthy population – globally and from a dermatological perspective.

Key words: improvement of skin barrier fonction, fatty acids, vitamin E, Essensis

The skin, like any other organ, requires appropriate nutrients to function healthily and therefore diet and nutrition play an essential role in maintaining skin health and quality. The health of the skin is not only important in terms of cosmetic attractiveness but also for its role as a protective barrier and regulating water lost from the body.

The skin is constantly exposed to environmental factors such as the climate, UV light and noxious substances, all of which can lead to skin damage. In addition, internal factors such as the immune response and ageing influence skin function. For these reasons, good daily skin care and protection, ensuring adequate intake of water as well as a healthy diet and are all essential for maintaining the condition of the skin.

The essential role of dermonutrition

Modern nutritional science is currently developing new insights into the relation between food intake and skin disorders. There is a growing interest in the role of diet, specific nutrients and supplements in protecting the skin function and preventing or reducing the risk of skin disease. Certain food nutrients have proven to be biologically relevant by acting at a cellular level, such as through enhancing keratinocyte

differentiation and skin barrier function in both normal skin function and in skin disease such as eczema or atopic dermatitis.

This scientific-based evidence has led to the development of a new discipline called Dermo-Nutrition where the potential effects of certain nutrients on skin quality and function are investigated. Accumulating evidence supported by clinical studies on the beneficial effects of certain dietary components, including polyunsaturated fatty acids, polyphenols and probiotics has shown significant effects in enhancing skin health [1-6].

Ingestion of appropriately selected foodstuffs (specific vegetable oils or plants) as well as food supplements may provide the opportunity for a more widespread and consistent delivery of products to the entire skin surface. As is normally the case in food and nutrition science, the delivery form and the food vector plays a key role in ensuring optimal delivery of nutrients throughout the body.

Basically a functional food development will have to take into consideration several parameters such as scientific knowledge on existing or new ingredients, safety and toxicity of the potential ingredients, regulatory status and of course technical product development that should lead to great tasting products. A simplified process is illustrated in figure 1.

Essensis®, an innovation from Danone Research

Based on this approach the Essensis® dairy product range was developed by the centre of research of Groupe Danone in cooperation with dermatological experts after a precise analysis of the function of the skin, skin barrier function and mechanisms through which certain food ingredients may enhance the latter. This product range is intended for people in good general health, but it is specifically those that have dry or sensitive skin.

Four components at levels of intake selected for their efficacy on skin function and safety were incorporated into the dairy matrix:

- 750 mg of borage oil supplying the equivalent of 150 mg of gamma-linolenic acid (GLA);
- 55 mg of green tea extract supplying 47 mg of catechins;
- 2 mg of vitamin E (in the form of dl-alpha-tocopherol acetate concentrate);
- 5.10^9 CFU of *Lactobacillus casei* DN-114 001 (i.e. 5×10^7 CFU/g).

Data available from toxicological studies, together with consumption simulation studies and analytical studies performed by Danone indicate that the added ingredients borage oil, vitamin E, and green tea extract come from natural sources, are food grade and are safe when incorporated into human food. As such, Essensis® is a natural, nutritional and tasty way to improve skin condition.

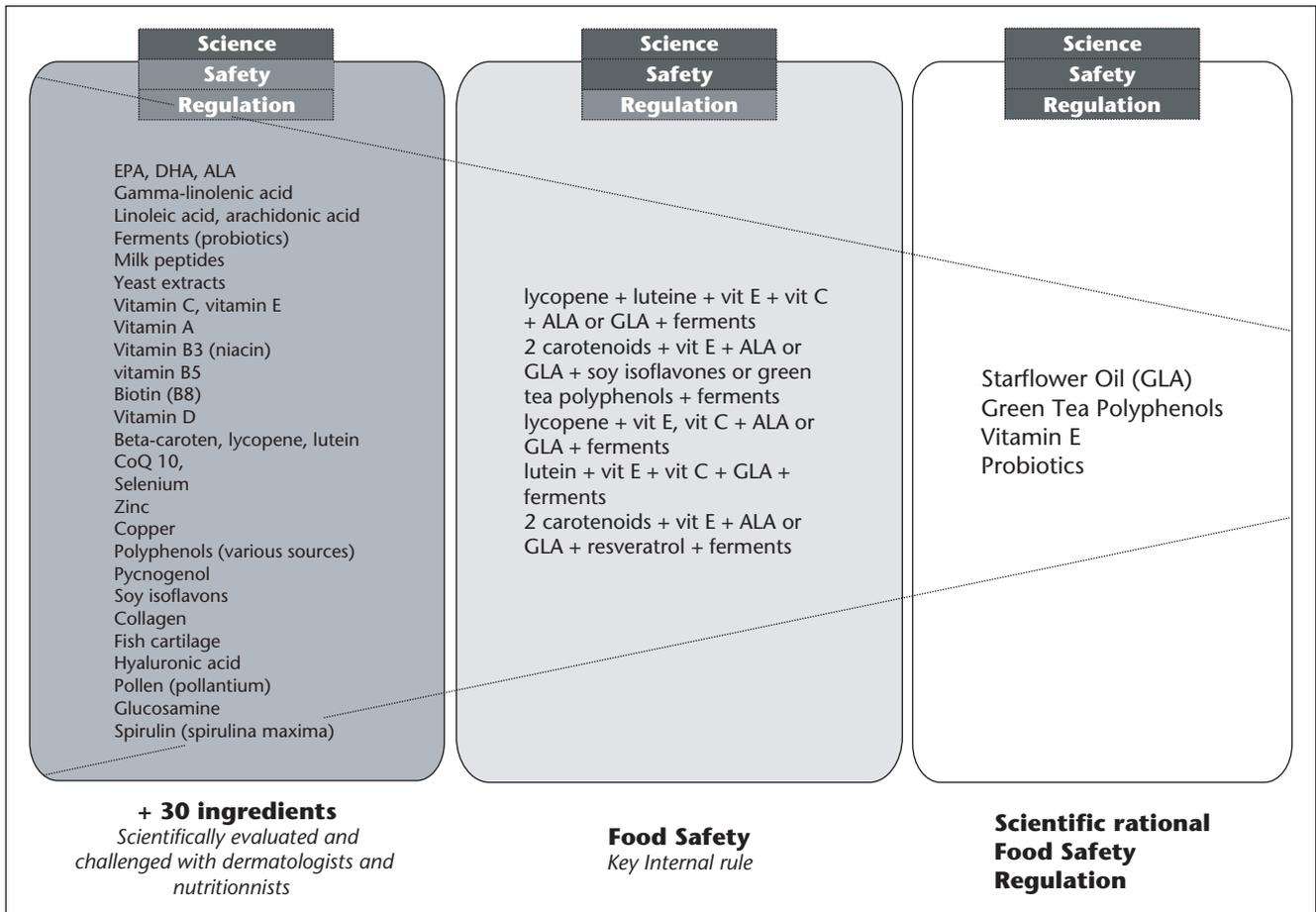


Figure 1. Process used to select Essensis active principles.

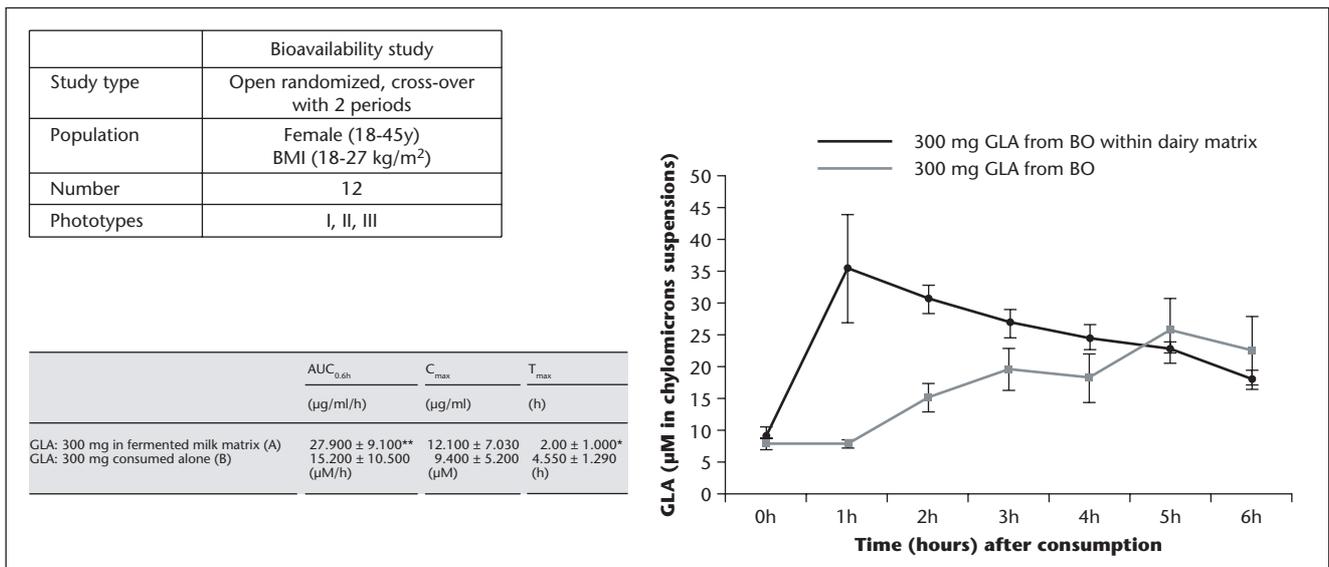


Figure 2. Positive impact of dairy matrix on GLA absorption in healthy subjects.

Table 1. Effect of GLA-rich oils on skin barrier function.

	Ziboh VA, 1992 (Am J Clin Nutr)	Muggli, 1997 (Cosmetics and Toiletries magazine)	Broche & Platt, 2000 (Arch Gerontol Geriatr)	Muggli, 2005 (Int Journal of Cosm Sciences) [10]	Callaway J, 2005 (J Derm Treat)	Puch F, 2008 (Exp Dermatol) [7]
Volunteers	20 healthy adults (25-55y)	40 (32-60y) with irritated skins using SDS	29 Elderly subjects	40 subjects	Atopic patients	72 healthy women with dry and sensitive skin
Ingredients consumed	GLA/d 480 mg 1,500 mg	3 g EPO → 345 mg GLA/d	360-720 mg/day GLA	20 → 345 mg GLA (contained in EPO)	Hempseed oil (contained BO)	300 mg GLA/d
Control	Olive oil	No EPO consumption	No	20 → 0 mg GLA	no	Yes without GLA
Period consumption	6 weeks	12 weeks	8 weeks	12 weeks	20 weeks	24 weeks
Results	Increase of DGLA in (PMN) (circulating leucocytes implicated in inflammation) decrease generation of LTB4 by PMN	At 12 weeks: Decrease TEWL 10.2% Increase moisture 13.9% Increase firmness & Roughness	- 11% decrease of TEWL - Decrease skin dryness (42% → 14%) - Decrease skin itchness (34% → 0%) - No significant alteration of skin hydration	7.7% decrease of TEWL	TEWL decrease (trend with p = 0.074) Skin dryness and itchiness improved	At 6 weeks: Decrease TEWL 13.25% BMI<25 population more respondent Increase of GLA in RBCL No changes in SC hydration

In order to demonstrate the functional effect of the product, specific studies of the product as marketed were conducted on a population representative of the target population.

The bioavailability study conducted under controlled conditions and conducted in compliance with the principles of the Declaration of Helsinki and Good Clinical Practices (CPMP/ICH/135/95) showed that GLA was effectively absorbed by subjects constituting the target population for the product. GLA results not only show effective and dose-dependent post-prandial absorption but also a very positive effect of incorporation in the dairy matrix, doubtless due to emulsification of the borage oil (figure 2).

A second randomized, double-blind, placebo-controlled study in subjects with dry and sen-

sitive skin demonstrated the efficacy of Essensis® in enhancing skin barrier function as measured by a reduction in a validated marker-transdermal water loss (TEWL). This occurred after 6 weeks daily consumption of 2 servings of Essensis®, and was maintained throughout the study period of 24 weeks. The improvement was statistically and biologically significant (figure 3).

Relative to control, skin barrier function was significantly improved after consumption of the active product. As expected, there was deterioration in TEWL over the winter period [8] which then improved slightly over the rest of the study. However, as a result of eating the active dairy product, the skin was better able to resist the environment impact on barrier func-

tion presumably due to changes in stratum corneum composition.

The reinforcement of barrier function was probably due to combined effects of GLA, catechins, vitamin E and probiotics on epidermal differentiation. Nevertheless, the role of GLA is maybe more important for improving barrier function integrity, as previously reported for both borage oil and evening primrose. The Broche and Platt study [9] demonstrated an improvement of barrier function after supplementation by 320 and 740 mg of GLA in elderly subjects while Muggli *et al.* [9] used 300 mg in a younger population. The relative improvements in TEWL to baseline were 10.8% and relative to control were 7.7% and 9.1% respectively in these two studies. However, the effect of the active product in this study had an effect on TEWL more quickly (6 weeks) and the percentage improvement in barrier function relative to control was greater (13.25%), presumably due to the improved bioavailability of at least the GLA in the product. A summary is presented in table 1.

Conclusion

These studies demonstrate for the first time the effect of a fermented dairy product on increasing the bioavailability of GLA and together with catechins, vitamin E and probiotics in the product its effects on improving skin barrier function.

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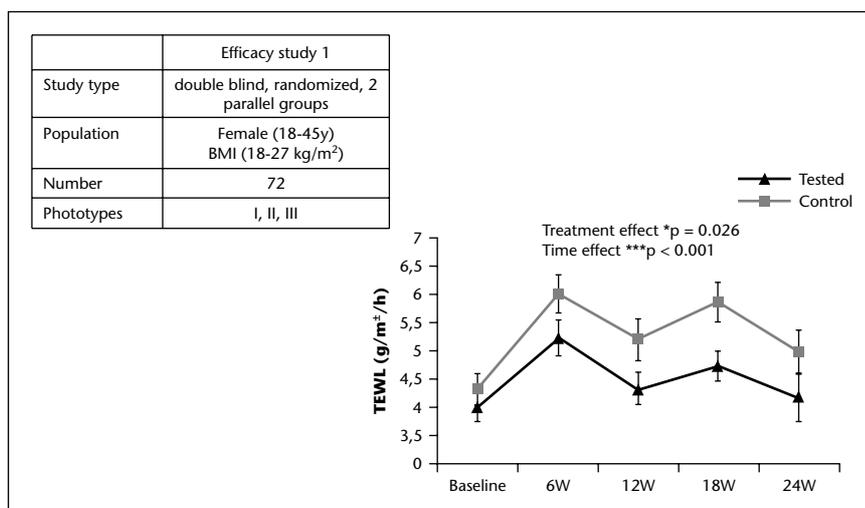


Figure 3. Effect of Essensis on skin barrier function as illustrated by Trans Epidermal Water Loss (TEWL) results.

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