

## **From $\alpha$ -linolenic acid to DHA (docosahexaenoic acid) : the pathway and its limits**

Pr. Philippe Legrand, Rennes

Alpha-linolenic acid is the precursor of the n-3 fatty acids. The others n-3 fatty acids are obtained from this precursor by a sequence of different steps of desaturation, elongation, and a partial peroxisomal  $\beta$ -oxydation. The desaturation steps are catalyzed by  $\Delta 6$  and  $\Delta 5$  desaturases and considered as the limiting steps of the pathway. The activity of this pathway from linolenic to DHA is low for multiples reasons : low availability of the substrate, low activity of the enzymes (desaturases and the  $\beta$ -oxydation step), competition with the n-6 fatty acids....

In human, conversion from  $\alpha$ -linolenic to DHA is less than 1%, suggesting to provide both precursor and derivatives in the diet.

**Placing on the market of Novel Foods and Novel Ingredients :  
« The Novel Food Procedure » (regul. EC 258/97)**

Abstract

**Novel Foods are foods and food ingredients that have not been used for human consumption to a significant degree within the Community before 15 May 1997.** Regulation EC 258/97 of 27 January 1997 of the European Parliament and the Council lays out detailed rules for the authorisation of novel foods and novel food ingredients.

Regulation (EC) 258/97 concerns the placing on the market of the following categories of foods or food ingredients :

- a. with a new or modified primary molecular structure,
- b. consisting of or isolated from micro-organisms, fungi or algae,
- c. consisting of or isolated from plants and food ingredients isolated from animals,
- d. to which has been applied a production process not currently used, where that process gives rise to significant changes in the composition or structure which affect the nutritional value, metabolism or level of undesirable substances.

In order to ensure the highest level of protection of human health, novel foods must undergo a safety assessment before being placed on the EU market. Companies need to submit their application in accordance with Commission Recommendation 97/618/EC that concerns the scientific information and the safety assessment report required.

The application is submitted by the company to one of the member States which is in charge of the initial assessment. This application is also submitted to the Commission and to all the member States to be assessed.

A proposal of the revision of this regulation has been adopted in order to reflect the fact that genetically modified (GM) food no longer falls under its scope, to create a more favourable legislative environment for innovation in the food industry, and to better facilitate foodstuffs trade between Europe and the rest of the world. The consumer would also benefit from a wider choice of safe novel foods.

# **Role of skin lipids: deficiency and cosmetic treatment**

**C. Montastier, Sté Cometap, France**

Lipids are found in the different cutaneous compartments: épidermis, dermis, and hypodermis.

In the hypodermis lipids are as triglycerides in the adipocytes .they formed the adipose tissue and are the main energy of the organism.

In the dermis, lipids are found in the sebocytes the cells of the sebaceous glands. These secrete the sebum at the stratum corneum surface. The sebum participates to the hydrolipidic film.

In the viable epidermis, lipids are the major components of the cell membranes. With differentiation of the keratinocytes they become intercellular cement of the stratum corneum .

This presentation will focus on the role of the epidermal lipids: ceramides cholesterol and fatty acids, which are the major components of the skin barrier.

The epidermal lipids represent 5% of the total lipids found at the skin surface. We will examine their function in skin homeostasis as well as the impact of deficiency which is responsible of dry skin developpement or xerosis

At the end of this presentation topical and oral treatments of dry skin will be detailed



## Vegetable oils for cosmetic applications

Anne ROSSIGNOL-CASTERA, Development Manager  
ITERG, France  
[a.rossignol-castera@iterg.com](mailto:a.rossignol-castera@iterg.com)

The vegetable glyceridic oils are natural sources of different macro and micronutrients with important biological and structural properties for the skin: essential polyunsaturated fatty acids (PUFA) omega 3 and 6, unsaponifiable compounds such as tocopherols (vitamin E), phytosterols, squalen, carotenoids, co-enzyme Q10, phospholipids. The bioavailability and the activity of these compounds are very similar in the case of oral intakes (“*inside skin nutrition*”) and topical uses (“*outside skin nutrition*”) with antioxidant or free radical scavenger properties, effect on the cellular membrane fluidity or anti-inflammatory function.

The future will be certainly to give by “inner and outer” ways the same active nutrients for a synergistic beneficial effect on the skin. In such an objective, the vegetable oils are high value nutraceutical ingredients, because of their guarantees of food quality, traceability and safety.

Among a lot of original and new vegetable oils, ten botanical sources will be described; they are not genetically modified, not allergenic, safe for topical or oral applications and they give a significant nutraceutical or dermocosmetic activity. Plum kernel oil, *Prunus domestica seed oil* (INCI name), is a very interesting oleic oil with a high oxidative stability in final products and a high emollient and moisturizing property, giving a dry touch and a high fluidity on skin. Its typical almond flavor is relevant for the formulation of hypoallergenic products without terpenic perfume for sensitive skins. The well known cosmetic interest of virgin argan oil, *Argania spinosa seed oil*, can be explained by the presence of some atypical triterpenic and phenolic minor compounds including squalenol, spinasterol and gamma tocopherol, and by its high level of omega 6 linoleic acid (LA) that gives a beneficial effect on skin elasticity and barrier function of epidermis. The omega 6 PUFA are used for anti-ageing products and formulations for dry and sensitive skins. Some new oils are very rich in omega 3 alpha-linolenic acid (ALA) that gives an anti-inflammatory protection and soothing, regenerating and emollient effects on skin. For instance, incha inchi oil, *Plukenetia volubilis linneo seed oil*, contains 50 % of ALA in association with a very high level of 2000 ppm of tocopherols. Fenugreek oil, *Trigonella foenum graecum seed oil*, has a perfect balance between omega 3 and omega 6 PUFA in association with a high level of vitamin E and unsaponifiable matter. Some “exotic” oils present atypical composition with uncommon fatty acids or a high level of a group of unsaponifiable compounds. Native baobab oil, *Adansonia digitata seed oil*, contains cyclopropenic acids and pomegranate oil, *Punica granatum seed oil*, is rich in conjugated PUFA omega 5 named punicic acid, that gives anti-inflammatory properties. Some tropical crude vegetable butters are rich in carotenoids that are precursors of vitamin A and scavengers of active oxygen and free radicals, for instance red palm oil, *Elaeis guineensis fruit oil*, and virgin buriti oil, *Mauritia flexuosa fruit oil*, that can be used in anti-ageing and solar products. Amaranth oil, *Amaranthus cruentus seed oil*, is very original with a high level of 5 to 8 % of vegetable squalene known for its smoothness and moisturizing properties. Finally is given the development of a very rich active lipidic extract obtained from native cistus pollen that contains high levels of carotenoids, lutein, zeaxanthin, selenium, waxes, sterols, phospholipids and phenolic compounds. This extract has a very high antioxidant activity for anti-ageing skin care products in association with good emollient and moisturizing properties.

As a conclusion, nutraceutical and cosmetic industries have to consider more and more the potentiality of innovation and efficacy of the natural vegetable oils, in respect of sustainable management of biodiversity.



### ITERG

French Institute for Fats & Oils  
Rue Monge – Parc Industriel  
33600 Pessac – France  
00 (33) 5 56 36 00 44

[www.iterg.com](http://www.iterg.com)

[www.prestations.iterg.com](http://www.prestations.iterg.com)

## Fish oils, resources to preserve

### 1. Preservation of sea resources and...

Each year more than 80 millions of tons of fish are caught in seas and oceans all over the world. 1/3 of the fish are used for the manufacturing of fish oils.

Ocean resources are not infinite. Even if they are, for most of them, all used, the access to resources remains free in a large number of fish areas. As a consequence, we have too many fish boats today and not enough fish. The situation is due to an excess of investment in the fish sector which lets to an over-exploitation situation. The over-exploitation is the main issue of this situation: boats go fishing too much and too many young species are caught. Consequence: certain species disappear (ex. fall in the stock of cod) + other problems: pollution, littoral urbanization, global warming, introduction of foreign species...

... future of fish resources

The expansion of aquaculture which uses more and more composed food rich in lipids (60% of the produced fish oil) makes increase the fish oil demand. In parallel, the fish catching stagnation limits the availability of this raw material. In 2010, the fish oil demand will be superior to the quantity of oil available.

### 2. Interests and benefits of fish oils on health

The food industry market concerning the Omega 3 fatty acids (reminder on PUFA) knows a great growth: 4.6 billion euro for 2006 and sales would reach 5.3 billion in 2011 with a domination of Omega 3 marine sources. Role of PUFA, benefits of Omega 3 marine sources on cardio-vascular diseases, brain and joint health, Alzheimer and DMLA diseases are the main applications of fatty acids on the human body.

### 3. Alternative to fish oil

Omega 3s from marine sources know a great success on different markets (food, cosmetics, OTC...) but the natural resources of fish are going to decrease: that would restrict the supplying sources in the future. We need to find other sources: research has been intensified these last years to evaluate consequences of the partial or total replacement of fish oils by vegetable oils. But the problem is the fatty acids content which is not the same. The replacement of fish oils by vegetable oils induces a diminution of Omega 3 fatty acids content, which is the characteristic of fish oils (EPA & DHA).

Other alternatives to fish oils: marine resources such as micro-algae, genie-genetics (phytoplankton); reusing of co-products (fish skin, eggs...)

## Lonza DHA - the vegetarian solution from microalgae

**Lonza DHA is a pure vegetarian and allergen-free source of the important omega-3 fatty acid DHA (Docosahexaenoic acid), manufactured via a unique fermentation process from microalgae. Lonza DHA comes from renewable resources and is free of potential contaminants that are discussed for fish and seafood.**

DHA is the most important omega-3 fatty acid for human health, being particularly effective in the areas of brain, heart and eye health. It occurs naturally as a building block of cell membranes and contributes to membrane properties such as fluidity, flexibility and permeability. DHA in the body is mainly derived from intake of fish and seafood. However, it is well-known that dietary DHA intake with a typical Western diet is well below recommended values.

Dietary intake of the precursor omega-3 fatty acid, alpha-linolenic acid (ALA), which is available in a variety of plant oils, cannot make up for the low dietary intake of DHA<sup>1</sup>. In addition, aging, illness and stress, as well as excessive amounts of omega-6 rich oils (corn, safflower, sunflower) can all compromise conversion<sup>2</sup>. Various human feeding studies which have addressed the question of bioconversion of ALA to DHA have concluded that this conversion is extremely low, while building of EPA from ALA is much better<sup>3,4</sup>. Uptake of preformed DHA from the diet may thus be critical for maintaining adequate membrane DHA concentrations<sup>5</sup>. In a recent human study, supplementation with Lonza DHA was found to significantly increase not only DHA plasma levels but also EPA levels<sup>6</sup>, demonstrating that DHA may at least partly substitute for EPA intake. Further, supplementation with Lonza DHA was found to decrease plasma triglyceride levels by 23%. This is good news since high circulating triglyceride levels in the plasma are associated with the severity and progression of arteriosclerosis and are recognized as independent risk factors for coronary heart disease.

However, DHA is not only beneficial for a **healthy heart**. As DHA is a major structural and functional building block of the **brain** many studies have shown beneficial effects in this area. DHA is required during foetal and child development for the growth and functional development of the brain, and demonstrated health benefits for both **mother and child**. In adults, DHA maintains normal brain function, and scientific evidence links reduced DHA levels to mental and neurological health concerns. The retina of the **eye** is also very rich in DHA, which explains that DHA plays a major role in visual function in both visual development in infants and visual function throughout life.

Consequently, there are several dietary recommendations for an increased intake of DHA as well as a number of health claims allowed or submitted.

### Lonza DHA Production Process

Using naturally occurring microalgae, Lonza's innovative technology allows DHA oils to be produced with a superior quality, avoiding over fishing.

During the unique fermentation process, microalgae are grown in large quantities and accumulate significant quantities of DHA. After the fermentation process, Lonza DHA is extracted from the microalgae and refined in processes that are very similar to those used in the production of conventional vegetable oils.

### What is Lonza DHA?

- pure vegetarian source of omega-3 DHA
- highly concentrated
- produced via a patented fermentation process from microalgae
- allergen, solvent, and GMO free
- free of contaminations that are discussed for seafood
- good sensory properties

Lonza Ltd, Muenchensteinerstrasse 38, CH-4002 Basel/BS, Switzerland

Phone: +41 (0) 61 316 81 11, Fax: +41 (0) 61 316 91 11

[dha@lonza.com](mailto:dha@lonza.com), [www.aboutdha.com](http://www.aboutdha.com), [www.lonza.com](http://www.lonza.com)

<sup>1, 2, 3, 4, 5, 6</sup> on request

**Incromega V3: A valuable source of n-3 and n-6 fatty acids**  
Dr. Miquel Mir, Health Care Applications Manager, Croda Europe Ltd

Incromega V3 is a patented<sup>1</sup> vegetable oil, containing the omega-3 fatty acid Stearidonic Acid<sup>2</sup>, extracted from the seeds of *Echium plantagineum*.

Incromega V3 offers the anti-inflammatory benefits of both omega-3 and omega-6 fatty acids, in a single vegetable oil of non-GMO plant origin.

Typical fatty acid composition of Incromega V3 is:

Linoleic acid	(LA, 18:2 n-6)	19 %
$\gamma$ -linolenic acid	(GLA, 18:3 n-6)	10%
$\alpha$ -linolenic acid	(ALA, 18:3 n-3)	30 %
Stearidonic acid	(SDA, 18:4 n-3)	13 %

This natural ratio of fatty acids, through their metabolism, deliver enhanced plasma concentrations of eicosapentaenoic (EPA, 20:5 n-3), docosapentaenoic (DPA, 22:5 n-3) and dihomo- $\gamma$ -linolenic (DGLA, 20:3 n-6) acids without increasing the concentrations of arachidonic acid (AA, 20:4 n-6)<sup>3,4</sup>.

LA and ALA are essential fatty acids and need to be supplied through the diet.

GLA is commonly associated with the anti-inflammatory effects of oils such as evening primrose oil and borage oil. Supplementation with GLA can markedly increase serum AA with subsequent pro-inflammatory effects. The presence of stearidonic acid prevents the accumulation of serum AA and AA-derived eicosanoids without preventing the accumulation of DGLA<sup>3,4,6</sup> which is the real n-6 precursor of anti-inflammatory eicosanoids.

SDA is an intermediate in the biosynthetic conversion of ALA to EPA. As SDA is the product of the rate-limiting  $\Delta$ 6-desaturase step and due to the efficiency of the elongase and  $\Delta$ 5-desaturase steps, SDA is readily converted to EPA<sup>3,4,5,6</sup>. SDA has the physiologic benefits of EPA, for instance, lowering the serum triglycerides in hypertriglyceridemic subjects<sup>3</sup>.

Incromega V3 is a potent vegetable source of GLA and SDA and their respective metabolites DGLA and EPA. It is a true alternative for vegetarians or those who do not eat fish, to benefit from the anti-inflammatory effects of omega-3 and omega-6 long chain polyunsaturated fatty acids.

References:

- 1.- US patent 6340485, Croda International Plc
- 2.- Guil-Gerrero JL, Stearidonic acid (18:4n-3): Metabolism, nutritional importance, medical uses and natural sources, *Eur. J. Lipid. Sci. Technol.*, **2007**, 109, 1226-1236
- 3.- Surette M, Edens M, Chilton F, Trampusch K, Dietary Echium oil increases plasma and neutrophil long-chain (n-3) fatty acids and lowers serum triacylglycerols in hypertriglyceridemic humans, *Journal of Nutrition*, **2004**, 1406-1411
- 4.- Holub B, Telpner MR, manuscript in preparation
- 5.- James M, Ursin V, Cleland L, Metabolism of stearidonic acid in human subjects: comparison with the metabolism of other n-3 fatty acids, *Am J Clin Nutr*, **2003**, 77, 1140-45
- 6.- Miles EA, Banerjee T, Calder P, The influence of different combinations of  $\gamma$ -linolenic acid, stearidonic acid and EPA on the fatty acid composition of blood lipids and mononuclear cells in human volunteers, *Prostaglandins Leukot Essential Fatty Acids*, **2004**, 70(6), 529-38.

## Linseed oil in the diet, a challenger for fish oils ?

Jean-Marc Maurette

### ABSTRACT

The too low level of omega 3 intake in the modern diet is a fact which is worrying health professional and authorities. Among the "traditional" recommendation for a safe and equilibrated diet, recommending food containing omega3, is there, out of the inescapable fish oil leading to some digestive discomforts, any alternative?

This is the bet which have been made in proposing flaxseed oil, as a food supplement, in a quite negative regulatory environment at that time in France. A registration dossier for this purpose has been filed towards the French Authorities (DGCCRF/AFSSA) in March 2004. In parallel, two human clinical trials have been conducted to verify the effective efficiency of this re equilibrated diet on various skin parameters (hydration, surface evaluation, inflammation).

The release on the registration dossier was obtained in July 2006, and the results of the clinical trials were quite convincing about the interest of such a supplementation.

**“A review on sources and health benefits of GLA ,  
the GOOD omega-6 “**

*R.H van Hoorn, Bioriginal Food & Sciences Corporation*

Gamma linolenic acid (GLA, cis 6,9,12-octadecatrienoic acid) is an intermediate in metabolic pathway of linoleic acid (LA, Omega-6 essential fatty acid). It is produced in the body by action of delta-6-desaturase enzyme on LA and this is the rate limiting reaction in the metabolic pathway. The activity of this enzyme decreases with age, inflammatory diseases, deficiency of micronutrients (zinc, vitamin B group), stress, diabetes, hypertension, etc. Once formed, it is rapidly elongated to dihomo-gamma linolenic acid (DGLA). DGLA can be further desaturated to arachidonic acid (AA) by delta-5-desaturase enzyme. It is also incorporated into cell membranes and competes with AA for cyclooxygenase and lipoxygenase enzyme. Prostaglandins produced from DGLA exert anti-inflammatory and vasodilatory actions while AA produced prostaglandins exert proinflammatory and proaggregatory actions. A balance of these different bioactive products is needed for maintenance of health. Diet in developed countries is rich in LA and AA from meat and processed vegetable oils. As a result, there is a shift towards AA derived bioactive compounds which is contributing to high incidences of chronic diseases (diabetes, cardiovascular diseases, arthritis, and other inflammatory diseases) in these populations compared to Asian populations.

GLA is present in trace amounts in green leafy vegetables. Only significant source is breast milk. It is naturally present in seed oils of plants in Boraginaceae (Borage, Echium), Onagraceae (evening primrose) and Grossulariaceae (Black currants) families. To limited extent, it is also present in hemp and blue green algae (Spirulina).

GLA rich oils are used mainly for their antiinflammatory effects. As inflammation plays a role in a large number of diseases, GLA can also affect a large number of diseases/conditions. Clinical studies have shown that GLA regulates transepidermal water loss (TEWL), whereby, it prevents dryness and also helps heal eczema and xeroderma. GLA also is shown to stimulate apoptosis of cancer cells without affecting healthy cells. It increases the efficacy of anticancer agents (e.g tamoxifen) and reduces their side effects by regulating apoptotic gene expression and estrogen receptors. GLA rich oils also reduce the pain and inflammation in rheumatoid arthritis. Recent clinical trial has indicated that GLA can prevent weight regain after weight loss, which is a big concern for people undergoing weight loss.

Several human and animal studies have confirmed safety of GLA.

The presentation will discuss the various sources for GLA and the actions of GLA in various conditions.

## Summary

### **Functional foods and dermonutrition : Essensis**

Taous LASSEL, PhD

Health and Innovation Manager

Danone Research

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. More precisely this product is the global population.

# **Increasing the value of Moroccan Argan oil**

**Zoubida CHARROUF**

**Prof. at the Faculty of Sciences, University Mohammed V-Agdal, Rabat**

**President of the Association Ibn Al Baytar**

Argan tree (*Argania spinosa*) is endemic in Morocco where it constitutes the second most abundant tree and covers slightly more than 800,000 ha. Argan tree plays an essential social and economical function and has an important environmental role as it efficiently fights against the desert progression. Despite its numerous advantages, argan tree is an endangered species so it is necessary to discover better uses to increase its value and distribute the benefits to the local populations who will therefore find a motivation to protect the tree.

Following the traditional know-how, we have worked for almost thirty years on different parts of the argan tree to promote the use of argan tree derivatives as pharmacologically active or industrially interesting compounds. We have successfully develop the production of argan oil based on the implantation of woman cooperatives. Such a project has allowed us to improve the technology used for the oil extraction, to scientifically demonstrate some traditionally claimed pharmacologic effects, to increase the preservation time of the oil and its packaging. Concomitantly we have protected the biodiversity and increased the average wage of the local populations.

The woman cooperative network created by the Faculty of Sciences of the University Mohammed V-Agdal together with the association Ibn Al Baytar aimed at sustainably developing the argan forest. The cooperatives teach the local populations the real value of the argan forest, help them to improve the oil extraction methodology, and find new commercial outcomes. Mainly women are working in these cooperatives, working as nut-breakers as well as managers or bottle-fillers or shopkeepers. The income obtained by women for their work helps them to access to a unprecedented social position.

**Summary of the Presentation**

***Journées Chevreul in Paris, Wednesday 2<sup>nd</sup> and Thursday 3<sup>rd</sup> April)***

**VIOGERM<sup>®</sup> wheat germ oil: technological, nutritional and sensory aspects**

HOCHDORF Nutrition AG (formerly Multiforsa AG) in Steinhausen in the centre of Switzerland is processing wheat germs since 62 years.

In the milling industry wheat germs are removed from the wheat grains because they are very susceptible to oxidation and therefore would reduce the shelf life of the flours. Although wheat germs are a waste product for the milling industry, from the nutritional point of view the wheat germ is the most valuable part of the wheat grain. MULTIFORSA developed a cold pressing technology in order to stabilise the nutritious raw wheat germs and to increase their shelf life significantly (> 6 months). The sophisticated pressing technology generates stabilised VIOGERM<sup>®</sup> wheat germ on the one hand and the valuable VIOGERM<sup>®</sup> wheat germ oil on the other hand. After the pressing a unique and complex process largely removes the pesticides contained in the wheat germ oil and assures pesticide values less than 0.05ppm for VIOGERM<sup>®</sup> wheat germ oil. For the production of 1kg VIOGERM<sup>®</sup> wheat germ oil 18'000kg of wheat grains are needed.

Due to the fact that VIOGERM<sup>®</sup> wheat germ oil is not refined after the pressing it still contains substantial amounts of various nutrients. VIOGERM wheat germ oil is one of the richest sources of natural Vitamin E and phytosterols. With an average Vitamin E content of 320 IU / 100g and with approx. 3.5g phytosterols / 100g, VIOGERM<sup>®</sup> wheat germ oil outvalues other plant oils by far. Furthermore VIOGERM<sup>®</sup> wheat germ is an excellent source of essential poly-unsaturated fatty acids (linoleic acid approx. 58g / 100g and  $\alpha$ -linolenic acid 9g / 100g) and of phospholipids.

VIOGERM<sup>®</sup> wheat germ oil has a pleasant nutty taste and is used to enrich various foods and cosmetic products.

In an extensive consumer test VIOGERM wheat germ oil was opposed to different other plant oils (rapeseed oil, argan oil, w3/w6-oil-mix, olive oil). The consumers were selected according to their age, their sex, their consumer behaviour and habits (frequency of oil consuming / olive-oil consumers and consumers of different plant oils than olive oil). A blind and a branded acceptability test (hedonic test) were carried out and showed that VIOGERM<sup>®</sup> wheat germ oil was generally well accepted. In the group consuming mainly other plant oils than olive oil, VIOGERM<sup>®</sup> wheat germ oil was mostly appreciated.

**HOCHDORF Nutrition AG**

**Marc Genet ([marc.genet@hochdorf.com](mailto:marc.genet@hochdorf.com); Tél: +41 41 749 48 23)**



**HOCHDORF Nutrition AG**  
Hinterbergstrasse 58  
Postfach  
CH-6312 Steinhausen  
Tel. +41 41 749 48 48  
Fax +41 41 749 49 99  
[nutrition@hochdorf.com](mailto:nutrition@hochdorf.com)

## Vegetal « butters » and natural waxes

V. Rossow, Établissements B. Rossow et Cie, France

Natural waxes such as Beeswax, Carnauba wax and Candelilla wax are widely used in the Cosmetic and Food industries. Thanks to their composition, and besides a compulsory high safety, they provide desirable properties such as strength, gloss, emolliency, barrier effect, making them essential in numerous applications. For example, lots of candies are coated with either one or a mix of these 3 waxes, while for Cosmetics, the waxy part of lipsticks contains various combinations of such waxes.

Within the cosmetic industry, the “green wave” - natural products - which is developing to the detriment of synthetic or mineral raw materials, has generated know-hows to enlighten new values to natural resources. Several types of developments have occurred: managing to substitute materials facing bad press (ex: petrolatum, lanolin), mimicking trendy “butter-like” textures either by adequate mixture or by chemical reaction to offer alternatives to overused Shea or Cupuaçu Butter, or as a result of more recent research programs, identifying natural waxes acting more like active ingredients than “just” like excipients (Mimosa Flower wax, Lemon Peel or Orange Peel waxes, etc.).

## **Valorization of a green technology for the alimentarity of two new ingredients: feed back on Novel Food registration**

**Dr A. Saunois et Dr D. Daguet, Laboratoires Expanscience, France**

### **Abstract**

Over the last forty years, Laboratoires Expanscience has developed an internationally-recognized expertise in the field of the chemistry of lipids. This expertise is based on knowledge acquired in the use of lipids in the Pharmacy, Cosmetics and Dietary contexts. The unsaponifiables from oils comprise a complex molecular mixture that is of interest for their nutritional and physiological properties. Fractions Rich in unsaponifiables are obtained by different techniques. Laboratoires Expanscience, specifically, exploits the technology of molecular distillation: this technique implements a physical process that makes it possible to obtain enrichment by a factor of 10 from dietary oils (Expanscience patent: EP1280420). Without noticeable previous consumption, such ingredients cannot benefit from a food status except through a "Novel food" registration (258/97/EC). Two concentrates from rapeseed oil and from maize-germ oil have been approved recently by the European Authorities.

The function of a food, provided by its active components, can be expressed through its nutritional properties and/or its physiological activities.

The promotion of a new ingredient, vehicles for active components, can take place in a wide context of potential applications and allegations.

OIL SEED RAPE AND SUNFLOWER SPECIALITY OIL PIPELINE FOR EUROPE  
Ph Lesigne, JP Despeghel Monsanto International

Monsanto's breeding and genetic engineering programs all around the world are more and more focused on the development of oils presenting specific Fatty Acid compositions. In Europe, efforts are focused on winter oilseed Rape and Sunflower.

Winter Oilseed Rape:

Beside the non Erucic Acid oilseed rape, which is the standard for food purposes (so called 00 oilseed rape, 0 Erucic acid and 0 glucosinolate), we are breeding for high Erucic (C22:1 > 50%) type dedicated to specific industrial usages such the plastic industry.

Within the non Erucic types, we have been developing and are working on several profiles associated to high content of Oleic acid (C18:1, HO profil)

- HO type with reduced amount of Polyunsaturated fatty acid (C18:1 > 75%)
- HO type with a ratio C18:2 / C18:3 of equal to about 1
- HO Low linolenic (HOLL) type with improved stability (C18:3 < 3.5%)
- HO with very low linolenic type to get rid of hydrogenation technology generating Trans fat (C18:3 < 1.5%)
- HOLL associated to low saturated fatty acid (C16:0 + C18:0 < 5%)

Some efforts are also dedicated to High linolenic type for the specific segment of the bottled oil known as "rich in Omega 3".

Sunflower:

Three Product concepts are already available on the market:

- Mid Oleic type (or "Nusun") with Oleic Acid from 55% to 75% (mainly USA).
- High Oleic type (HOSO) with Oleic acid greater than 80% (mainly Europe).
- Very High Oleic type with Oleic acid over 90% for non food usages.

For those concepts, the focus is more on improving the quality of the agronomic parameters of the germplasm carrying those traits.

The efforts to develop new oil quality are mainly focused on:

- High Oleic type with low level of total Saturated Fatty Acid (C16:0+C18:0<5%)
- Oleic acid around 40% with high stearic content (C18:0 > 20%)

On both European oilseeds crops, the level of advancement of those projects varies according to the complexity of the genetic control, the power of molecular breeding tools available if any, the competitiveness versus standard crops and the visibility of the market demand.

Those two crops are, by far, the most advanced ones in the development of special fatty acid profile, especially around the High Oleic types which looks like a major quality.

## **Regulation of feeding behavior by lipids : role of gustation**

*Philippe BESNARD, Physiologie de la Nutrition, UMR Inserm U866,  
ENSBANA, Dijon France*

The eating act is a complex behavior resulting from the integration of physiological, hedonic, cultural, even philosophical parameters. The profound technical and economic changes of the XX<sup>th</sup> century has greatly affected our way of life and, therefore, our feeding behavior. For the first time of its history, a broad part of the world population “does not run any more after calories”. A direct consequence of this fundamental change has been the emergence of plethora diseases which raise a real problem of public health. One of the most patent examples is obesity which reaches epidemic proportions in the world and is a major contributor to the global burden of chronic diseases. This phenomenon affects non only adults but also children (Malecka-Tendera and Mazur 2006). Recent data even suggest that the rise of obesity is associated with a decrease in the life expectancy in children (Olshansky et al. 2005).

Food opulence has an obvious consequence: it promotes our specific appetites. Lipids account for about 40% of the calories ingested in Western countries, whereas nutritional recommendations are lower from 5 to 10%. This excessive lipid intake, associated with a qualitative imbalance (excess of saturated fatty acids and cholesterol, a too high  $\omega 6/\omega 3$  ratio) greatly contribute to obesity and associated diseases (atherosclerosis, non insulin-dependent diabetes, hypertension, cancer). This attraction for the fatty foods is not specific to humans. Rats and mice spontaneously prefer lipid-enriched foods in a free-choice situation (Tsuruta et al. 1999, Takeda et al. 2000). This lipid attraction is so strong that a mouse with a free access to an oil as optional diet becomes rapidly obese (Takeda et al. 2001a). Origin of this preference for lipids is not yet fully understood.

Until recently, it was thought that oral lipid detection takes place only through somesthetic and olfactory cues. This restrictive view has been challenged by recent observations suggesting that gustation is also implied in the spontaneous fat preference. This review highlights recent findings in this new field of investigations both in rodents and humans.

**Title: Lipids and satiety: Pinnothin, effect on satiety hormones**

**Hiskias G. Keizer PhD  
Lipid Nutrition**

Abstract

At Lipid Nutrition, we innovate and market scientifically sound lipid ingredients from natural origin, which improves and maintains health and well being. Lipid nutrition is a company with more than 100 years of expertise in lipids and oils. Since 2002 it is part of the IOI group. Apart from the production, about 50 people are employed in this company.

Obesity is an increasing problem in the western world and it forms a serious health risk. A lack of physical activity and unbalanced food intake are major factors in this phenomenon. Lipid Nutrition tries to contribute to a solution of this problem by providing edible oil which induces a feeling of satiety. This product is called "PinnoThin™"

The feeling of satiety is induced by a complex interaction of psychological and biochemical factors. These biochemical factors include several hormones including ghrelin, PYY, CCK and GLP-1.

In vitro studies show that PinnoThin™ free fatty acid is very potent compared to other free fatty acids to release CCK from enteroendocrine cells. This probably contributes to clinical effects observed with PinnoThin™, including increased GLP-1 and CCK release, reduced satiety, reduced food intake and reduced body weight gain.

At this moment two papers on the efficacy of PinnoThin™ are accepted for publication in the peer-reviewed paper "lipids in health and disease".

## **Fabules: functional ingredient for weight management concepts.**

Philip Rijken, Head Nutritional Science, DSM Food Specialties

The challenge of managing overweight is considerable. But strategies that result in relatively small effects on weight or body fat can provide meaningful benefits, if they are longer-lasting. Observational studies indicate that reductions in calorie intake or expenditure of 100 kcal daily, equaling only ~4% of the total daily energy intake, may stop weight gain in 90% of populations.

In addition to lifestyle changes, food solutions can contribute to weight management. Higher nutritive quality - lower calorie density food alternatives are one example. Functional ingredients that support people in managing calories are another. DSM Food Specialties offers such ingredients, as part of a much wider range of functional food ingredients relevant to health and wellness.

One example of a product relevant to weight management is Fabules. This ingredient consists basically of palm and oat oil. A collection of short and long term clinical studies support the potential mechanisms of action and efficacy of Fabules. Two long term studies show effects on weight management relevant parameters like weight, body fat mass, waist circumference and BMI.

Looking at the present-day market, dairy products are an attractive and suitable vehicle for this ingredient, as they can combine three key consumer megatrends in one product proposition: taste, convenience and health.