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# Sea Buckthorn Oil for skin health and Beauty from Within



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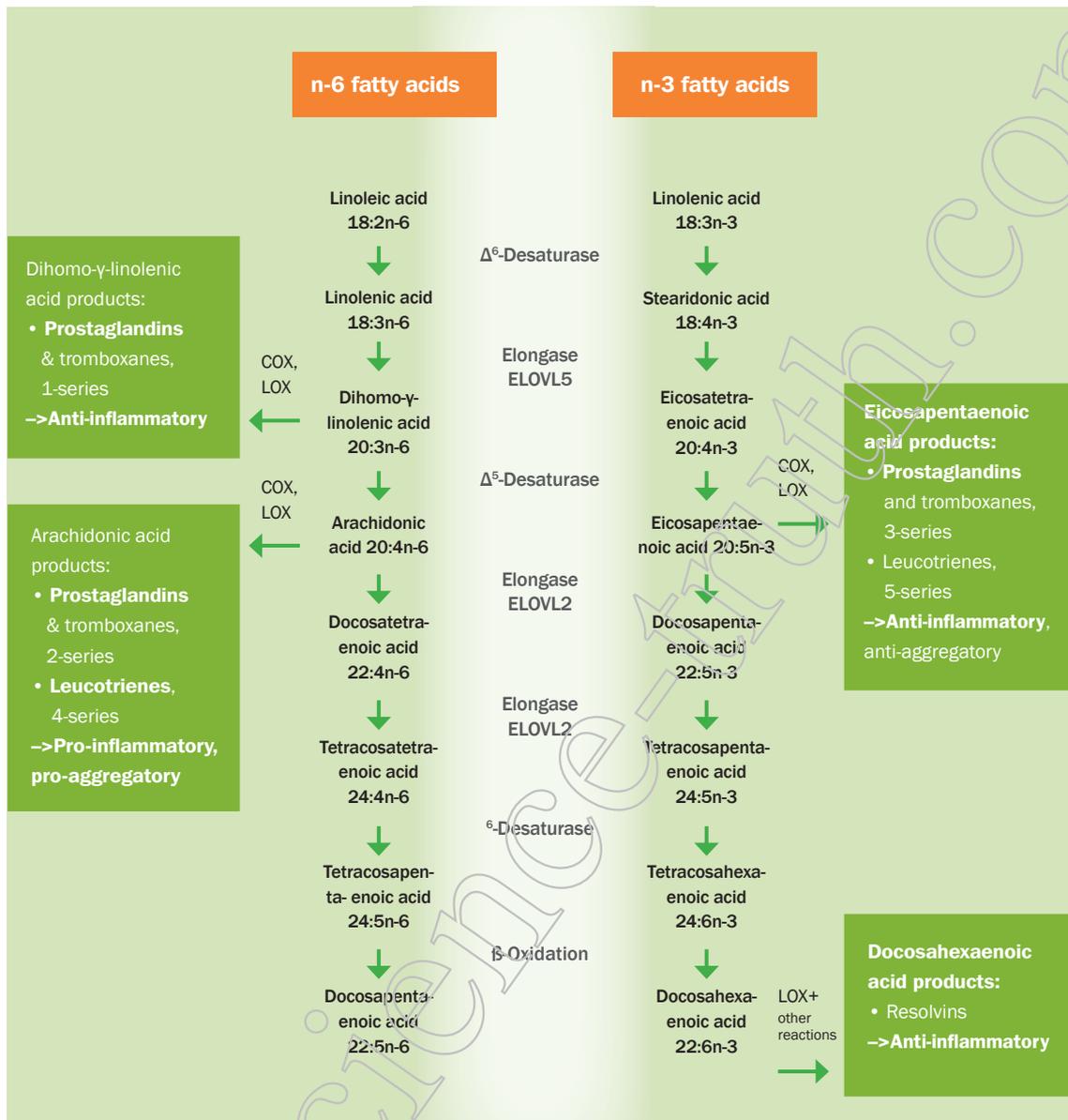
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*Berry seeds are known to be rich in oil which commonly contains essential omega 6 and omega 3 fatty acids. The unique fatty acid composition, in combination with high contents of oil soluble antioxidants has in recent years made the seeds of wild and cultivated berries valuable raw materials for ingredients used in personal care and nutraceutical products. This paper discusses the unique compositional characteristics of berry oils of Arctic origin, focusing on sea buckthorn, and recent efficacy studies in view of the use of these special actives in Beauty from Within product applications.*

## Essential fatty acids – building blocks of healthy skin

Linoleic (omega 6) and  $\alpha$ -linolenic (omega 3) acids are essential fatty acids (EFA), which need to be acquired through diet to maintain a healthy human body. Insufficient or unbalanced intake of EFA, as well as deficiency in EFA metabolism result in dry, sensitive and easily inflamed skin. Linoleic acid is an essential component of skin ceramides, a key group of compounds in the skin's lipid barrier structure. Replacing linoleic acid with other fatty acids, e.g. oleic acid, in skin ceramides leads to an increased permeability, sensitivity, and dryness of the skin. Linoleic acid is the precursor of 13-hydroxyoctadecadienoic acid (13-HODE), an anti-hyperproliferative compound in the epidermis. An EFA deficiency decreases the level of 13-HODE in the epidermis, resulting in scaly skin (1; 2; 3). Linoleic and  $\alpha$ -linolenic acids inhibit UV-induced hyperpigmentation and reduce age-related skin spots and uneven skin tones (4; 5). A healthy diet for the skin should contain sufficient amounts of EFA with a balanced ratio between omega 3 and omega 6 fatty acids.



**Fig. 1.** Synthesis of long-chain n-3 (omega 3) and n-6 (omega 6) fatty acids from  $\alpha$ -linolenic and linoleic acids, respectively, and a simplified overview of the messengers derived from them in humans. COX = cyclo-oxygenase, LOX = lipoxygenase

## Arctic berries, a treasure box of bioactives

In order to survive extreme cold temperatures as low as  $-50^{\circ}\text{C}$ , arctic berry species, such as sea buckthorn, cloudberry, blackcurrant, lingonberry, bilberry and cranberry have developed a highly unsaturated lipid profile. Seed oils from arctic berries are enriched with  $\alpha$ -linolenic and linoleic acids, the two essential fatty acids together constituting up to 90 % of the total fatty acids. The special fatty acid composition makes arctic berry seed oils a valuable source of EFAs for both internal and external care of the skin.

## Tocopherols and tocotrienols

Tocopherols and tocotrienols (vitamin E) are the major lipid-soluble antioxidants in cell membranes. Four tocopherols and four tocotrienols exist in nature.  $\alpha$ -Tocopherol from both synthetic and natural sources has been the major antioxidant in food. In dietary supplementation natural  $\alpha$ -tocopherol has a higher bioavailability than synthetic  $\alpha$ -tocopherol (6). The skin probably needs  $\gamma$ -tocopherol more than other tissues in the body. While most skin care products have included  $\alpha$ -tocopherol as an antioxidant,  $\gamma$ -tocopherol has been largely neglected.

Tocotrienols have superior mobility in cell membranes and are often more potent radical scavengers than  $\alpha$ -tocopherol (7).  $\gamma$ -Tocopherol is very efficient in scavenging reactive nitrogen-containing molecules (8). Synergy between different isomers of tocopherols and tocotrienols may present far more protection of cellular components from oxidation stress than any single isomer.



## Protection from UV radiation and air pollution

Peroxynitrite is produced during UV-irradiation and inflammation. Nitric oxide, nitrogen dioxide and nitrous acid are present in the air due to pollution. These reactive nitrogen species are potent oxidants and mutagenic agents that cause damage to the DNA (9).  $\gamma$ -Tocopherol efficiently deactivates these harmful nitrogen molecules by forming stable 5-nitro- $\gamma$ -tocopherol. Compared with  $\gamma$ -tocopherol,  $\alpha$ -tocopherol is less efficient in quenching reactive nitrogen molecules (8).

Research evidence suggests that  $\gamma$ -tocopherol has great potential in reducing inflammation (10; 8). In addition to topical application, oral supplementation effectively supplies the skin with natural  $\gamma$ -tocopherol. These oils are excellent active ingredients for oral skin care products, protecting the skin from air pollution and UV radiation.

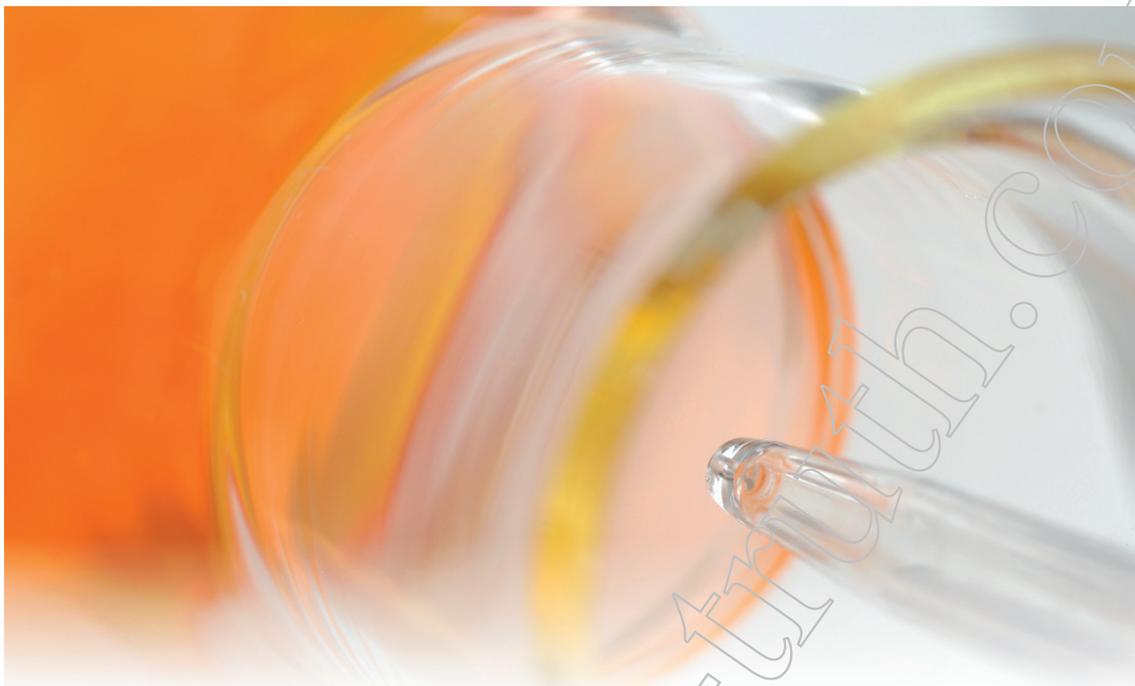
Tocotrienols have higher efficiency in radical scavenging and in the regeneration of themselves by other antioxidants and are thus more potent antioxidants compared to tocopherols. Under specific conditions,  $\gamma$ -tocotrienol was up to 60 times more effective than  $\alpha$ -tocopherol in inhibiting lipid peroxidation in microsomal membranes (11).

## Unique composition of sea buckthorn oil

The seed oil and pulp oil from sea buckthorn berries contain all the natural isomers of tocopherols and tocotrienols.  $\alpha$ -Tocopherol is the major isomer in the pulp oil, whereas the seed oil contains almost equal levels of  $\alpha$ - and  $\gamma$ -tocopherols. Sea buckthorn seed oil and pulp oil are also rich in natural carotenoids, a group of antioxidants working synergistically with tocopherols and tocotrienols by quenching oxygen and scavenging oxygen containing free radicals.  $\beta$ -Carotene in sea buckthorn oil is a precursor for vitamin A, known to be essential for skin well-being. Both pro- and nonvitamin A carotenoids present in sea buckthorn oil have proven effects on inflammation in vitro. The oil is rich in phytosterols, associated with potential antioxidant and anti-inflammatory activity.

The unique combination of multiple natural antioxidants provides the skin with a synergistic protection against oxidation induced by UV, stress and ageing. The antioxidative, anti-inflammatory and tissue regenerating effects of sea buckthorn oils have been proven by extensive studies (12; 13; 14).





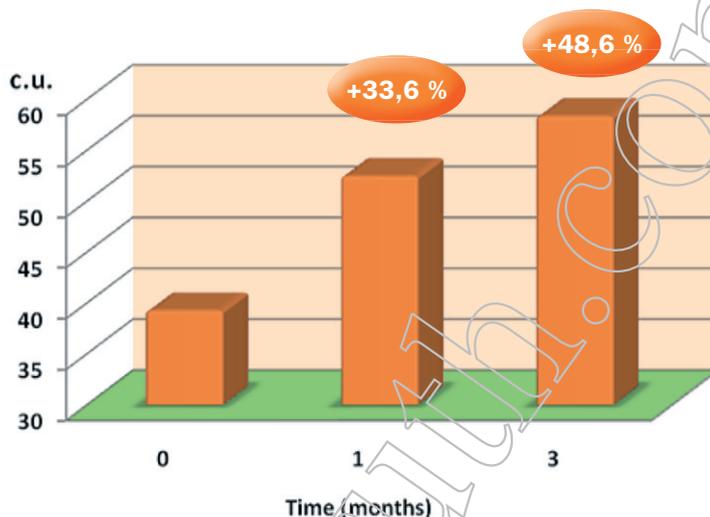
## Clinical studies of Omega7 sea buckthorn oil effects on skin

An oral supplementation with supercritical CO<sub>2</sub> extracted sea buckthorn seed oil and pulp oil improved the conditions of atopic skin (14). The oil supplementations also led to increases in the proportion of essential fatty acids in the plasma of the atopic subjects.

A recent study focusing on changes in skin hydration, elasticity and roughness was made with oral supplementation with standardized SBA24<sup>®</sup> Sea Buckthorn Oil in capsule form (15). 30 female subjects with average age of 61 years took four capsules (2 g oil) per day for three months. A highly significant increase in skin hydration status and in overall skin elasticity of the subjects was recorded (Figs. 2-3). The treatment also resulted in decreases in the mean and maximum roughness of the skin surface (Fig. 4), indicating anti-wrinkle efficacy of the product.

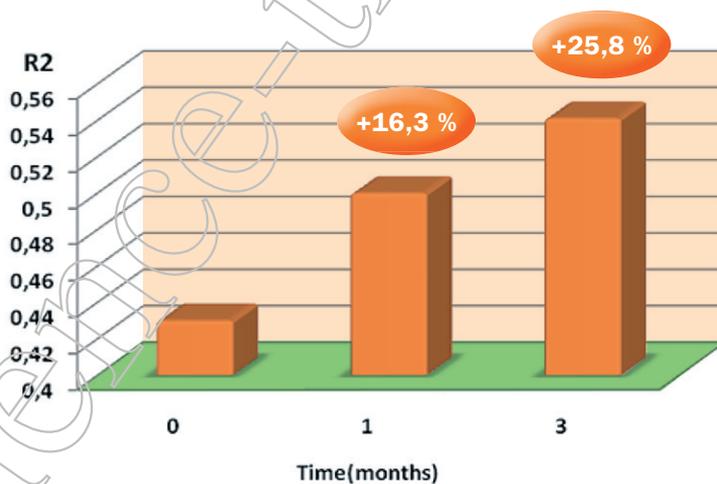
### Skin hydration

**Fig. 2.** The effect of intake of SBA24® Sea Buckthorn Oil on skin hydration measured by Corneometer CM825 (c.u. = corneometric unit). A highly statistically significant ( $P < 0.001$ ) increase in skin hydration was recorded after 1 month (+33.6 %) and after 3 months (+48.6 %) of treatment.



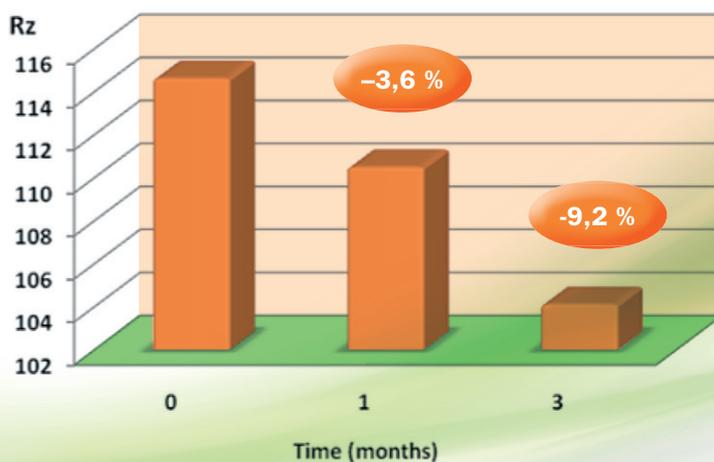
### Skin elasticity

**Fig. 3.** The effect of intake of SBA24® Sea Buckthorn Oil on skin elasticity measured by Cutometer SEM 575 ( $R_2$  = overall elasticity = total deformation recovery of skin at the end of stress-off period/ maximum deformation of the skin). A highly statistically significant ( $P < 0.001$ ) increase in overall elasticity was recorded after 1 month (+16.3 %) and after 3 months (+25.8 %) of treatment.



### Skin roughness

**Fig 4.** The effect of intake of SBA24® Sea Buckthorn Oil on skin roughness measured by image analysis of wrinkles (Quantilines, Monaderm image analysis;  $R_z$  = maximum roughness value, deep wrinkles). A decrease in maximum roughness was recorded after 1 month (-3.6 %) and after 3 months (-9.2 %) of treatment.



A new paper discusses the antioxidative activities of supercritical CO<sub>2</sub> extracted arctic berry oils based on measurements of peroxy radical scavenging activity and inhibition of LDL oxidation in vitro (16). A positive correlation between the peroxy radical scavenging activity of the oils and the total content of tocopherols and tocotrienols was obtained. The results also suggest the role of carotenoids in providing antioxidative activity.

## Conclusions

Arctic berry oils are characterized by a unique composition that reflects the berries' ability to survive the harsh growth conditions in the extreme North. Firstly, they are rich in  $\alpha$ -linolenic and linoleic acids, essential fatty acids (EFA) that appear in an optimum ratio and help correct the imbalance between omega 3 and omega 6 fatty acids in the western diet. Secondly, they contain lipid soluble antioxidants, tocopherols and tocotrienols that appear in all isomers for best antioxidative synergy. Recent in vitro and human intervention studies clearly demonstrate the skin benefits of dietary supplementation with CO<sub>2</sub> extracted arctic berry oils, supporting their use in Beauty from Within product formulas.

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