Flax and Skin Health

Greek and Roman writings reference the healing properties of flax as far back as 650 BC. In fact, the 8th century emperor Charlemagne considered flax so important for health that he passed regulations related to a requirement for consumption. The botanical name of flax is *Linum usitatissimum* of the family Linaceae. Flax is a versatile, blue-flowered crop that is grown primarily in Western Canada and the Northern Midwestern States. The seed contains approximately 40 percent fat, 28 percent dietary fiber, 21 percent protein, 4 percent ash, and 6 percent carbohydrates. Flax possesses a unique nutritional composition of omega-3 fatty acid, phytoestrogens, antioxidants and fiber.

The skin is the largest organ of the body. The functions of the skin include protection of the body against injury, heat and light radiation, regulation of body temperature, elimination of waste products, and secretion of hormones and enzymes. The skin also acts as an external sensory organ and plays an immunological role.

The surface of the skin is made up mostly of dead cells. Underneath the surface, there are three thin distinct layers, including the epidermis, the dermis and hypodermis. The epidermis is responsible for the look and the health of the skin. It protects the skin from moisture loss and the penetration of chemical products and bacteria. It is also the initial barrier to oxidant assault. The epidermis holds a large amount of water. The skin's capacity to retain water decreases with age, making it more vulnerable to dehydration and wrinkles. It is in this layer that the consumption of flax will have its greatest effects.

Aging of the Skin

The most important environmental factor that contributes to aging is the oxidation of bio-molecules by free radicals, which causes, among other things, aging of the skin. UV radiation is the main factor. Other oxidative processes cause aging at the cellular level, which damages many organs in the body and enhances age-related diseases such as arteriosclerosis. Cellular oxidation leads to collagen breakdown and chronic skin inflammation. The accumulation of abnormal elastin in the superficial dermis leads to wrinkles, mottled coloration and skin laxity.

The Influence of Diet

Diet significantly influences the health and vitality of the skin. Of particular importance are essential fatty acids (EFAs) and antioxidants. Flaxseed is a rich source of the omega-3 EFA, alpha linolenic acid (ALA) as well as an array of antioxidants, the most important being a family of compounds called lignans.

EFAs are critical components of the membranes of all cells including the skin, where they ensure "fluidity" and stability. The proper functioning of all body cells depends upon healthy membranes as they act as "gate keepers" in the cells.

Antioxidants help reduce the damage to body cells caused by the constant assault of free radicals (reactive oxygen species or ROS) such as those generated through UV radiation. Free radicals are produced as a result of normal metabolic processes in living systems. Pollution, second-hand smoke, many dietary constituents and aging contribute to the production of free radicals, often exceeding the protective antioxidant capacity of our bodies. This can lead to oxidative stress. Antioxidants such as lignans, flavonoids and phenols "neutralize" free radicals and offer protection against oxidative damage.[1]

The Importance of the EFAs for Skin Health

EFAs are required in the diet, as they cannot be made by humans. The two established EFAs are the omega-6 EFA, linoleic acid (C18:2n-6, LA) and the omega-3 EFA, ALA. ALA can be converted in the body into longer chain fatty acids which are also found in fish called EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). LA is converted in the body to another long-chain fatty acid arachidonic acid (AA).

The body further converts AA and EPA into very powerful hormone-like substances (called "eicosanoids") that affect physiological functions such as cell growth and division,

inflammatory responses, muscle activity, blood pressure and immune function. Eicosanoids formed from AA cause inflammation and are released in the body in response to injury, infection, stress, or certain diseases. In the skin, AA-derived eicosanoids in excess will lead to inflammation, redness and swelling. EPA forms eicosanoids that behave in opposition to those derived from AA and may help protect against these reactions. Both families of EFA are, however, necessary for overall skin health — but a balance between the two is important for vibrant skin.

EFAs are critical for maintaining the integrity of the skin and the structure of its cell membranes. In fact, when flax is consumed, ALA will accumulate and be preferentially stored in the skin as well as the adipose tissue.[2] People who reduce dietary fat, especially omega-3's, too drastically will very quickly notice dry, eczema-type skin problems. Loss of epidermal barrier function leading to rapid water (moisture) loss is one of the first consequences of EFA deficiency. Long-term depletion of dietary EFAs will lead to erythema (abnormal skin redness) with scaling, dermatitis, skin atrophy, edema, hair loss, itching, poor wound healing and a tendency to cutaneous infection.

Omega-3s have been shown to reduce skin inflammation and improve overall skin vitality, such as softer, smoother and healthier skin. These benefits are attributed to enhanced blood flow to the skin, maintenance of epidermal integrity (and therefore protection from water loss) and decreased inflammatory eicosanoid synthesis.

In a study of 40 people with psoriasis, those who were treated with medications and omega-3 supplements showed improvements in skin health that were more significant than those treated with medications alone.[3] In addition, many clinicians believe that flaxseed (which contains omega-3 fatty acids and antioxidants) is helpful for treating acne.

One personal way to check EFA balance is to monitor the dryness of the skin. Skin that obtains sufficient omega-3 feels soft and velvety to touch. Skin that is too dry needs more omega-3.

Recommended Versus Current Intakes of Omega-3 EFAs

Many countries and international organizations have made formal population-based dietary recommendations for omega-3s. These typically range between 0.3 to 0.5 g/day of EPA+DHA and 0.8 to 1.1 g/day of ALA.

The average North American diet skews heavily toward too much omega-6 intake which has serious implications for a wide range of health disorders including cancer, coronary heart disease, immune system function, kidney disease and several neurological and psychological disorders. Although a 1:1 to 5:1 ratio of omega-6 to omega-3 in the diet is recommended,[4] actual dietary ratios are as high as 15:1 or even 30:1.[5] Flaxseed consumption could be a significant part of the solution.

The Importance of Antioxidants to Skin Health

The skin is exposed to numerous environmental assaults that can lead to premature aging. Of these agents, perhaps none is more ubiquitous than the ultraviolet (UV) wavelengths of sunlight. The primary immediate defense against environmental skin damage is the antioxidant capacity of the skin. However, this defense system can be compromised by moderate exposure to UV light. Therefore, bolstering the antioxidant defense system of the skin through diet is a potentially important strategy for reducing environmentally induced skin damage. The oral administration of antioxidants through diet appears to provide better skin protection against oxidation and superior photoprotective activity following UV light irradiation than when the antioxidants are applied topically.[6] The importance of diet to healthy skin can not be over-emphasized.

Flax and Skin Health

Flax has a unique and healthy fatty-acid profile in the oil with 57 percent being represented by ALA, giving the seed a very favorable omega-6 to omega-3 ratio of 0.3:1. Flax therefore provides a very important source of omega-3 for skin health.

Flaxseed naturally contains a very active and stable antioxidant system[7] that protects its oil content of ALA. The antioxidant system in flax represents the interaction of a group of compounds working synergistically. Flaxseed contains several bioactive compounds such as lignans, phenolic acids, anthocyanin pigments, several flavonols and flavones, and phytic acid — all known to have antioxidant activity.[8] These powerful antioxidants can reduce the activity of cell-damaging free radicals that are generated through oxidation in the body and thus, can help protect the skin from damage.[9]

There are many anecdotal reports on the value of flax for maintaining healthy, younger-looking skin and for the treatment of skin disorders. Clinical studies in humans are

limited. However, the topical application of ALA has been shown to alleviate the symptoms of dry skin by altering the lipid composition of the skin surface and affecting barrier integrity.[10] In addition, significantly lower trans epidermal water loss was noted.

Research conducted in animals supports the positive skin care effects that flax constituents, especially ALA and the seed's antioxidant system, can provide. Feeding flaxseed for example, resulted in significant improvement in abnormal skin lesions in atopic horses[11]. It also reduced skin inflammation and did not elicit any negative side effects in the experimental horses. In dogs that were fed flaxseed, very positive improvements in skin and hair coat were observed following a one-month supplementation period.[12] Many pet food companies use flax in their products, specifically for its enormous benefits to the hair and skin of animals.

The health industry is being increasingly driven by aging demographics in industrialized nations. With the global population having more than tripled since the 1950s, more people than ever before are reaching the age of 50. Demand for anti-aging solutions is therefore increasing. Younger consumers too are increasingly conscious of ways to ensure health and wellness, and are seeking ways to delay aging and maintain soft, vibrant skin.

While it is still not possible to reverse the effects of aging, its mechanisms have been identified by scientific studies, together with various active biological compounds that interact with such mechanisms. As this article has shown, flax omega-3 and antioxidants are natural substances that can reduce the environmental, chronological and hormonal factors that impact the skin.

References

[1] Balentine, D.A., Albano, M.C. and Nair, M.G. 1999. Role of medicinal plants, herbs, and spices in protecting human health. Nutrition Rev. 57 (9 Pt. 2):S41 – S45.

[2] Sinclair, A.J., Attar-Bashi, N.M., and Li, D. 2002. What Is the Role of α-Linolenic Acid for Mammals? Lipids. 37:1113-1123.

[3] Meschino, James. 2003. Essential fatty acid supplementation improves skin texture and overall health. Dynamic Chiropractic, Sep 24.

[4] Health and Welfare Canada. 1990. Nutrition Recommendations. The Report of the Scientific Review Committee. Department of Supply and Services. Cat.No.H49-42/1990E. Ottawa, On.

[5] Simopoulos, A.P. 1999. Essential fatty acids in health and chronic disease. Am J Clin Nutr. 70(suppl):560S-569S.

[6] Palombo P, Fabrizi G, Ruocco V. 2007. Beneficial long-term effects of combined oral/topical antioxidant treatment with the carotenoids lutein and zeaxanthin on human skin: a double-blind, placebo-controlled study. Skin Pharmacol Physiol. 20(4):199-210.

[7] Daun JK, Barthet VJ, Chornick TL, Duguid S. 2003. Structure, composition, and variety development of flaxseed. In: *Flaxseed in Human Nutrition*, 2nd ed. Thompson LU, Cunnane SC, eds. Champaign: AOCS Press: 1-40.

[8] Westcott ND, Muir AD. 2003. Chemical studies on the constituents of *Linum* spp. In: *Flax—The Genus Linum*. Muir AD, Westcott ND, eds. New York: Routledge; 55-73.

[9] Prasad, K. 1997. Hydroxyl radical scavenging property of secoisolariciresinol diglucoside (SDG) isolated from flaxseed. Mol. Cell. Biochem. 168, 117-123.

[10] Loden, M. and Andersson, A C. 1996. Effect of topically applied lipids on surfactant irritated skin. Br. J. Dermatol. 134(2):215.

[11] O'Neill W, McKee S, Clarke AF. 2002. Flaxseed (Linum usitatissimum) supplementation associated with reduced skin test lesional area in horses with Culicoides hypersensitivity. Can J Vet Res. 2002 Oct;66(4):272-7.

[12] Rees CA, Bauer JE, Burkholder WJ. 2001. Effects of dietary flax seed and sunflower seed supplementation on normal canine serum polyunsaturated fatty acids and skin and hair coat condition scores. Vet Dermatol. 2001 Apr;12(2):111-7.