Evening primrose oil

BOTANY

*Oenothera biennis* L. Common name, *evening primrose* or *evening star*. Family Onagraceae. The root is biennial, fusiform and fibrous, yellowish on the outside and white within. The first year, many obtuse leaves are produced, which spread flat on the ground. From among these in the second year, the more or less hairy stems arise and grow to a height of 3 or 4 feet. The later leaves are 3 to 5 inches long, 1 inch or more wide, pointed, with nearly entire margins and covered with short hairs. The flowers are produced all along the stalks, on axillary branches and in a terminating spike, often leafy at the base. The uppermost flowers come out first in June. The stalks keep continually advancing in height, and there is a constant succession of flowers till late in the autumn, making this one of the showiest of our hardy garden plants, if placed in large masses. The flowers are of a fine, yellow colour, large and delicately fragrant, and usually open between six and seven o’clock in the evening, hence the common name of “evening primrose”. The seeds are 1.5 mm long, dark grey to black with irregular sharp edges. Originally indigenous to North America it is now naturalized throughout most of the Europe and parts of Asia.

Evening primrose oil is produced from the seeds of *Oenothera biennis*.

CHEMISTRY

**Lipids**

Evening primrose seeds are rich in fatty acids (14-20%). The fatty acids composition of evening primrose seeds is showed in table 1.

<table>
<thead>
<tr>
<th>Fatty acid</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Palmitic acid (C16:0)</td>
<td>7-10</td>
</tr>
<tr>
<td>Stearic acid (C18:0)</td>
<td>1.5-3.5</td>
</tr>
<tr>
<td>Oleic acid (C18:1)</td>
<td>6-11</td>
</tr>
<tr>
<td>cis-linoleic acid (C18:2)</td>
<td>65-80</td>
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<tr>
<td>cis-y-linolenic acid (18:3)</td>
<td>8-16</td>
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</tbody>
</table>

Table1. Fatty acid composition of evening primrose seeds (Alonso, J., 2004).
TRADITIONAL USES

Evening primrose seeds are very valuable in folk medicine for their oil which is rich essential fatty acids. This oil is used to treat neurodermatitis, premenstrual syndrome and as a dietary supplement.

COSMETIC PROPERTIES

Activity on epidermal barrier function
Emollients are mainly lipids and oils, which give the skin improved moisture, smoothness and flexibility. These compounds repair the skin and influence skin permeability, improving the barrier function. Stearic, linoleic, oleic, linolenic and lauric acids are emollient compounds habitually used in cosmetics and dermopharmacy (Kraft, JN & Lynde CW, 2005).

It is well known that deficiency of polyunsaturated acids result in several abnormalities of the structure of the epidermis, which mainly impair its barrier function. It causes the increase in its permeability both for water evaporating from the skin (increase in TEWL, dryness) and for substances permeating into the skin (increase of the skin irritation risk). Malfunction of the barrier is caused by changes in the structure of stratum corneum lipids. These changes inevitably result in a deviation in physicochemical properties of the intercellular cement.

Plant oils are the rich source of polyunsaturated fatty acids of n-6 group. Evening primrose oil (*Oenothera biennis*), containing over 10% of γ-linolenic acid (GLA), is one of the most used by the industry (Arct, J. & Pytkowska, K., 2000).

Gehring W et al. (1999) made a study with the aim of establishing the effect on barrier function in atopic dermatitis of topical evening primrose oil in an amphiphilic and a stable water-in-oil emulsion. The studies were vehicle-controlled in two populations of 20 atopic subjects. Barrier function was assessed in terms of transepidermal water loss and stratum corneum hydration after a 4-week treatment period and a 1-week treatment-free period. A barrier function test with sodium lauryl sulphate (SLS) and nicotinic acid ester was also carried out. Evening primrose oil proved to have a stabilising effect on the stratum corneum barrier with the water-in-oil emulsion.

In recent decades, much research has been conducted on the role of essential fatty acids in the formation and the barrier function of superficial skin layers. Some studies revealed that by applying linoleic acid (LA) and γ-linolenic acid (GLA) for some days, transepidermal water loss (TEWL) is reduced. After different treatments with LA or GLA, constant TWEL was observed for several days. However, the effects of applying other fatty acids reverted immediately. It was concluded that the action of LA and GLA on TEWL was not only due to their occlusive effects, but also to their ability to induce structural changes in the epidermis, particularly in the horny layer (Le Poole, H.A.C., 1995).

Because of these reasons, evening primrose oil is highly recommendable to formulate cosmetic products with moisturizing and emollient activities.

Activity on hair metabolism
Essential fatty acids also have an effect on hair metabolism. Essential fatty acid deficiency brings about skin conditions such as scalp dermatitis, alopecia and hair depigmentation. These symptoms may be reverted by topical applications of linoleic acid-rich oils. Skolnik, P. et al (1977) carried out a study on a 19-year-old male maintained on a 4 months regimen of fat-free, intravenous hyperalimentation fluids. During the treatment period, an essential fatty acid deficiency developed in this patient. This deficiency, as well as all associated skin symptoms, reverted after a 21-day treatment consisting in topical applications of linoleic acid-rich oil.

Because of these reasons, evening primrose oil is useful to formulate cosmetic products to treat hair loss.
COSMETIC APPLICATIONS

<table>
<thead>
<tr>
<th>Action</th>
<th>Active</th>
<th>Cosmetic Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>On epidermal barrier function</td>
<td>Essential fatty acids</td>
<td>-Emollient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Moisturizing</td>
</tr>
<tr>
<td>On hair metabolism</td>
<td>Essential fatty acids</td>
<td>-Anti-hair loss</td>
</tr>
</tbody>
</table>

RECOMMENDED DOSE

The recommended dose is between 0.5% and 5.0%.

BIBLIOGRAPHY

PDR for Herbal Medicines. Medical Economics Company. Monvale (New Jersey), 1998; p: 998-999 (ref. 633.8 (ENC)).
Kraft JN & Lynde CW. Moisturizers: What They are and a Practical Approach to Product Selection. Skin Therapy Letter, 2005; 10 (5): 1-8

Web sites: