D-Panthenol

D-Panthenol is the most used pro-vitamin in the cosmetics industry. Because of its physical properties it is easily incorporated into all normal cosmetic formulations. It penetrates the skin, hair and nails and generally fulfills all the expectations of both the producer and consumer.

D-Panthenol in skincare

In skin D-Panthenol has the following properties:

- It improves and increases the humidity properties of the skin (moisturising effect); it also makes dry skin softer and more elastic
- It has anti-inflammatory effect and soothes irritated skin
- It stimulates epithelisation and helps to heal minor wounds (shaving, skin grazes and blisters).

Weiser and Erlemann (1987) have shown, that even low concentrations of D-Panthenol have a positive influence on epithelisation. The studies were carried out using a commercially available W/O-cream with varying concentrations of D-Panthenol.

The results are shown in Fig. 1.

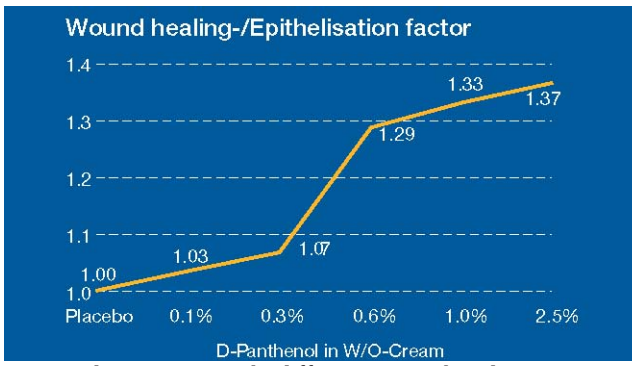

Fig. 1: Wound treatment with different D-Panthenol concentrations

The effect of D-Panthenol in a 5% formulation on epithelisation and wound healing has been published. In the same study Vitamin E Acetate was also documented for effectiveness.

D-Panthenol in haircare

D-Panthenol in haircare products will:

- Give the hair long lasting moisturisation
- Improve the manageability of the hair
- Reduce the formation of split ends
- Improve the condition of damaged hair
- Thicken the hair
- Give the hair shine.

In hair strengthening products like setting lotions and hair sprays the softeners for the polymers can often be replaced with D-Panthenol.

In contrast to the normal softeners D-Panthenol is released from the film coating the hair and penetrates the hair slowly.

The Panthenol which penetrates the hair is replaced with sebum so the hair does not get heavy and the style lasts longer.

Studies have shown that although single applications of Panthenol have an effect multiple applications give better results.

Panthenol is deposited on the hair and also penetrates the hair shaft accumulating in the hair.

A study with a leave-on conditioner showed that Panthenol penetrates through the hair root and is metabolised to Pantothenic Acid (Fig. 2).

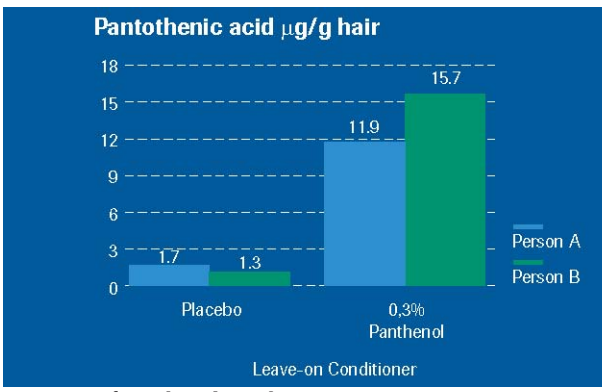

Fig. 2: Penetration of Panthenol into hair

The time between the determination of the Pantothenic Acid content in the control hair and the test hair was 4 weeks.

The test hair which was treated with Panthenol contained 9 times more Pantothenic Acid than the control hair.

Because Pantothenic Acid is an important constituent of healthy hair, the work carried out by Stüttgen (1960) and Stangl (1952), suggests that Panthenol acts as a nutrient for the hair.

The influence of concentration on effect was carried out. Shampoos, which contained 0.1%, 0.3% and 0.5% Panthenol, were diluted 1 to 10 with water.

The deposition of Panthenol on the hair was 36.4 µg/g hair after one cycle rising to 115.7 µg/g hair after five cycles (Fig. 3).

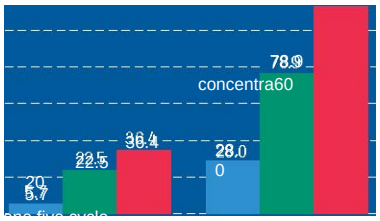

Fig. 3: Deposition of Panthenol on the hair - influence of concentration

The penetration of Panthenol into the hair showed similar results. After one cycle the penetration was
7.5 µg/g hair and after five cycles 21.5 µg/g hair (Fig. 4).

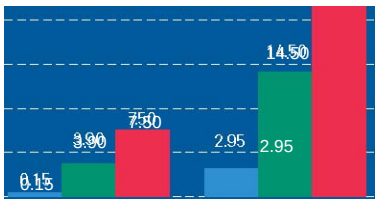

Fig. 4: Penetration of Panthenol on the hair - influence of concentration

Fig. 5 shows the water storage capacity of the hair as a result of the deposition and penetration of Panthenol with concentrations of 0.1%, 0.3% and 0.5% in a shampoo.

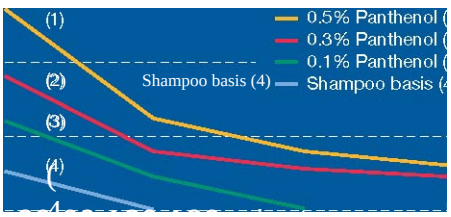

Fig. 5: Panthenol in a shampoo improves the water storage capacity

It can be shown that the water storage capacity is long-lasting. That is of particular interest as in the first two hours after shampooing the hair is espacially stressed by combing, brushing, blow drying and permanent waving. The high water content of the hair helps to prevent damage especially in bleached or damaged hair.

D-Panthenol in shampoos, conditioners, hair- and scalp treatments and hair tonics not only improves the shine, the feel and the flexibility of the hair, it also protects the hair against mechanical damage and in general makes the hair more resistant to environmental stresses.

Panthenol in nailcare

The elasticity of finger nails depends on the water storage capacity of the nail keratin.

Panthenol can substantially increase the water storage capacity of nails and by this mechanism the flexibility and stability of the nails is improved.

In a study, pieces of nail were fixed on an acrylic block and a mechanical pendulum placed to strike the nail.

Initially the number of swings necessary to break the nail was determined. This was used as the control.
The nail pieces were soaked in various solutions and again the number of swings of the pendulum necessary to break the nail were counted.

The solutions used in the test were water, l% Panthenol in water, l% Panthenol +0.5% Sodium Lauryl Sulphate (SLS) in water and l% Panthenol + 0.5% Triton X-100 in water.

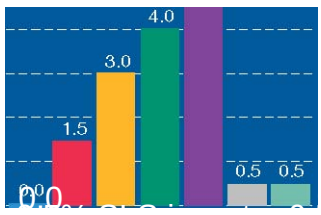

Fig. 6: Panthenol improves the flexibility of nails

It is interesting to note that SLS and Triton X-100 alone showed almost no effect (Fig. 6).