YUMEDICS
SCALPDOSE BIO AMPOULE PP88

- **Biotin**
- **Niacinamide**
- **Copper Tripeptide-1**
- **Panthenol**

Biotin

Review Article

Skin Appendage Disorders

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A Review of the Use of Biotin for Hair Loss

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Abstract

Background: Biotin has gained commercial popularity for its claimed benefits on healthy hair and nail growth. Despite its reputation, there is limited research to support the utility of biotin in healthy individuals. ***Objective:*** To systematically review the literature on biotin efficacy in hair and nail growth. ***Methods:*** We conducted a PubMed search of all case reports and randomized clinical trials (RCTs) using the following terms: (biotin and hair); (biotin and supplementation and hair); (biotin supplementation); (biotin and alopecia); (biotin and nails); (biotin and dermatology), and (biotin recommendations). ***Results:*** We found 18 reported cases of biotin use for hair and nail changes. In all cases, patients receiving biotin supplementation had an underlying pathology for poor hair or nail growth. All cases showed evidence of clinical improvement after receiving biotin. ***Conclusions:*** Though its use as a hair and nail growth supplement is prevalent, research demonstrating the efficacy of biotin is limited. In cases of acquired and inherited causes of biotin deficiency as well as pathologies, such as brittle nail syndrome or uncombable hair, biotin supplementation may be of benefit. However, we propose these cases are uncommon and that there is lack of sufficient evidence for supplementation in healthy individuals.

Niacinamide (=Nicotinamide, Vitamin B3)

Table 10.1 Mechanistic effects of niacinamide and the postulated skin appearance benefits.

Niacinamide effect (ex vivo, in vitro)	Postulated skin appearance benefits
Inhibition of sebum production, specifically reducing the content of diglycerides, triglycerides, and fatty acids	Reduced acne Reduced pore size Improved texture
Stimulation of epidermal skin barrier lipids (ceramides) and proteins (keratin, involucrin, filaggrin)	Improved skin barrier and moisturization Reduced skin redness Rosacea appearance benefits
Anti-inflammatory (inhibition of inflammatory cytokines)	Anti-aging Reduced skin redness Rosacea appearance benefits
Increased production of collagen	Anti-wrinkle
Inhibition of production of excess dermal GAGs (glycosaminoglycans)	Anti-wrinkle
Inhibition of melanosome transfer from melanocytes to keratinocytes	Reduced hyperpigmentation
Inhibition of protein glycation via anti-oxidant effects (niacinamide, as precursor, increases levels of the redox co-factors NADH and NADPH)	Inhibit skin yellowing Sun protection

Table 10.2 Newly discovered mechanistic effects of niacinamide and the postulated skin appearance benefits.

Niacinamide effect (ex vivo, in vitro)	Postulated skin appearance benefits
Stimulation of keratinocyte proliferation via potentiation of KGF-mediated effects	Wound healing
Stimulate production of collagen and mRNA transcripts of several matrix components, associated enzymes, and cytokines: fibulin-1, fibronectin-1, elastin, lysyl oxidase (1 and 2), procollagen, collagen (I and III), TGF-beta (1, 2, and 3), actin, CTGF, tenascin XB)	Anti-wrinkle (anti-aging)
Down regulation of MITF, tyrosinase, TRP1, TRP2, and PMEL17	Reduce hyperpigmentation
Reducing UV-induced PGE_2 synthesis from keratinocytes	Inflammation
Preventing UV-induced immunosuppression	Actinic keratosis
Metabolic oscillator for circadian rhythm regulation	Skin barrier

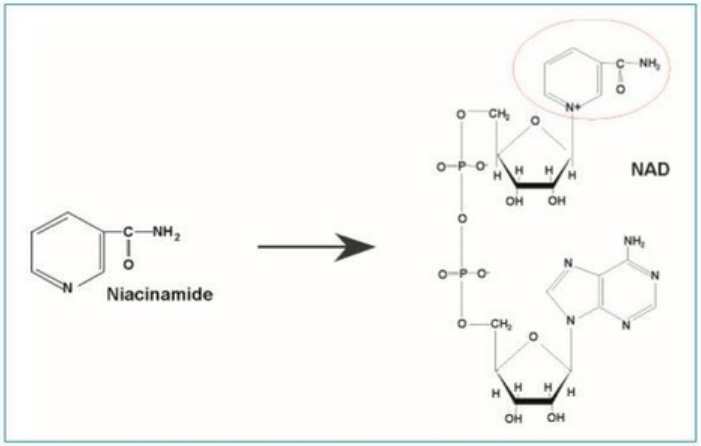
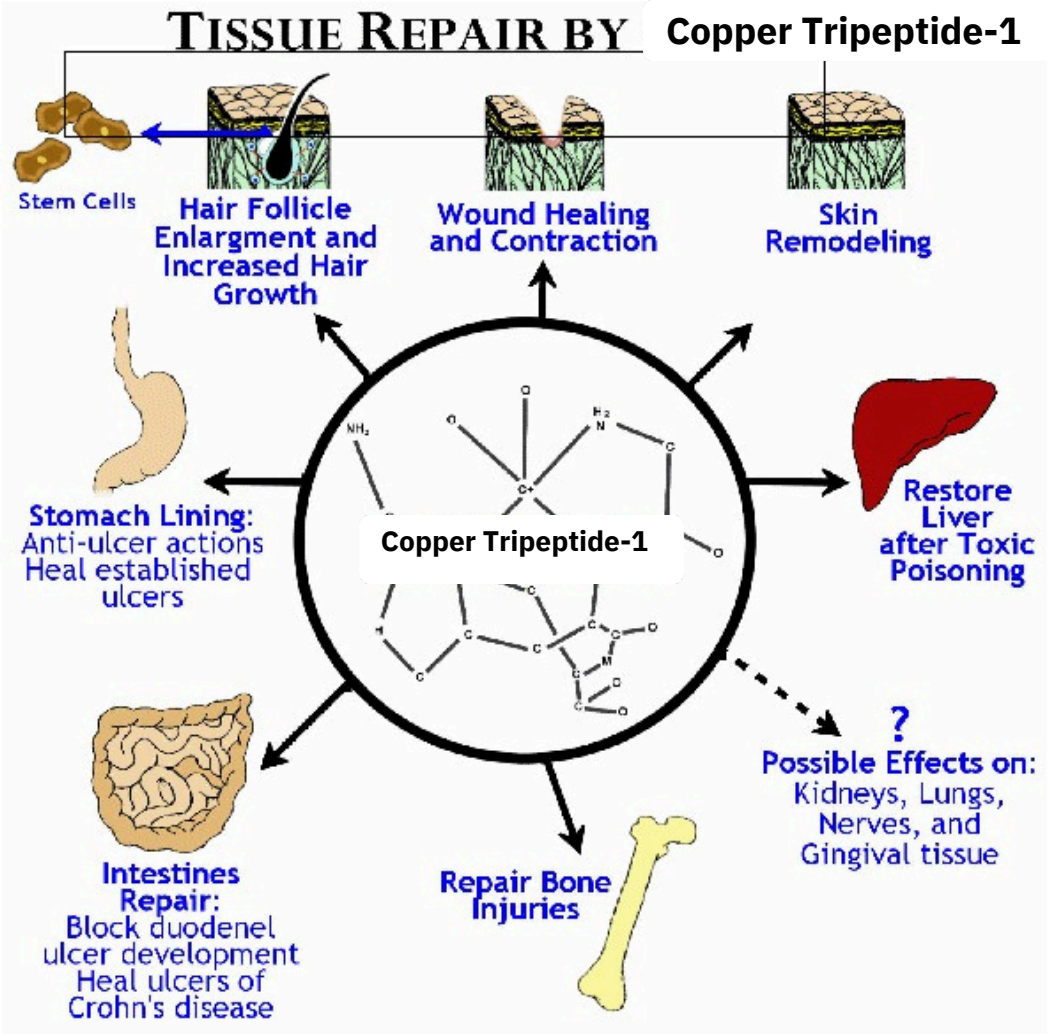


Fig. 2: Structure of niacinamide and inclusion within NAD molecule

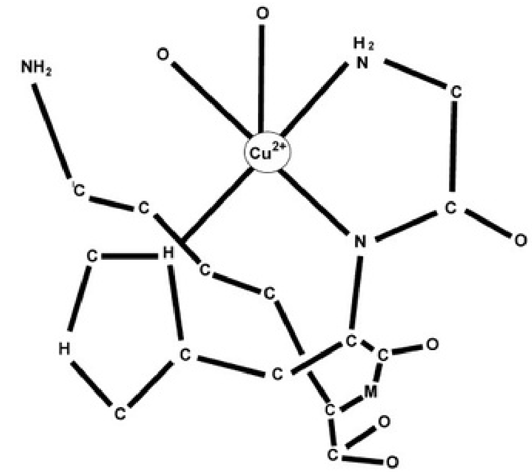
Reference

Niacinamide: A Topical Vitamin
with Wide-Ranging Skin Appearance Benefits

Copper Tripeptide-1



Copper Tripeptide-1



1. 5-α reductase inhibition
Decreases hair loss-inducing hormone DHT, Hair loss preventive effect

2. Synthesis of cell growth factor promoting effect
Normalization of hair growth cycle by preventing shortening of anagen stage or transition to catagen stage of hair

3. Antioxidant function to suppress oxygen free radical
Prevent oxidative damage of hair follicle cells to prevent hair loss.
Supply nutrition to the hair follicles.
Stimulating blood vessel formation in the scalp.

Copper Tripeptide-1

Proven hair growth effect

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Archives of Pharmacal Research
http://apr.psk.or.kr

The Effect of Tripeptide-Copper Complex on Human Hair Growth *In Vitro*

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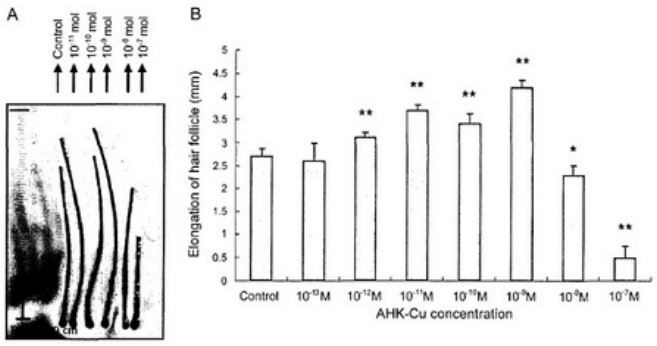
AHK-Cu stimulated the elongation of human hair follicles ex vivo

After 12 days of organ culture, the length of human hair follicles in the 10^{-12}~10^{-9} M AHK-Cu treated group were significantly increased compared with the vehicle-treated group (Fig. 1). 10^{-8} and 10^{-7} M AHK-Cu, however, significantly inhibited the hair follicle elongation by 14.8 ± 1.2 (2.3 ± 0.18 mm) and 81.5 ± 40.8% (0.5 ± 0.25 mm), respectively, as compared with the vehicle-treated control.



AHK-Cu induced the proliferation of cultured DPCs

According to the result of MTT assay, AHK-Cu significantly stimulated the proliferation of cultured DPCs at concentrations of 10^{-12}~10^{-9} M versus the vehicle-treated control (Fig. 2); however, 10^{-8} M AHK-Cu did not affect the proliferation of DPCs.

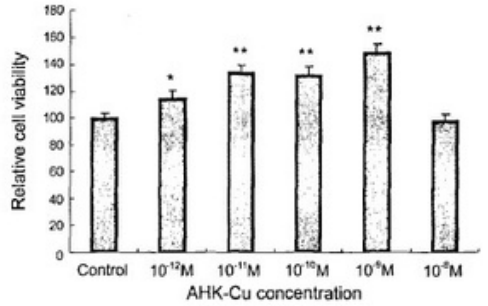


Fig. 2. Viabilities of human dermal papilla cells (DPCs) treated with AHK-Cu. DPCs (5.0×10^3 cells/well) were seeded into 96-well plates,

*Dermal Papilla Cells: DPC *AHK-Cu : Copper Tripeptide-1

Copper Tripeptide-1

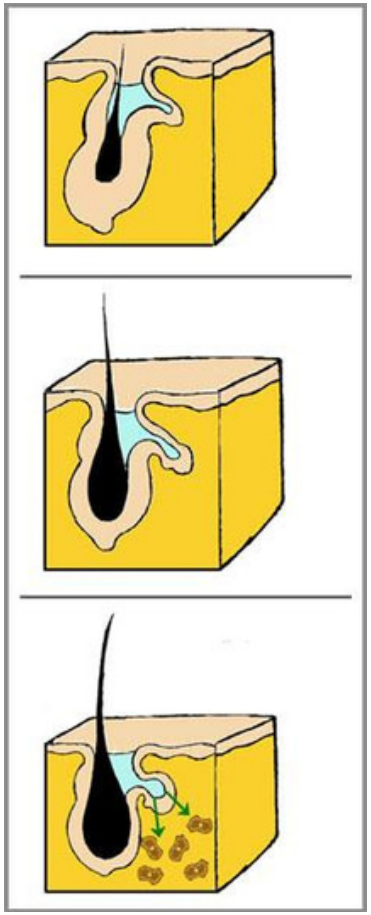
The role of regeneration and hair follicle production

- Skin remodeling starts with the hair follicles.
- New skin cells arise from the hair follicle and migrate into the surrounding skin area.

•I found that copper peptides not only stimulated healing of wounds but also increased the size of the hair follicles near the wounds.

•The copper peptides were not hair growth stimulators, per se, but did increase the hair follicle size and vitality. In recent years, it has been established that genetic
- modifications in mice that stimulate skin remodeling also increase hair follicle size (Fuchs 1998).

•Genes such as sonic hedgehog (Sato et al 2001, Nanba et al 2003, Oro et al 2003. Mill eta al 2003), catinin (Huelsken 2001, Van Mater et al 2003), Wnt (Stenn 2001) and Noggin (Botchkarev 2001) all enhance hair follicles then produce remodeling.

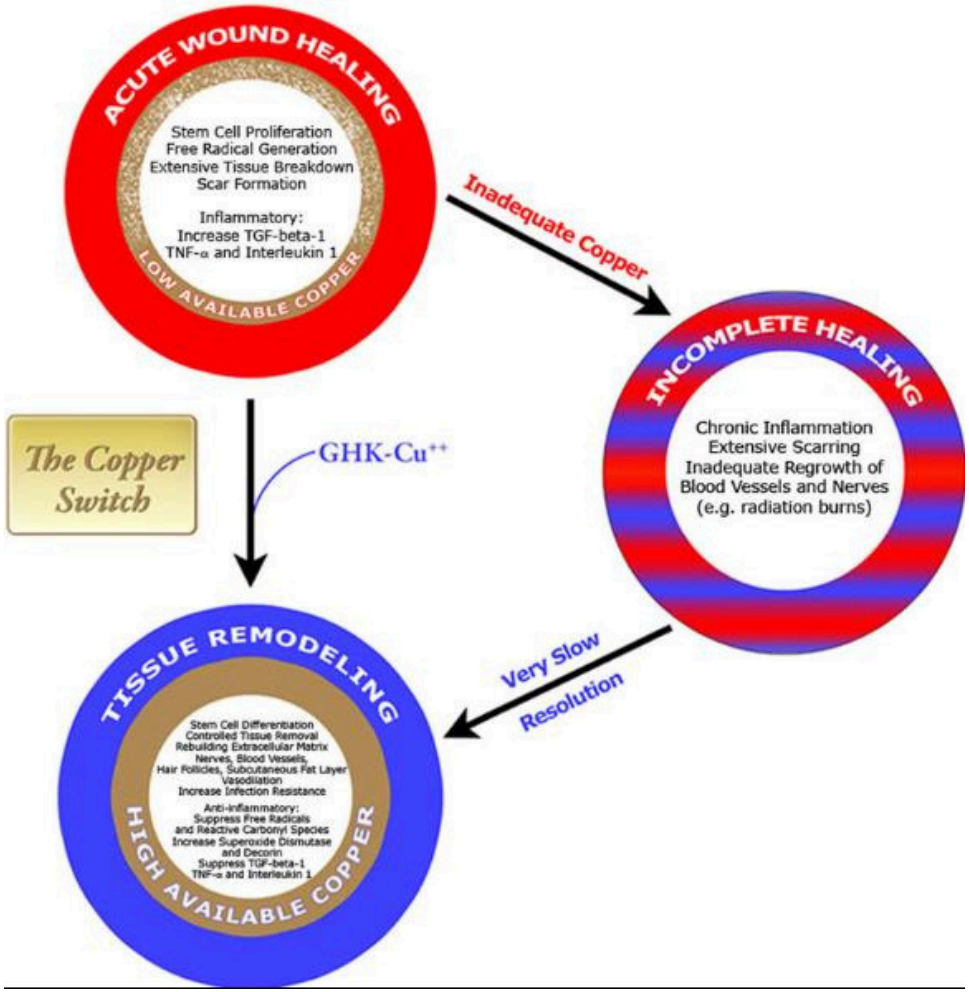


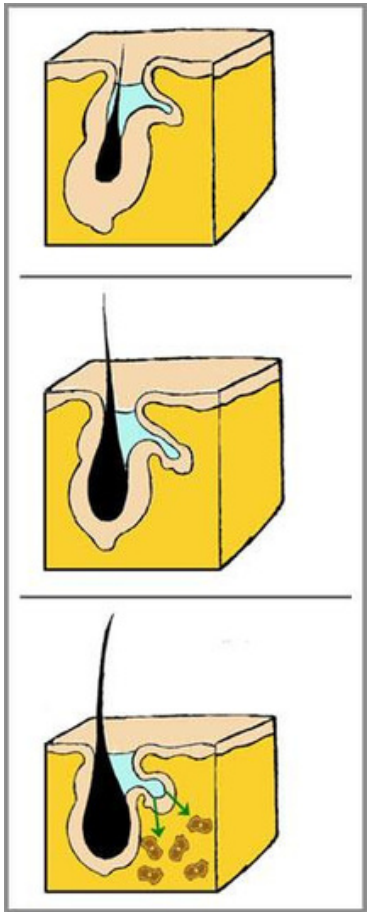
Hair follicle before remodeling signal.

The remodeling signal increases the size of the hair follicles.

The enlarged hair follicle begins to product new skin cells that migrate into the surrounding skin and rebuild the skin.

Copper Tripeptide-1





Hair follicle before remodeling signal.

The remodeling signal increases the size of the hair follicles.

The enlarged hair follicle begins to product new skin cells that migrate into the surrounding skin and rebuild the skin.

Copper Tripeptide-1

Hair follicle regeneration and strengthening

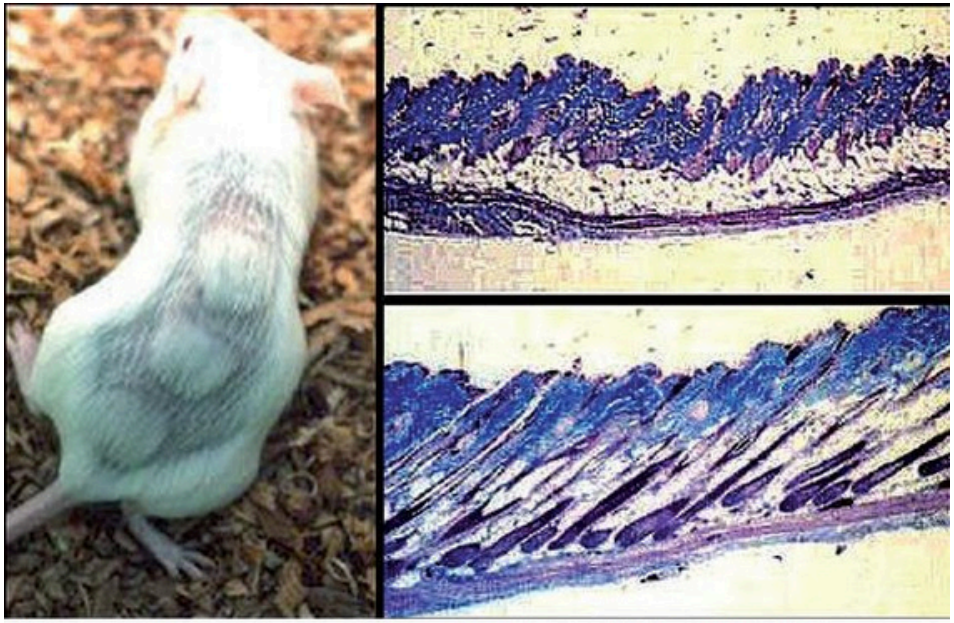
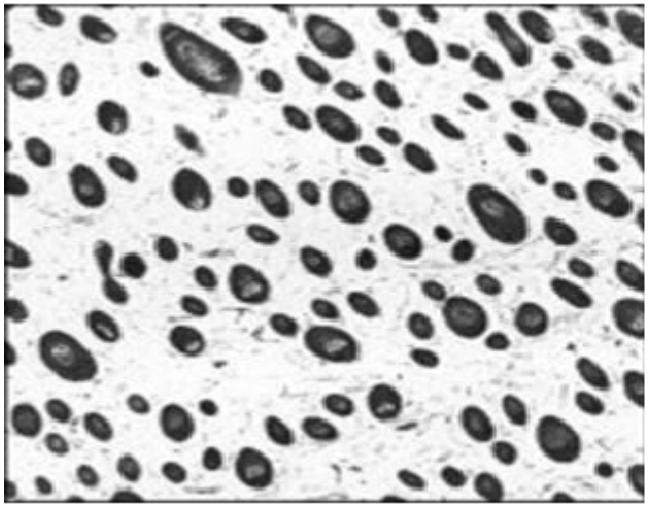


Fig. 2 A 25 day-old mouse was shaved and injected intradermally in three spots with GHK-Cu. Twelve days later, there was a very strong stimulation of hair growth at the injection sites

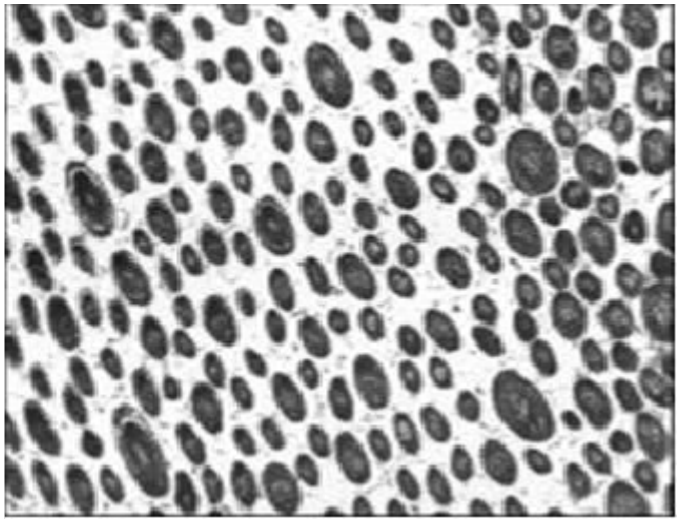
Pic. <Microscopic images>,
Ref. The human tri-peptide GHK and tissue remodeling, Loren pickart, skin biology, 4122 factoria boulerard, suite 200

Copper Tripeptide-1

New hair follicle formation effect



Control



Treated
Copper Tripeptide-1

Ref.
•The human tri-peptide GHK and tissue remodeling, Loren pickart, skin biology, 4122 factoria boulerard, suite 200
•http://skinbiology.com/copperpeptideregeneration.html

Panthenol

J. Cosmet. Sci., 62, 361–369 (July/August 2011)

Skin moisturizing effects of panthenol-based formulations

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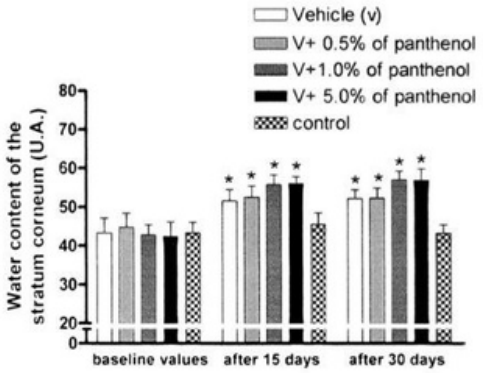

Figure 1. Water content of the stratum corneum before (baseline values) and 15 and 30 days after daily application of the formulations: vehicle (V), V+0.5%, V+1.0%, and V+5.0% of panthenol and control site (ANOVA test, n = 20 subjects, mean ± SEM). *Significantly different from the base values and control site ($p < 0.001$).

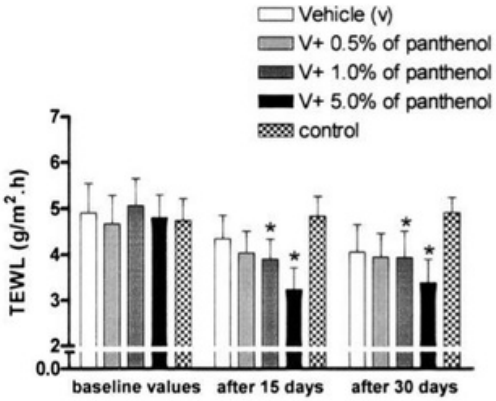

Figure 2. Transepidermal water loss before (baseline values) and 15 and 30 weeks after the application of the formulations: vehicle (V), V+0.5%, V+1.0%, and V+5.0% of panthenol and control site (ANOVA test, n = 20 subjects, mean ± SEM). *Significantly different from the base values and control site ($p < 0.001$).

Panthenol

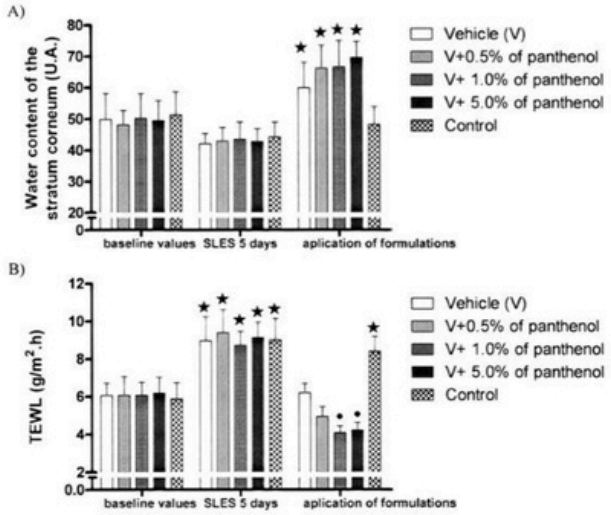

Figure 3. Water content of the stratum corneum (A) and transepidermal water loss (B) before (baseline values) and after repetitive skin washing with SLES solution for five days (SLES five days) and two hours after a single application of the formulations: vehicle (V), V+0.5%, V+1.0%, and V+5.0% of panthenol and the control site (with SLES washing and without the application of the formulations) (ANOVA test, n = 20 subjects, mean ± SEM). ★ Statistically significantly higher compared to baseline values ($p < 0.001$); • Statistically significantly lower compared to baseline values ($p < 0.001$).

CONCLUSION

This clinical study showed that panthenol-based formulations increased skin moisture and had a significant effect on skin barrier function by decreasing TEWL values. In addition, concentrations of pro-vitamin also influenced the improvement of skin barrier function. One percent panthenol added to the basic formulation tested was sufficient to show efficacy in this parameter. It seems that the moisturizing effects of panthenol can be attributed mainly to the protection of skin barrier function, and thus it may be used in cosmetic products to maintain physiological skin conditions and to prevent dry skin alterations, since loss of water may adversely impact skin appearance and lead to skin disorders.