

# NIACINAMIDE PC

Treasures to discover

a **DSM** Product



DSM Nutritional Products

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# NIACINAMIDE PC

Niacinamide PC – treasures to discover

Formulating with Niacinamide PC

## Niacinamide – from science to cosmetic products

Niacinamide belongs to the family of the B vitamins. It is essential in the diet and is contained in many foodstuffs. Niacinamide is also known as vitamin B3 or nicotinamide.

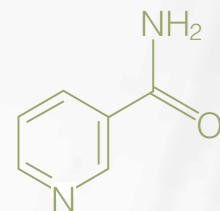


Figure 1: Structure of niacinamide

Niacinamide was recognized in the early 20th century as the vitamin that prevents pellegra, an epidemic disease with severe cutaneous lesions. Originally, niacinamide was named vitamin PP for pellegra-preventive.

After Feldmann and Maibach<sup>1</sup> highlighted the good skin penetration of niacinamide, scientists have been highly interested in exploring the topical effects of niacinamide.

## Niacinamide PC – the special grade

To match today's industry needs, DSM offers Niacinamide PC, a new grade of niacinamide, with minimal traces of nicotinic acid.

## Niacinamide PC – to improve skin moisturization

Skin softness, suppleness and skin hydration are related to the barrier properties of the horny layer. It is known that several lipids such as fatty acids and ceramides are critical for the structural and functional integrity of the stratum corneum. The skin barrier function can be assessed by transepidermal water loss (TEWL) measurements.

A study conducted by Tanno et al.<sup>2</sup> showed that 2% niacinamide reduced the TEWL by 24% in 4 weeks. At the same time free fatty acids and ceramides in stratum corneum were boosted by 67% and 34%, respectively.

Niacinamide increases the keratin synthesis and stimulates two other epidermal proteins as well: filaggrin and involucrin<sup>3</sup> (Figure 2). Filaggrins play a central role in the aggregation of keratinocytes. Involucrin is a component of the cornified envelope of the corneocytes.

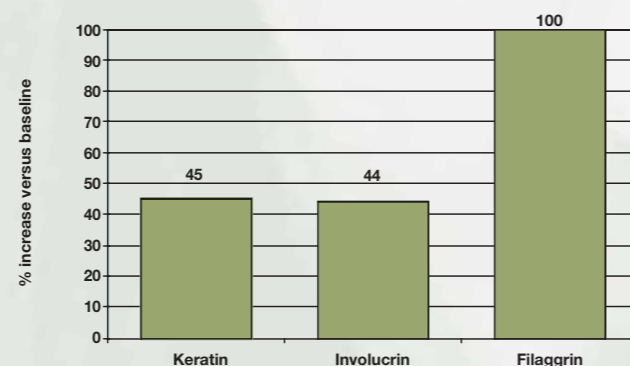


Figure 2: The in vitro study with human keratinocytes showed significant increase of barrier layer proteins by niacinamide.

Niacinamide PC will help to moisturize skin and may also soothe sensitive skin.

## Niacinamide PC – to improve the appearance of aging skin

Skin aging is characterized by major skin changes like reduced skin elasticity, poorer structure and appearance of wrinkles. An important factor is the gradual loss of collagen and elastin fibers synthesised in fibroblasts. A recommended strategy in preventing skin aging is to reduce collagen breakdown, while increasing fibroblasts. Studies with human fibroblasts showed<sup>3</sup> that niacinamide stimulates new fibroblasts by 20% and collagen secretion by 54%.

## Niacinamide PC – to impart a more even-looking skin tone

Extended exposure to sun light is a main reason for hyperpigmentation. Melanocytes in deeper skin layers produce melanosomes that contain the pigment melanin. These are then released to keratinocytes that move upwards to the upper epidermis.

Niacinamide does not inhibit the production of melanin but Hakozaki et al.<sup>4</sup> showed niacinamide inhibits the transfer of the melanosomes to the surrounding keratinocytes up to 68%. The scientists used a keratinocyte/ melanocyte co-culture model.

A clinical trial with volunteers confirmed the skin lightening activity<sup>4</sup>. They had applied a skin cream with 5% niacinamide for 8 weeks. Age spots around the eye and cheek were significantly reduced (Figure 3).

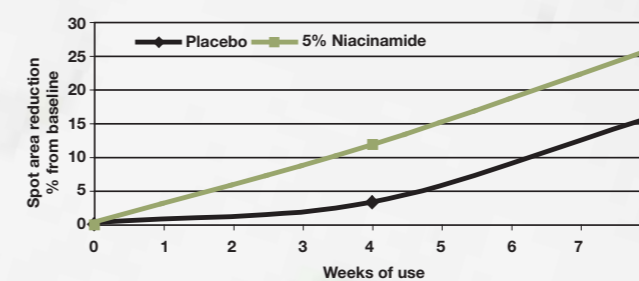


Figure 3: Image analysis of facial age spots after 8 weeks of daily application with either a 5% niacinamide cream or the placebo.

## Niacinamide PC – to reduce the appearance of acne

Typical antimicrobial agents used in the treatment of acne may provoke skin irritation or induce bacterial resistance. A study performed by Shalita and colleagues<sup>5</sup>, showed that 4% niacinamide is of comparable efficacy as 1% clindamycin in the treatment of acne (Figure 4). The appearance of acne was reduced by 52% with niacinamide and by 38% with clindamycin.

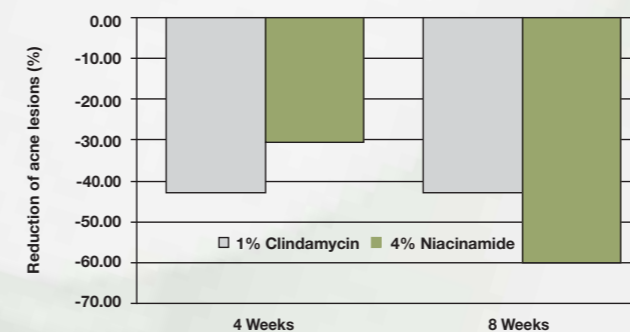


Figure 4: The study showed reduction of acne lesions (papules and pustules) after 76 acne patients had applied either a gel with 4% niacinamide or with 1% antibiotic clindamycin twice daily for 8 weeks.

The multiple beneficial effects on the skin make Niacinamide PC the ideal ingredient for daily skincare formulations (dry and sensitive skin), creams which help to reduce the appearance of wrinkles (e.g. night creams), and products which help to improve the appearance of acne and skin tone.

Niacinamide PC is one of the most stable vitamins: It is stable to light, heat, reducing and oxidizing substances.

Recommended use level: 0.5 – 5%

## Some formulation guidelines

- Niacinamide PC is water soluble and very easy to formulate
- Easy dissolution up to 5%
- Tolerates a broad range of pH (3-7.5)

Different reference formulations with Niacinamide PC are available on request.

## References

- 1 Feldmann, RJ & Maibach, HI Absorption of some organic compounds through the skin in man. J. Invest. Dermatol. 54:399-404 (1970)
- 2 Tanno, O et al. Nicotinamide increases biosynthesis of ceramides as well as other stratum corneum lipids to improve the epidermal permeability barrier. Br. J. Dermatol. 143: 524-531 (2000)
- 3 Bissett, DL et al. Topical niacinamide provides skin aging appearance benefits while enhancing barrier function. J. Clin. Dermatol. 32 Suppl. 9-18 (2003)
- 4 Hakozaki, T et al. The effect of niacinamide on reducing cutaneous pigmentation and suppression of melanosome transfer. Br. J. Dermatol. 147:20-31 (2002)
- 5 Shalita, AR et al. Topical nicotinamide compared with clindamycin gel in the treatment of inflammatory acne vulgaris. Int. J. Dermatol. 34:434-7 (1995)

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