



## The Effects of Vitamin B on the Skin

### Studies Regarding the Beneficial Effects of Topical Vitamin B3 (Niacinamide)

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#### Evaluation of anti-wrinkle effects of a novel cosmetic containing niacinamide.

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##### Abstract

Niacinamide is known to have effectiveness on sallowness, wrinkling, red blotchiness and hyperpigmented spots in aging skin. In this study, we have evaluated the anti-wrinkle effects of a new cosmetic containing niacinamide. A randomized, placebo-controlled, split face study was performed in 30 healthy Japanese females who had wrinkles in the eye areas. The tested cosmetic containing 4% niacinamide was applied on wrinkles of one side for 8 weeks, and a control cosmetic without niacinamide on another site. Anti-wrinkle effects were evaluated with two methods: (i) doctors' observation and photographs based on the guideline of the Japan Cosmetic Industry Association; and (ii) average roughness of skin surface (Ra value) using skin replica. This cosmetic showed marked and moderate improvement in 64% of the subjects with a significant difference as compared with the control site ( $P < 0.001$ ). Wrinkle grades in the tested area significantly reduced more than pre-application ( $P < 0.001$ ) and the control ( $P < 0.001$ ). Reduction in Ra value on the tested area was more than pre-application ( $P < 0.01$ ) and the control site ( $P < 0.05$ ) with significant differences. Only one subject stopped the study with minimal irritation. These results indicated that the tested lotion was well tolerated and may be an optional preparation for the treatment of wrinkles in the eye areas.

Int J Cosmet Sci. 2004 Oct;26(5):231-8.

Dermatol Surg. 2005 Jul;31(7 Pt 2):860-5; discussion 865.

#### Niacinamide: A B vitamin that improves aging facial skin appearance.

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##### Abstract

BACKGROUND: In multiple chronic clinical studies, topical niacinamide (vitamin B3) has been observed to be well tolerated by skin and to provide a broad array of improvements in the appearance of aging facial skin (eg, reduction in the appearance of hyperpigmented spots and red blotchiness). OBJECTIVE: To clinically determine the effect of topical niacinamide on additional skin appearance and property end points (wrinkles, yellowing, and elasticity). METHODS: Female white subjects (N = 50) with clinical signs of facial photoaging (fine lines and wrinkles, poor texture, and hyperpigmented spots) applied 5% niacinamide to half of the face and its vehicle control to the other half twice daily for 12 weeks (double blind, left-right randomized). Facial images and instrumental measures were obtained at baseline and at 4-week intervals. RESULTS: Analyses of the data revealed a variety of significant skin appearance improvement effects for topical niacinamide: reductions in fine lines and wrinkles, hyperpigmented spots, red blotchiness, and skin sallowness (yellowing). In addition, elasticity (as measured via cutometry) was improved. Corresponding mechanistic information is presented. CONCLUSION: In addition to previously observed benefits for topical niacinamide, additional effects were identified (improved appearance of skin wrinkles and yellowing and improved elasticity).

#### Nicotinic acid/niacinamide and the skin.

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##### Abstract

Nicotinic acid (also generally known as niacin) and niacinamide (also known as nicotinamide) are similarly effective as a vitamin because they can be converted into each other within the organism. The blanket term vitamin B(3) is used for both. Niacinamide is a component of important coenzymes involved in hydrogen transfer. Here, the two codehydrogenases, nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP) are of central importance. Topical application of niacinamide has a stabilizing effect on epidermal barrier function, seen as a reduction in transepidermal water loss and an improvement in the moisture content of the horny layer. Niacinamide leads to an increase in protein synthesis (e.g. keratin), has a stimulating effect on ceramide synthesis, speeds up the differentiation of keratinocytes, and raises intracellular NADP levels. In ageing skin, topical application of niacinamide improves the surface structure, smoothes out wrinkles and inhibits photo-carcinogenesis. It is possible to demonstrate anti-inflammatory effects in acne, rosacea and nitrogen mustard-induced irritation. Because of its verifiable beneficial effects, niacinamide would be a suitable component in cosmetic products for use in disorders of epidermal barrier function, for ageing skin, for improving pigmentary disorders and for use on skin prone to acne.

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#### Photoprotective effects of nicotinamide.

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##### Abstract

Sun protective measures can reduce numbers of both precancerous actinic keratoses and cutaneous squamous cell carcinomas within relatively short periods of time even in high-risk populations. Sunscreens, which tend to provide greater protection against shortwave UVB than against longer wavelength UVA radiation, can however provide only partial protection from the mutagenic and immune suppressive effects of sunlight. In large part, this reflects poor compliance with proper sunscreen application and reapplication. Skin cancer is by far the most common malignancy in Caucasian populations, and additional strategies to reduce the morbidity and economic burden of this disease are now urgently needed. Nicotinamide, the amide form of vitamin B3, is an inexpensive agent which is used for a variety of dermatological applications with little or no toxicity even at high doses. Nicotinamide has photoprotective effects against carcinogenesis and immune suppression in mice, and is photoimmuno-protective in humans when used as a lotion or orally. UV irradiation depletes keratinocytes of cellular energy and nicotinamide, which is a precursor of nicotinamide adenine dinucleotide, may act at least in part by providing energy repletion to irradiated cells.

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#### Niacinamide-containing facial moisturizer improves skin barrier and benefits subjects with rosacea.

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##### Abstract

A growing body of literature suggests that some moisturizers can improve stratum corneum barrier function, as well as ameliorate dry skin. The clinical signs and symptoms of rosacea, which include increased facial skin dryness and sensitivity, suggest a possible role for such moisturizers as an adjuvant in the management of this condition. This randomized, investigator-blind, controlled observational study (N = 50) was designed to assess whether a niacinamide-containing facial moisturizer would improve the stratum corneum barrier and thus provide a clinical benefit to subjects with rosacea. Subjects with rosacea applied the test moisturizer to their face and to one forearm twice daily for 4 weeks. The other forearm remained untreated as a control. Barrier function on the forearms was assessed instrumentally and using a dimethyl sulfoxide (DMSO) chemical probe. Stratum corneum hydration also was measured instrumentally. The dermatologist investigator evaluated each subject's rosacea condition over the course of the study, and subjects self-assessed their facial skin condition at study end. Instruments provided objective measures of stratum corneum barrier function and hydration on the face.

#### Topical nicotinamide modulates cellular energy metabolism and provides broad-spectrum protection against ultraviolet radiation-induced immunosuppression in humans.

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##### Abstract

BACKGROUND: Ultraviolet (UV) radiation can profoundly suppress the cutaneous immune system, thus enhancing carcinogenesis. Agents that prevent UV-induced immunosuppression may thus reduce skin cancer. Nicotinamide (vitamin B3) prevents UV-induced immunosuppression and carcinogenesis in mice, and solar-simulated (ss) UV-induced immunosuppression in humans. Its effectiveness against different UV wavebands and mechanism of action is as yet unknown. OBJECTIVES: To determine the effects and mechanisms of topical nicotinamide on UV-induced suppression of delayed type hypersensitivity (DTH) responses in humans. METHODS: Healthy Mantoux-positive volunteers in four randomised, double-blinded studies were irradiated with solar-simulated (ss) UV (UVB + UVA) or narrowband UVB (300 nm) or UVA (385 nm). Topical nicotinamide (0.2% or 5%) or its vehicle were applied immediately after each irradiation. Mantoux testing was performed at irradiated sites and adjacent un-irradiated control sites 48 h after the first irradiation and measured 72 h later. Immunosuppression was calculated as the difference in Mantoux-induced erythema and induration at test sites compared to control sites. Human keratinocyte cell cultures, with and without ssUV and nicotinamide, were used for quantitative real-time reverse transcriptase-polymerase chain reaction assessment of TP53 and enzymes that regulate oxidative phosphorylation. RESULTS: Nicotinamide cooperated with ssUV to increase enzymes involved in cellular energy metabolism and p53, and significantly protected against immunosuppression caused by UVB, longwave UVA and single and repeated ssUV exposures. CONCLUSIONS: Longwave UVA, which is poorly filtered by most sunscreens, was highly immune suppressive even at doses equivalent to 20 min of sun exposure. Nicotinamide, which protected against both UVB and UVA, is a promising agent for skin cancer prevention.