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20 | Topical activity of ascorbic acid: from in vitro optimization to in vivo efficacy.

Raschke T, Koop U, Düsing HJ, Filbry A, Sauermann K, Jaspers S, Wenck H, Wittern KP.; Skin Pharmacol Physiol. 2004 Jul-Aug;17(4):200-6.

ABSTRACT

We present here a new cosmetic formula system containing 3% ascorbic acid based on an optimized oil-in-water (O/W) emulsion.

This formulation demonstrated a good long-term stability of the active ingredient and also of the emulsion itself. It could be deduced from in vitro release studies that this O/W emulsion enabled a better release of the hydrophilic active agent than an alternative W/O emulsion.

By measuring the ultraweak photon emission, which is a well-established parameter for the oxidative stress in the skin, the high in vivo antioxidant capacity of 3% ascorbic acid was demonstrated after 1 week of product application.

This placebo-controlled study also proved that ascorbic acid in an O/W cream reduced oxidative stress in human skin significantly better than the derivative sodium ascorbyl-2-phosphate, a more stable vitamin C replacement commonly used in cosmetic formulations.

With increasing age, the number of papillae in the epidermal-dermal junction zone in human skin are reduced. This implies a possible consequence of reduced mechanical resistance of the skin and impaired supply of the epidermis with nutrients. In a 1-month placebo-controlled study on 25 human volunteers, a significant increase in the number of dermal papillae after application of the 3% ascorbic acid cream was demonstrated, using a confocal laser scanning microscope. Fine lines and wrinkles are a characteristic sign of aged and especially photo-aged skin.

Application of 3% ascorbic acid in a 12-week placebo-controlled usage study indicated a significant reduction of facial wrinkles. Altogether, 3% ascorbic acid in a cosmetic O/W emulsion has been shown to be appropriately stable and to enable a good release of the active agent in vitro as a precondition for a high efficacy in vivo. Application in vivo resulted in a significant reduction of oxidative stress in the skin, an improvement of the epidermal-dermal microstructure and a reduction of fine lines and wrinkles in aged skin.

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These results were received within a relatively short period of time of product application.