

The Presence of Niacinamide Influences the In Vitro Skin Accumulation of ethyl Paraben



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Introduction

Niacinamide (Vitamin B3) is widely used in cosmetics and skin care products. The vitamin has been shown to be able to reduce skin pigmentation and to increase lipid biosynthesis in the stratum corneum. Parabens are used as preservatives in cosmetics, food and pharmaceutical products. Although parabens are generally regarded as safe, recent reports suggest that they may possess oestrogenic activity.

Experimental Methods

Permeation experiments:

- Franz type diffusion cells (area 0.6 cm²).
- Barrier: human skin.
- Donor (0.5 ml): gel (pH 6.0) containing niacinamide (3.5 and 10% w/w) and ethyl paraben (0.1% w/w).
- Receptor solution: saline (4 ml).

Extraction:

- Epidermis-dermis heat separation.
- Extraction with methanol (15.8% v/v) 0.1 M sodium acetate (84.2% v/v), containing propyl paraben (2 µg/ml) as internal standard for ethyl paraben.

HPLC analysis:

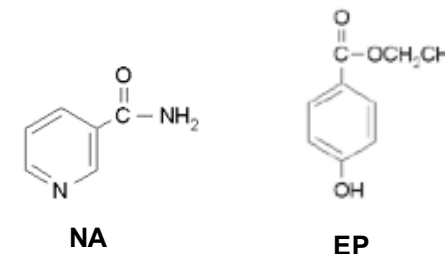
- µBondapak Waters C18 column (300 x 3.9 mm)
- Niacinamide: Mobile phase methanol (15.8% v/v) 0.1 M sodium acetate containing 0.01 M TBA to pH 5.0 (84.2% v/v), @ 1.2 ml/min. UV detection @ 261 nm
- Ethyl paraben: Mobile phase acetonitrile:water (50% v/v), @ 1.2 ml/min. UV detection @ 254 nm

Validation of Extraction Method

		µg Added	µg Recovered	%
NA	Epidermis	7.94±0.85	8.32±0.80	104.8
NA	Dermis	7.94±0.85	8.04±1.27	101.3
EP	Epidermis	1.19±0.05	1.14±0.06	96.0
EP	Dermis	1.19±0.05	0.72±0.05	60.9
PP	Epidermis	1.76±0.06	8.32±0.80	92.2
PP	Dermis	1.57±0.07	0.86±0.11	55.0

Aim of the work

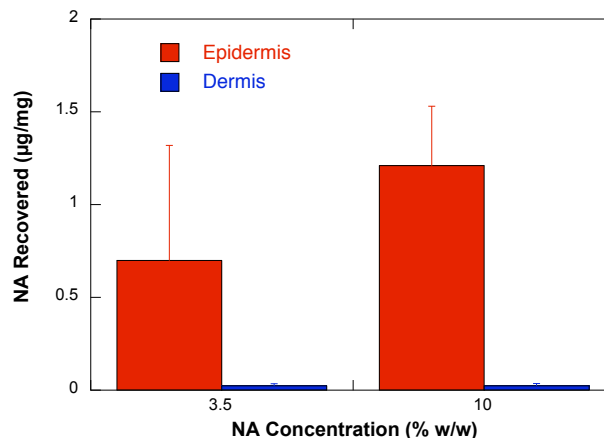
To determine the effect of the presence of niacinamide (NA) on ethyl paraben (EP) accumulation in the dermal and epidermal layers of human in vitro skin after application of topical gels.



Results & Discussion

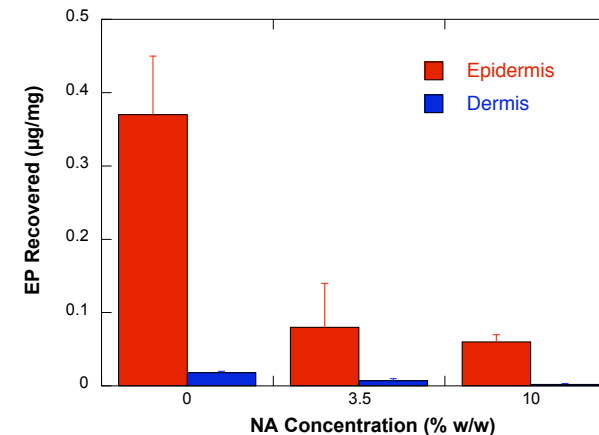
Niacinamide Accumulation

(Human skin, 20 min)



Ethyl Paraben Accumulation

(Human skin, 20 min)



Conclusions

- Niacinamide and ethyl paraben are able to accumulate in the skin in vitro already after 20 min. of application.
- The presence of niacinamide in the formulation reduces the skin accumulation of ethyl paraben in a concentration dependent way.
- Niacinamide can be considered as a potential penetration retarder for ethyl paraben.
- However, these preliminary data need to be confirmed in vivo.