Assessment of Transdermal Penetration Enhancement by Topical Pharmaceutical Excipients Using Skin PAMPA Method

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Introduction

The in vitro skin permeation study offers an alternative miniaturized Skin Delivery Platform to permeation of CMC, and in vivo protocols. This platform provides unique access to areas in need to the Topical Drug Delivery, Sensory, Wound Care and on Crafts, and exhibits comparable results to in vivo experiments in terms of transdermal drug penetration enhancement for local topical. Three transdermal delivery systems were tested, and the obtained transdermal penetration enhancement is comparable with that of the clinical study.

Objectives

A summary of the individual ingredients tested in this study is shown in Table 1.

Materials

A list of the most common excipients used in skin drug delivery is shown in Table 1. The excipients were selected based on their potential to enhance the permeability of the API across the artificial skin-mimetic membrane.

Methods

Comparison of Solvents

Comparison of Lipidic Fluids (Emulsifiers)

Comparison of Emulsifiers

Results and Discussion

Comparison of Solvents

Comparison of Lipidic Fluids (Emulsifiers)

Comparison of Emulsifiers

Conclusions

The skin PAMPA method is a sensitive 90-nl-based assay to determine the effect of topical transdermal permeability of sodium ibuprofen across an artificial skin-mimetic membrane. The addition of dermatological ingredients did not affect the membrane, and it was found to show an enhancement of permeation in the case of the penetration enhancers, while avoiding the reduction of sodium ibuprofen and emulsifiers due to drug retentation.

Sodium ibuprofen was shown to have superior penetration through the PAMPA membrane due to the increase in solubility, which decreases the skin permeability of sodium ibuprofen. The reduction in penetration shown by the emulsifier comparison is hypothesized by the decrease in transdermal activity, and consequently, the reduction in permeation.

While the reduction in penetration shown by the solvent comparison is hypothesized by the decrease in transdermal activity, and consequently, the reduction in permeation, the reduction in permeation is hypothesized by the decrease in the maximum permeation rate. This is because the maximum permeation rate is observed when the drug is closest to supersaturation. It should be noted that in a real system, the emulsifier/surfactant combination can lead to the decrease in permeation due to drug retention.

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The skin PAMPA method is a sensitive 90-nl-based assay to determine the effect of topical excipients on permeability of sodium ibuprofen across an artificial skin-mimetic membrane. The addition of dermatological ingredients did not affect the membrane, and it was found to show an enhancement of permeation in the case of the penetration enhancers, while avoiding the reduction of sodium ibuprofen and emulsifiers due to drug retentation.

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