OBJ LIMITED
Active transdermal drug delivery

Trial Summary| Hydrocortisone

Dermaportation increases hydrocortisone penetration of human epidermis ex vivo

Objective

Hydrocortisone is one of the most commonly used topical steroids. Here, the effect of the standard Dermaportation waveforms on the transdermal diffusion of hydrocortisone HCL was evaluated.

Method

Human skin was obtained following abdominoplasty surgery under existing approval from the Human Research Ethics Committee of Curtin University.

The epidermis was heat separated from the dermis using standard procedures (Kligman and Christophers 1963). The epidermis was mounted in Franz-type diffusion cells with the stratum corneum facing the donor compartment. Skin integrity was determined by conductance measurement. The receptor compartment was filled with 20:80 ethanol:phosphate buffered saline pH 7.4, stirred continuously and maintained at 37°C throughout the experiment. Hydrocortisone solution (1 mL of saturated solution in 20:80 ethanol:phosphate buffered saline pH 7.4; solubility approx 1 mg/mL) was applied to the donor side of the epidermis.

Dermaportation was applied from time 0 to 4 h. Samples were removed from the receptor fluid at time points up to 4 h. At each time point the receptor fluid volume was replaced with fresh receptor solution preheated to 37°C. Four Dermaportation cells and three passive cells (no Dermaportation) were conducted using skin from the abdominal region of a female donor. The content of hydrocortisone in receptor fluid samples was analysed by HPLC with ultraviolet detection using a validated assay procedure.

The cumulative amount of hydrocortisone in receptor versus time was plotted and flux values calculated from the slopes per group.

Result

Dermaportation enhanced the skin penetration of hydrocortisone (flux 2.44µg/cm^2/h), when compared that of passive administration (flux 0.08µg/cm^2/h). At 30min the cumulative amount penetrated was 93.22µg for Dermaportation and 2.51µg for passive diffusion. The largest increase in Dermaportation-related diffusion was achieved in the first 40min (see Figure 1).

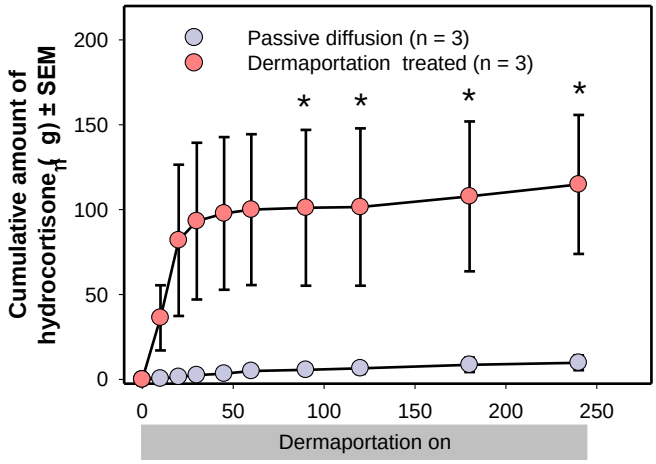

Figure 1: *The average cumulative amount of hydrocortisone in the receptor chamber of a standard Franz-type diffusion set-up is depicted for passive and Dermaportation induced penetration through excised human epidermis. Dermaportation was switched on from 0-240min (grey bar).*

Summary

Dermaportation was successful at delivering hydrocortisone through excised human epidermis within 30min, in far greater amounts than the passive controls. The steep increase in diffusion is typical for the drug push phase of Dermaportation.

REFERENCES:
Kligman A, Christophers E. Preparation of isolated sheets of human stratum corneum. Arch Dermatol 88: 70-73 (1963).