

Caffeine permeation across the skin from cosmetic patches

S. Nicoli, P. Colombo, P. Santi

Department of Pharmacy, Parco Area delle Scienze 27/A, Parma, Italy



AIM OF THE WORK

The aim of the work was the preparation and evaluation of the transdermal permeation of caffeine from a new transdermal film.

The fluxes obtained were compared with those obtained starting from a commercial formulation and from a caffeine saturated solution.



METHODOLOGY

Patch preparation:

Lamination of a solution of film forming agent, adhesive, caffeine and plasticizer

Permeation experiments:

Franz-type diffusion cells (0.6 cm²)

Rabbit ear skin

Donor compartment:

Water solution (18 mg/ml)

Commercial gel (5%)

Commercial Gauze

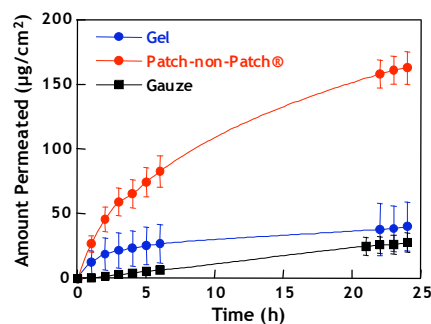
Film (5%)

RESULTS

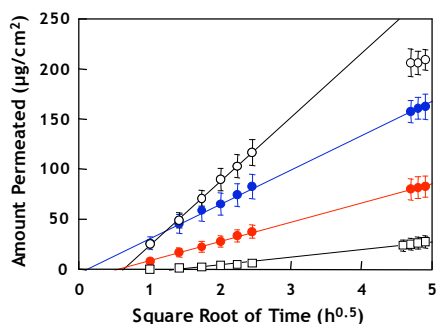
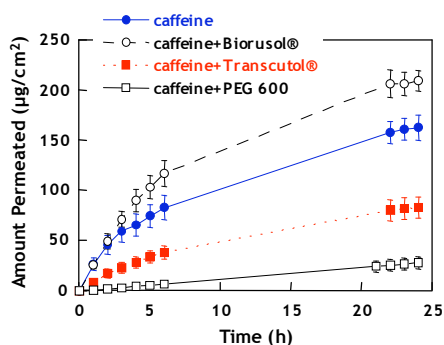
Patch Characterization

Enhancer	Film weight (mg/cm ²)	Caffeine Content (% w/w)	Film thickness (μm)	Water Content (%)
-	6.04 ± 0.28	5.54 ± 0.24	60 - 70	3.62 ± 0.77
Biorisol®	9.28 ± 0.55	3.59 ± 0.13	70 - 80	4.09 ± 0.82
PEG 600	12.42 ± 0.75	2.49 ± 0.02	90 - 100	4.79 ± 0.29
Transcutol®	7.53 ± 0.08	4.45 ± 0.14	60 - 70	4.27 ± 1.31

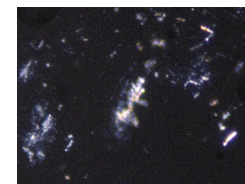
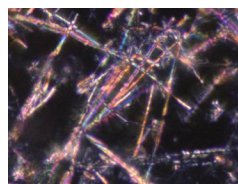
Comparison with Commercial Formulations



Effect of Enhancers



Water Interaction



Amount Permeated

Formulation	Caffeine applied (mg/cm ²)	Caffeine permeated after 6 h (μg/cm ²)	% Permeated after 6 h
Solution	30.0	17.7	0.06
Gel infinite dose	83.3	78.4	0.09
Gel finite dose	1.00	26.9	2.69
Medicell Patch®	0.30	6.6	2.20
Film 5%	0.33	83.1	25.18

CONCLUSIONS

- The prepared films can be considered a good alternative to semisolid formulations.
- The film produces high percentages of caffeine permeated across the skin
- The permeation can be modulated by the addition of different excipients.
- The permeation profiles found suggest that the film controls the permeation of caffeine.

ACKNOWLEDGMENTS

Lisapharma S.p.A., Erba (Italy)