

# Effect of Adhesive Polymer on Lidocaine Transport from Transdermal Film



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## AIM OF THE WORK

The Patch-non-Patch® platform is a bioadhesive film with a monolayer structure which includes backing, adhesive and drug reservoir in one layer. Moreover it is not adhesive in the dry state but bioadhesive when applied on wet skin.

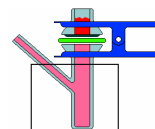


The aim of this work was to modulate the delivery of lidocaine hydrochloride from the bioadhesive film across rabbit ear skin.

## METHODS

### Permeation experiments

Franz diffusion cells  
Barrier: rabbit ear skin, silicone membrane  
Receptor: saline  
Donor: bioadhesive film, solutions

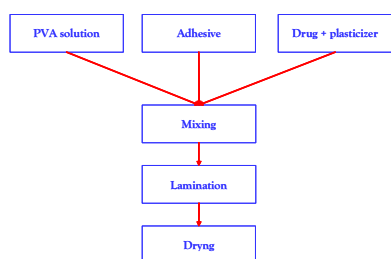


### HPLC analysis

Column: Waters  $\mu$ Bondapak™  
Mobile phase: CH<sub>3</sub>CN: pH4 phosphate buffer (20:80, v/v)  
Flow rate: 1.3 ml/min  
UV detection: 216 nm

## RESULTS

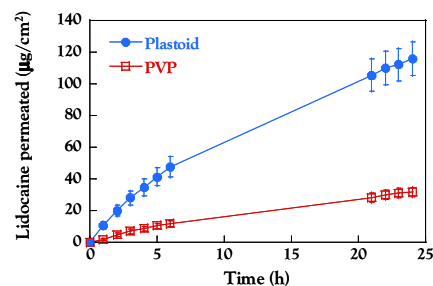
### Permeation from transdermal film across rabbit ear skin



Composition of the mixtures used for film preparation (% wet weight)

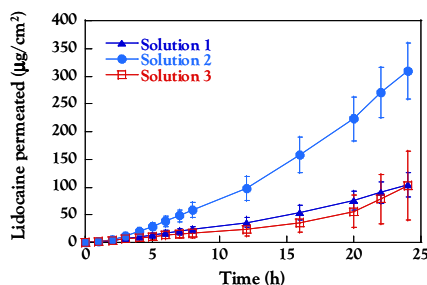
	Plastoid	PVP
PVA 83K	11.2	11.2
Plastoid E 35 H	27.0	-
PVP 16% sol	-	27.0
Sorbitol	4.0	4.0
Lidocaine HCl	2.0	2.0
Water	54.6	54.6
Lidocaine content *		
% w/w	5.6±0.1	7.1±0.1
mg/cm <sup>2</sup>	0.25±0.01	0.54±0.01

\* as base on finished product



### Permeation from solutions

#### Rabbit ear skin

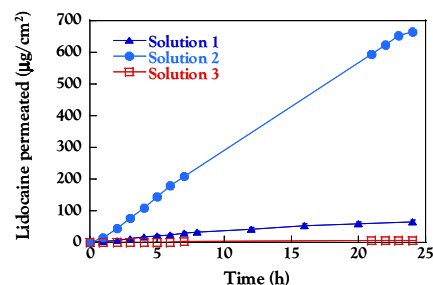


Solutions composition (%)

	Solution 1	Solution 2	Solution 3
Water	98	71	71
Lidocaine HCl	2	2	2
Plastoid E 35 H	-	27	-
PVP 16% sol	-	-	27

PVP had no effect on lidocaine permeation, while Plastoid® increased in a significant way the amount of lidocaine permeated, compared to the neat solution in water.

#### Silicone membrane



### Permeation parameters

$$Q(t) = (KH)C_{app} \left[ \frac{D}{H^2} t - \frac{1}{6} - \frac{2}{\pi^2} \sum_{n=1}^{\infty} \frac{(-1)^n}{n^2} \exp\left(-\frac{Dn^2\pi^2 t}{H^2}\right) \right]$$

	KH x 10 <sup>3</sup> (cm)		D/H <sup>2</sup> x 10 <sup>3</sup> (h <sup>-1</sup> )		P x 10 <sup>4</sup> (cm h <sup>-1</sup> )	
	Skin	Membrane	Skin	Membrane	Skin	Membrane
Solution 1	8.6±2.9	0.71±0.2	64.2±18.4	472±106	3.0±0.5	2.7±0.3
Solution 2	31.5±4.6	7.5±0.6	33.7±5.9	423±68	9.5±1.2	29.8±4.0
Solution 3	8.3±6.4	0.35±0.01	47.3±14.9	71±0.5	2.9±2.8	0.25±0.01

## CONCLUSIONS

The choice of the adhesive seems to be an important variable governing drug transport from transdermal films. In particular, the presence of lauric acid combined with a basic drug, such as lidocaine, can produce a relevant improvement in permeation, because of the formation of an ion-pair.

## REFERENCES

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