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Transdermal delivery of zidovudine (AZT) through rat skin: optimization of a suitable delivery vehicle

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The objective of this study was to develop a transdermal delivery system for zidovudine (AZT). The pharmacokinetic characteristics and the potential toxicity associated with this drug when administered through *peroral* route make it a suitable candidate for transdermal delivery. Selection of appropriate vehicle composition is an important step in optimizing the transdermal delivery (Sathyan et al., 1995). Vehicles modify topical bioavailability: (a) by virtue of a higher thermodynamic activity of the drug in the solvent and (b) by affecting the barrier properties of the study, *in-vitro* permeation of AZT through rat skin was studied to identify a suitable delivery vehicle. A saturated solution of the drug in water, propylene glycol, and ethanol and their mixtures were evaluated. Further, the effect of these solvents on skin permeation properties would be explained using skin FT-IR.

The skin permeation parameters (lag time, flux, amount of the drug in the skin) of AZT across the excised skin of rat are shown in the Table 2. Amount of the drug present in the receptor compartment determined at the end of experiment is also tabulated in the Table 2. The skin affinity of the drug was defined as the drug concentration in the skin divided by the drug concentration in the receptor compartment (Panchagnula and Patel, 1997).

The studies so far indicates that ethanol (100%) would be a good solvent since it has given a very high flux as compared to other solvent (water, propylene glycol, each 100%). Also the amount of the drug residing in the skin is less in case of ethanol (5.85). The high skin affinity values in water (89.80) and PG (76.78) is an indication that AZT is forming depot in the skin. Further permeation studies and the skin FT-IR will be used to explain the concentration of drug in the skin.

Table 1. Saturated solubility of AZT in different solvent system(n=3, S.D)

WATER (µl)	PG (µl)	EtOH (µl)	CONC. (mg/ml)
1000	0	0	26.61(2.85)
0	1000	0	64.43 (0.84)
0	0	1000	66.21 (5.35)
500	500	0	158.93(2.64)
0	500	500	113.35 (4.47)
500	0	500	71.48 (5.88)

Table 2. Permeation parameters of AZT in saturated solution of triple distill water, ethanol and propylene glycol(n=4, S.D)

	lag time (hr)	flux ($\mu g\ cm^{-2}.h^{-1}$)	A ($\mu g.mg^{-1}$)	B ($\mu g.mg^{-1}$)
C	8.61 (4.42)	12.87 (3.8)	9.3 (4.9)	104.34 (25.13)
EtOH	5.36 (1.78)	98.39 (29.53)	4.09 (2.38)	698.89 (228.6)
PG	6.68 (2.59)	7.09 (3.15)	4.39 (1.68)	57.18 (23.35)

A Amount in skin
B Amount in receptor compartment

Panchagnula, R., Patel, J.R., (1997) Pharm. Sci., 3: 83-87

Sathyan, G., Ritschel, W.A., Hussain, A.S., (1995) Int. J. Pharm., 114: 75-83