IN-VITRO PERCUTANEOUS ABSORPTION OF 1-CHLORO-2,4-DINITROBENZENE (DNCB) THROUGH HUMAN, HOODED RAT AND MOUSE EPIDERMIS

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1-chloro 2,4-dinitrobenzene is frequently used to study contact allergy (Miller and Levis, 1973) and application to the skin can produce a hypersensitivity which becomes evident at subsequent exposures. Immunotherapy with topically applied DNCB is used to treat warts, alopecia and verrucae. For such effects to occur DNCB must be absorbed through the stratum corneum. DNCB has, indeed, been shown to penetrate human epidermis rapidly and associate with epidermal cells within one hour following application (Carr et al, 1984). The percutaneous absorption of a chemical is influenced by the vehicle (formulation) and skin type (e.g. species). We have measured the in-vitro absorption of DNCB from two vehicles, dimethylformamide (DMF), acetone:olive oil (Ao) through human epidermis and from DMF through hooded rat and mouse epidermis.
Epidermal membranes were mounted in glass diffusion cells (consisting of donor and receptor chambers). The receptor fluid was 50% aqueous ethanol. DNCB in a vehicle was applied to the skin in the donor chamber. Cells were maintained at 30°C (±1°C), with receptor solutions continuously stirred. Samples were taken from the receptor solution at frequent intervals and analysed by GC for DNCB. The percutaneous absorption rate was influenced by the vehicle and skin type (Table). The rate of absorption through human skin was much higher from DMF than from Ao: this probably reflects a difference in the partitioning behaviour of DNCB between the skin and vehicle. When the concentration of DNCB was increased tenfold in the vehicle, in agreement with theory, the absorption rate increased; eightfold from DMF, but only fourfold from the Ao. The absorption rates through the rodent skins were higher than through human reflecting a definite species difference in the absorption of DNCB. Such differences could influence the systemic reaction following exposure of this chemical to human skin compared to rodent skin.

Table: Absorption* of DNCB through human, hooded rat and mouse epidermis

Species	Absorption rate µg cm^{-2} hr^{-1}* HUMAN		HOODED RAT	MOUSE
Vehicle / Concentration	DMF	Ao	DMF	DMF
10%	286.1 ±52.5 n = 6	8.5 ±4.3 n = 5	1161.1 ±227.5 n = 7	1736.7 ±256.6 n = 5
1%	34.4 ± 4.72 n = 6	2.0 ±0.5 n = 5	-	-

(*±SEM; n = number of determinations)

Miller Jr., A.E. and Levis, W.R. (1973). J.Invest.Dermatol. 61:261-269
Carr, M.M., et al (1984). Br.J.Dermatol. 110:637-641