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Evaluation of the Percutaneous Absorption of Ketamine HCl, Gabapentin, Clonidine HCl, and Baclofen, in Compounded Transdermal Pain Formulations, Using the Franz Finite Dose Model

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Abstract

Objective: This study evaluates the ability of four commonly used analgesics (ketamine HCl, gabapentin, clonidine HCl, and baclofen), when incorporated into two transdermal compounding bases, Lipoderm and Lipoderm ActiveMax, to penetrate human cadaver trunk skin in vitro, using the Franz finite dose model.

Design: In vitro experimental study. Methods. Ketamine HCl 5% w/w, gabapentin 10% w/w, clonidine HCl 0.2% w/w, and baclofen 2% w/w were compounded into two transdermal bases, Lipoderm and Lipoderm ActiveMax. Each compounded drug formulation was tested on skin from three different donors and three replicate skin sections per donor. The Franz finite dose model was used in this study to evaluate the percutaneous absorption and distribution of drugs within each formulation.

Results: Rapid penetration to peak flux was detected for gabapentin and baclofen at approximately 1 hour after application. Clonidine HCl also had a rapid penetration to peak flux occurring approximately 1 hour after application and had a secondary peak at approximately 40 hours. Ketamine HCl exhibited higher overall absorption rates than the other drugs, and peaked at 6–10 hours. Similar patterns of drug distribution within the skin were also observed using both transdermal bases.

Conclusions: This study suggests that the combination of these 4 analgesic drugs can be successfully delivered transdermally, using either Lipoderm or Lipoderm ActiveMax. Compounded transdermal drug preparations may then provide physicians with an alternative to traditional oral pain management regimens that can be personalized to the specific patient with the potential for enhanced pain control.

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