# Ex vivo delivery study of diclofenac formulated in a nanoemulsion

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## Introduction

Diclofenac is a commonly used, highly effective non - steroideal anti-inflammatory agent (NSAID) in the management of acute conditions of inflammation and pain, musculoskeletal disorders, arthritis and dysmenorhea. (1) Is one of the most commercially successful. It has an annual turnover of over 1 billion US dollars, approximately of which is achieved with the topical remedies. (2) Thus, although diclofenac is a relatively safe and tolerable, serious gastrointestinal adverse affects occasionally appear after oral administration. (1)

Diclofenac salt is soluble in aqueous solutions as ionized salts and its penetration into the skin is dependent upon partitioning of the unionized form into the lipophilic phase of the topical emulsion (1)

In this study have been formulated a nanoemulsion with diclofenaco (2-(2,6-dichloranilino) phenylacetic acid) in a unionized form, in order to see the relationship between unionized formula and other formulations in the market manufactureed with diclofenaco salts.

## Objetive

A transdermal permeation experiment was conducted in order to see the diclofenac (2-(2,6-dichloranilino) phenylacetic acid) release from an anhydrous nanoemulsion with Plurol oleique®, Labrasol ®, Labrafac® and propylenglycol, prepared by lab scale sonication.

## Method and Materials

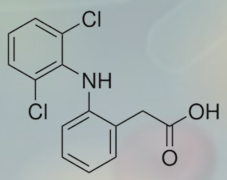
The study, was carried out first by the preparation of nano-structured emulsion, using a surfactant, co-surfactant, emollient and moisturizer. Once prepared, diclofenac was incorporated, the final concentration was 5%, the particle size was determinated by the equipment Zeta - sizer (Malvern Instruments).

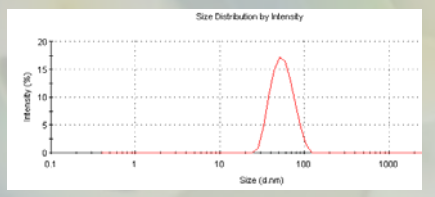
The permeation test was carried out using human skin (n=6) from abdominal lipectomies, from three different donors in a manual sampling system cells Co.Mod Franz Crown Glass. CDCF-9. The receptor phase was ethanol:water (7:3), under temperature of 32 ± 1ºC. Samples were taken at fixed times during 24 hours. The concentrations of each sample were obtained by High Performance Liquid Chromatography (HPLC Waters LC Module I plus and Waters In-Line degasser AF) with the UV detector set at 211 nm. The analyses were preformed with a Column EC250/4.6 Nucleosil 100-5 C18 Macherey-Nagel. The mobil phase, consisting of methanol-acn was pumped at flow rate of 1.5 ml/min.

## Results and Discussion

The diclofenac (2-(2,6-dichloranilino) phenylacetic acid) nanoemulsion prepared has an average particle size of diameter of 50.76 nm with a polydispersion of 0.381

Figure No.1 Diclofenac nanoemulsion




The diclofenac (2-(2,6 diclhloranilino) phenylacetic acid) nanoemulsion presented a flux rate (expressed by median) of 2.26 µg/hour/cm2. Steady state concentration achieved of diclofenac after 24 hours were of 0.014 µg/ml (therapeutic level oral dosage: 1.5 µg/ml).

## References

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## Conclusions

The results obtained with this experiment demonstrate the possibility to use an diclofenac (2-(2,6 diclhloranilino) phenylacetic acid) nanoemulsion for joint or local effects, because of the low concentrations obtained, however the quantities obtained are enough to the purposes.

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