

# Preliminary Study of Developing Corticosteroid-loaded Nanostructured Lipid Carriers for Ocular Applications <sup>†</sup>

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<sup>†</sup> Presented at The Sixth International Meeting of Pharmaceutical Sciences (RICiFa), November 10-12, 2021, Córdoba, Argentina

**Received: 26.04.2022; Revised: 4.05.2022; Accepted: 6.05.2022; Published: 8.05.2022**

**Abstract:** The ocular corticosteroid administration is the first-line treatment of choice for different ocular disorders; however, the anatomical barriers of the eye hinder optimum drug delivery. In this work, we propose the development and characterization of nanostructured lipid carriers (NLC) as a drug delivery carrier for dexamethasone (DXM) for ocular applications. The NLC, composed of 5,5% total lipids and 5% surfactants, was prepared by ultrasonication method. First, the incorporation of a permeation enhancer in empty NLC that allows drug solubilization was studied by a mixture design study with Minitab18® to optimize the surfactant proportions. Then, the preparation of DXM-loaded NLC was carried out based on the optimized formula of empty NLC. All NLCs were characterized in terms of average particle size (APS), polydispersity index (PDI) and zeta potential (ZP), and DXM-loaded NLC by Fourier-transform infrared spectroscopy (FTIR) studies and thermal analysis. DXM-loaded NLC showed an APS of (67±3) nm, PDI=(0.13±0.01), and negative ZP (14.7±0.8) mV. Moreover, it showed colloidal stability for forty days under storage conditions at 4°C, with no macroscopic changes in appearance being observed at the end of the study. FTIR studies and thermal studies showed that there are no apparent changes in functional groups of the components, and neither did thermal changes occur during NLC preparation, respectively. Preliminary studies showed an encapsulation efficiency greater than 90%. The novel formulation is a promising cost-effective system for drug delivery in ocular therapy that could be a potential strategy to treat uveitis.

**Keywords:** nanostructured lipid carriers; dexamethasone; ocular drug delivery.

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## Funding

This research was funded by Fondo Nacional para Investigaciones Científicas y Tecnológicas (FONCyT), grant number PICT 2018-N°1834, and a grant of the Consejo Nacional de Investigaciones Científicas y Técnicas de la República Argentina (CONICET).

## Acknowledgments

The authors are grateful for the donation of lipids from the Gattefosé pharmaceutical company.

## **Conflicts of Interest**

The authors declare no conflict of interest.