CARRIER IN CARRIER: DNA-DOXORUBICIN COMPLEX SELF-ASSEMBLED WITH AMPHIPHILIC CYCLODEXTRINS AS NANOSYSTEMS FOR CANCER THERAPY †

Liliana P. Alarcón [1], Heber Andrada [2], Darío R. Falcone [2], Fernando Silva [3*], María E. Olivera [1*]

[1] Unit for Research and Development in Pharmaceutical Technology, CONICET and Department of Pharmaceutical Sciences, Faculty of Chemical Sciences, UNC, Córdoba, Argentina; liliana.alarcon@unc.edu.ar; lilipaola@gmail.com
[2] Institute for Agroindustrial Development and Health (IDAS). Chemistry Department. National University of Río Cuarto. Rio Cuarto, Argentina.
[3] Institute of Research in Physics-Chemistry of Córdoba, INFIQC-CONICET, FCQ, Department of Organic Chemistry, UNC, Córdoba, Argentina.
* Correspondence: M. E. O. eugenia.olivera@unc.edu.ar; F. S. fernando.silva@unc.edu.ar.
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Abstract:

The goal of the present work was to characterize the interaction between DNA–Doxorubicin (DNA-Dox) complex and catanionic vesicles based on amphiphilic cyclodextrins (ModCBHD) for their application as drug delivery systems. The systems were characterized by dynamic light scattering (DLS), Zeta potential (ζ), circular dichroism (CD), Emission spectroscopy, atomic force microscope (AFM), transmission electron microscopy (TEM) and drug release in two-compartment Franz cells. Fluorescence spectra, CD profile and ζ showed multifaceted interaction pathways between DNA and Dox, with ionic and intercalation interactions, trought of the amino sugar residue and the tetracene ring system of the drug, to form DNA-Dox complexes with a negative surface charge. DNA behaves as a reservoir of Dox, that is slowly released from the complex triggered the presence of ions the medium. ModCBHD-DNA-Dox complexes were formed by self-assembling in aqueous solution without introducing any subsequent steps, and exhibited around 160 nm particle size, monodisperse size distribution (PDI 0.250) and spherical shape, which could be an advantage for the enhanced permeability and retention (EPR) effect in cancer therapy. All these results demonstrated that ModCBHD can load the DNA-Dox complex and indicated the potential of the ModCBHD-DNA-Dox systems as nanocarriers to be evaluated in both in vitro cancer cell lines and in vivo tumor models.

Keywords: DNA-Doxorubicin complex; Amphiphilic Ciclodextrins; Cancer therapy; Drug delivery; vesicles.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.