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PROGRAM AND ABSTRACT BOOK

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Ilustração da Capa: Alexandre Takashi

CD.29 - Evaluation of structural changes of benzocaine-loaded, optimized nanostructured lipid carriers using SANS and Raman imaging approaches

Hery Mitsutake¹, Alessandro Delfino de Souza², Fabiano Yokaichiya³, Margaret Kazuyo Kobayashi Dias Franco⁴, Daniel Clemens³, Ben Kent³, Marcia Cristina Breitreitz¹, Lígia Nunes de Moraes Ribeiro⁵, Eneida de Paula², Heloisa Nunes Bordallo⁶

¹Department of Analytical Chemistry, Institute of Chemistry, University of Campinas (São Paulo, Brazil),

²Department of Biochemistry and Tissue Biology, Institute of Biology, University of Campinas (São Paulo, Brazil),

³Helmholtz-Zentrum Berlin, Helmholtz-Zentrum Berlin (, Germany), ⁴Nuclear and Energy Research Institute, Nuclear and Energy Research Institute (São Paulo, Brazil), ⁵Institute of Biotechnology, Federal University of Uberlândia (Minas Gerais, Brazil), ⁶Niels Bohr Institute, University of Copenhagen (Denmark)

Local anesthetics are substances that reversibly block the nerve-impulse conduction, alleviating pain without loss of consciousness. Benzocaine, a poorly soluble local anesthetic, is an ester of para-aminobenzoic acid. Several strategies of formulations can be used to improve bioavailability and decrease adverse effects of benzocaine. In this study nanostructured lipid carriers (NLC) were employed. These lipid-based drug delivery carriers have a lipid core composed of a blend of solid and liquid lipids, and a shell of non-ionic surfactant. The main aim of this work was to optimize benzocaine-loaded NLC and to investigate structural changes in these nanoparticles, under different temperatures. The ratio of excipients (cetyl palmitate, Capmul® PG-8 NF and Pluronic®F68) and benzocaine in the NLC was optimized using a 2³ factorial design with respect to the following parameters: particle size, polydispersity index (PDI) and zeta potentials. The interactions between the factors were found relevant to determine particle size and PDI. Using desirability function, the best formulation conditions were found. Structural changes in optimized NLC were observed with Small-Angle Neutron Scattering (SANS) and Raman imaging, in samples at 27, 37 and 40° C. SANS pointed the formation of lamellar structures inside the NLC, which interlamellar distances increase at higher temperature. Raman imaging showed that the incorporation of P68 and benzocaine in-between the lipids increased at higher temperatures, explaining the changes in Q values (SANS). This work shows how different scattering techniques can provide complementary information and be used together to characterize and understand the physical, chemical, and structural changes on the organization of pharmaceutical carriers in drug delivery system.

Keywords: factorial design, local anesthetic, pharmaceutical formulations

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