Asian Journal of Pharmaceutical Technology and Innovation
Abstract

In vitro and in vivo antimicrobial activity of sodium colistimethate and amikacin-loaded nanostructured lipid carriers (NLCs)

Claudia Vairo
BioKeralty Research Institute AIE, Spain.

Abstract:

Sodium colistimethate (SCM) and amikacin (AMK) are among the few antibiotics effective against resistant P. aeruginosa, K. pneumoniae and A. baumannii; however, their toxicity severely limits their use. Enclosing antibiotics into nanostructured lipid carriers (NLCs) might decrease drug toxicity and improve antibiotic disposition.

Consecuently, four SCM-loaded NLCs (SCM-NLCs) and four AMK-loaded NLCs (AMK-NLCs) were developed. In vitro activity against a wide range of clinical multiresistant isolates was evaluated and the efficacy of the most efficient formulation was finally assessed in vivo in a neutropenic murine acute pneumonia infection model caused by an extensively drug-resistant A. baumannii strain, following intraperitoneal (IP) and intramuscular (IM) routes.

Results indicated that the addition of a high pressure homogenization step allowed to work with bigger size batches and both negatively and positively charged NLCs were correctly produced. It was shown that encapsulation did not reduce drug efficacy but positive chitosan coating was discarded due to its low cost-efficiency. Negatively charged SCM-NLCs, with trehalose as cryoprotectant, were selected for their better efficacy in several bacteria strains, especially in A. baumannii. Finally, the in vivo efficacy study revealed that (-) SCM-NLCs could be administered with a dose interval of q24h (in spite of q6h for free SCM) and with a 10-fold lower dose (6 mg/kg) to achieve the same effect of the current SCM treatment dose (60 mg/kg).

In conclusion, IP (-) SCM-NLC 6mg/kg q24h could represent a promising option to fight against resistant pulmonary infections due to A. baumannii and successfully tackle the alarming AMR problem.

Biography:

Claudia Vairo has completed his industrial PhD at the age of 28 years from University of the Basque Country (UPV/EHU), in collaboration with BioKeralty Research Institute AIE. She has published 5 papers in reputed journals (Q1). She is expert in nanotechnology, regenerative medicine and antimicrobial resistance. Her investigation is recently focused on NLC nanosafety. Currently, she is Project Manager at BioKeralty research Institute AIE.

Webinar on Nanotechnology and Nanomedicine, August 24, 2020, London, UK

Citation: Claudia Vairo; In vitro and in vivo antimicrobial activity of sodium colistimethate and amikacin-loaded nanostructured lipid carriers (NLCs), Spain; Nanomedicine 2020; August 24, 2020; London, UK.