

Lipid nanoparticles as tobramycin and sodium colistimethate encapsulation alternative: towards improved anti-infective therapy against *Pseudomonas aeruginosa* infection

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Abstract

Antibiotic resistance is becoming a major threat for the society [1]. In this framework, *Pseudomonas aeruginosa* plays a major role as it is responsible for 10% of nosocomial infections leading to severe and life-threatening infections [2]. As a strategy to enhance the antimicrobial therapy against *Pseudomonas aeruginosa*, herein we developed sodium colistimethate (SCM) or tobramycin (TOB) loaded lipid nanoparticles, namely, nanostructured lipid carriers (NLC).

Lipid nanoparticles were elaborated following an organic solvent free hot-melt homogenization technique. Subsequently, NLCs were freeze dried. The nanoparticles obtained displayed a 200-400 nm size, high drug entrapment ($\approx 94\%$) and a sustained drug release profile over 48h. As TEM images showed (Fig.1.) particles were spherical and homogeneous.

Formulation	Size (nm) ^a	PDI ^a	Zeta potential (mV) ^a	EE (%) ^a
SCM-NLC	412.5 \pm 13.9	0.442	-21.97 \pm 1.72	94.79 \pm 4.20
TOB-NLC	254.05 \pm 14.50	0.311	-23.03 \pm 2.76	93.14 \pm 0.13

Moreover, the formulations were active against clinically isolated *Pseudomonas aeruginosa* as MIC test revealed, where both formulations showed a MIC value ranging from 0.5 to 1 $\mu\text{g/ml}$ (see Fig 2). Altogether, the work reported here seems to us an encouraging step towards an improved therapy against *Pseudomonas aeruginosa*.

References

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 [2] V Aloush, S Navon-Venezia, Y Seigman-Igra, S Cabili, Y Carmeli. Multidrug-Resistant *Pseudomonas aeruginosa*: Risk Factors and Clinical Impact. Antimicrobial Agent and Chemotherapy, **50** (2006) 43-48.

Figures

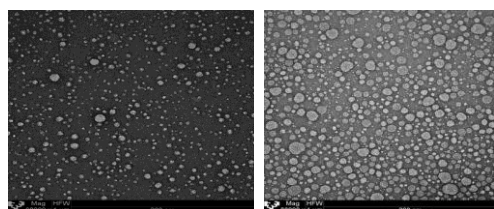


Fig. 1-SEM images, left TOB-NLC and right SCM-NLC

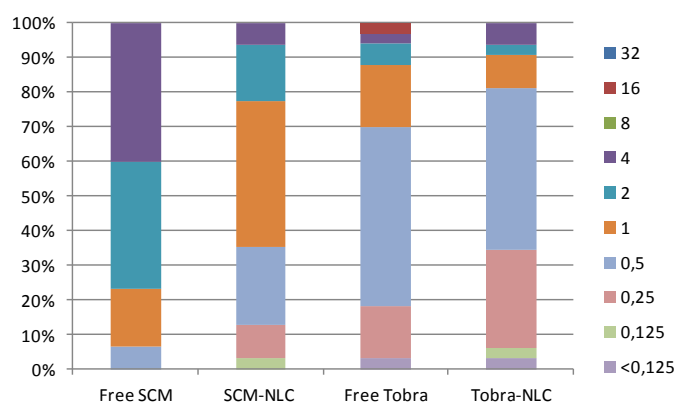


Fig.2. MIC values of free and encapsulated antibiotics in $\mu\text{g/ml}$

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