Lipid nanocapsules: Ready-to-use nanovectors for the aerosol delivery of paclitaxel

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Résumé en anglais	Aerosol drug delivery permits the development of dose-intensification strategies in severe, malignant lung diseases. The aim of the study was to demonstrate that the encapsulation of paclitaxel in lipid nanocapsules (LNCs), a novel drug nanocarrier for lipophilic components, allows one to provide pulmonary drug delivery of paclitaxel by nebulisation, thereby allowing preclinical and clinical studies. LNC dispersions are made into aerosols with commercial nebulisers. The structure, drug payload and cytotoxicity of nebulised LNCs were compared to fresh LNCs. The results demonstrated that LNC dispersions could be made into aerosols by using mesh nebulisers without altering the LNC structure. Only eFlow® rapid-produced aerosols are compatible with human use: the mean duration to nebulise 3 ml of LNC dispersion is less than 9 min, with an aerosol mass median aerodynamic diameter equal to 2.7 ± 0.1 μm and a fine-particle fraction (between 1.0 and 5.0 μm) of 81.5 ± 3.1%. No modifications of drug payload or cytotoxicity effects of paclitaxel-loaded LNC (PTX–LNC) were observed. In order to carry out preclinical studies, a scaled-up LNC formulation protocol was used. Chemical parameters, such as acidity and osmolarity, were optimised, and a storage procedure for PTX–LNC batches was set-up. Animal studies are now needed to determine the tolerance and therapeutic potential of LNC dispersion aerosols.
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