DEVELOPMENT OF LIPOSOMAL MOXIFLOXACIN BY MICROFLUIDICS: COMPARISON OF TWO MF-PLATFORMS

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ABSTRACT

Liposomes are spherical vesicles, that consist of natural or artificial lipids, which have been increasingly used for biomedical and biotechnological purposes over the past years, as a result of their drug delivery capacity. Recently, the manufacturing of liposomal drugs by microfluidic methods is intensively studied, due to the scalability of such methods and the ability to use them under GMP (good manufacturing practice) conditions. In the present study we aimed to prepare liposomal forms of the antibiotic drug moxifloxacin by means of microfluidic techniques. Two microfluidic systems were used in our study: (i) the more compact NanoAssemblr® Benchtop system (Precision NanoSystems) and (ii) the more versatile Dolomite® system for liposomal preparation. The present study explored the capability of moxifloxacin to be encapsulated in liposomal forms prepared by the two systems, their physicochemical characteristics, as well as the in vitro release profile of the liposomal forms. Our results revealed that using the two microfluidic liposome preparation systems, the antibiotic moxifloxacin can be encapsulated in liposomes, while in all cases liposome mean diameter ranged between 80-150 nm. The amount of encapsulated antibiotic (encapsulation efficiency) and the physicochemical characteristics of the prepared liposomes depend on the two major characteristics of the microfluidic systems: Flow Rate Ratio (of the aqueous and organic phases) and Total Flow Rate. Nowadays, the antibiotic moxifloxacin is used in patients during and after cataract surgery to avoid post- operative endophthalmitis. By finding the optimal antibiotic incorporation conditions in liposomes using microfluidic platform systems, the future goal is to develop a sustained release formulation of moxifloxacin with high topical bioavailability following intracameral administration, that can be manufactured under GMP conditions.

Acknowledgments

We would like to thank the Operational Programme Competitiveness, Entrepreneurship and Innovation 2014-2020 (EPAnEK) and the Special Service for the Management and Implementation of Actions in the field of Research and Technological Development and Innovation (ΕΥΔΕ ΕΤΑΚ) under the Operational Program "Competitiveness-Entrepreneurship-Innovation 2014-2020" "In the context of the" RESEARCH-CREATIVITY-INNOVATION "Action Plan to finance the present study entitled" Pre-Clinical Development of Innovative Forms of antibiotics for intracameral administration for the treatment / prevention of postoperative endophthalmitis (INNOFOR-I) "and MIS code 5031792.

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης