

AIMS AND ORGANIZATION OF THE THESIS

During the last decades, pharmaceutical technology has taken the advantage of the advent of nanotechnology and, nowadays, new pharmaceutical dosage forms are under development to deliver many physicochemically different drug molecules.

The present thesis aimed to study the promising potential of the novel lipid nanoparticles, i.e. solid lipid nanoparticles (SLN) and nanostructured lipid carriers (NLC), as new drug delivery systems for antifungal agents. To test their suitability as carrier systems within the scope of topical and dermatological purposes, intensive investigations using semi-solid formulations have also been performed.

In the present thesis two different imidazole antifungals (clotrimazole and ketoconazole) have been used as model drugs for the study of the topical features of aqueous SLN and NLC dispersions. Once the poor solubility of the drug in the carrier matrix results in a low affinity of the molecule for the carrier and, therefore, poor *in vivo* bioavailability, different lipid matrices have been chosen according to the solubility of the selected drugs in several lipids. This research project was also designed to assess the possibility to develop SLN- and NLC-based semi-solid formulations using a well established hydrogel as topical vehicle. Investigations included the production and optimisation of the physicochemical properties of the colloidal systems containing clotrimazole and after their entrapment into carbomer-based hydrogels.

Concerning the organization of the different subjects, the thesis has been divided into six main chapters. A review of the state of the art is provided in the chapter 1, where several examples of drugs, active ingredients and macrocyclic skeletons incorporated into lipid particles are given. Chapter 2 comprises a review of the physiological characteristics of topical and dermatological routes, the main aspects related to drug transport across these routes and the detailed description of the innovative lipid carriers in terms of morphology, production procedures and related stability problems. The materials and methods used to characterize the developed formulations are described in the chapter 3. The development and the characterization of clotrimazole and ketoconazole loaded lipid nanoparticles are provided in chapter 4. Chapter 5 is related to the development and characterization of SLN- and NLC-based semi-solid formulations, and chapter 6 is devoted to the main conclusions of this research project and opens the perspectives for further investigations related to this area.