

ABSTRACT

The habilitation thesis entitled "**Contributions to the development of new pharmaceutical formulations for skin application to increase the release and dermal permeation of some drugs**" is a synthesis of the my scientific, professional and academic research activity after the defence of the PhD thesis in 2004, entitled "*Formulation and evaluation of the action of multiple H/L/H emulsions with piroxicam*" - science advisor Prof. Ph.D. Popovici Adriana, U.M.F. Tîrgu-Mureş and the conferring of the title of *Doctor of Medical Sciences – Pharmacy domain*, by the Order of the Minister of Education and Research no. 4450/02.08.2004.

The thesis is written in accordance with the CNATDCU recommendations and the legislation in force and includes the academic, scientific and research career development plan, as well as the main research directions.

The scientific research carried on in the postdoctoral period followed two research directions presented in the second chapter of this habilitation thesis, addressing the field of the pharmaceutical forms for skin application and the aspects related to the preformulation of topical preparations in order to optimize the solubility of poorly water-soluble drugs. The starting point for these two main research directions were the results that have been obtained from my research activity and concretized by published articles in specialized journals.

The first research direction entitled "*Scientific achievements in the field of pharmaceutical forms for skin application*" addresses the most important research on the development of innovative dermal formulations for increasing the release and percutaneous penetration of lipophilic drugs, and of some hydrophilic beta-blockers used for the local treatment of infantile hemangiomas. Thus, the development of new gelled L/H microemulsions for fluconazole dermal delivery and of novel chitosan-based hydrogels and co-solvents as potential promoters for percutaneous permeation of fluconazole, as well as innovative biocompatible topical hydrogels based on chitosan/hydroxypropyl methylcellulose, containing 2% fluconazole and various natural absorption promoters (sucrose esters and essential oils), were approached. Studies have also been conducted on the development of new loratadine loaded L/H gel microemulsions, as well as the potential of cosolvents and terpenes as promoters for dermal penetration of tenoxicam, from hydroethanolic hydrogels based on carbomer or hydroxypropyl methylcellulose.

Most of the studies on increasing the percutaneous penetration of propranolol hydrochloride and metoprolol tartrate by formulating gelled L/H microemulsions was achieved thanks to the funding obtained for the *Research Project no.11450 / 01.10.2015*, - "*Studies on the development of some topical gels with beta-blockers as modern, safe and effective methods of treatment of infantile hemangiomas*" - in which I participated as project director. In this research project, studies have been carried out to increase the percutaneous penetration of the two beta-blockers from hydrogels, by using absorption promoters in their formulation and by formulating gelled L/H microemulsions.

The researches in the field of *pharmaceutical forms for skin application* has also addressed other topics of interest such as:

- studies on the influence of the composition of the receptor media on the kinetics of the *in vitro* release of some drug substances from pharmaceutical preparations through synthetic membranes, using vertical diffusion cells;

- rheological development and characterization of new hydrogel bases containing co-solvents, in order to obtain ointments with dissolved poorly water-soluble drugs.

The second research direction entitled "*Scientific achievements in the field of preformulation of topical drugs to enhance the solubility of substances poorly water-soluble*" includes the results obtained in the studies on increasing the water solubility ofazole-derived antimycotics by co-solvation, complexation and micellar solubilization, as well as the applicability of the co-solving method in case of some oxicams.

The last part of the second chapter contains two subchapters, one dedicated to scientific achievements in the post-doctoral experience, and the second one on academic and professional achievements.

The development plan of my university career follows two main directions: the didactic and the scientific activity, to be permanently improved in order to obtain the best results in the field of Pharmaceutical Technology.

Future development of my professional, scientific and academic activities are described in the third chapter of this habilitation thesis.

Postdoctoral research has been marked by my editorial and publishing concern that is supported by the 32 articles published in extenso in ISI-indexed journals and over 16 articles published in extenso in BDI-indexed and other specialized journals, 50 abstracts (of which 7 in ISI-indexed journals) and 1 patent application filed with the OSIM under evaluation, 2 chapters in treaties published abroad, 6 specialized books (course lecturers and laboratory supports) on Pharmaceutical Technology, editor of a study support for the internship of the 5th year students. My academic activity is also sustained by the 82 bachelor and master dissertations that I supervised.

The last part of the habilitation thesis contains the main bibliographical references used both in describing the current state of knowledge and in order to support the results presented in the thesis chapters.