UNIVERSITATEA DE MEDICINĂ ŞI FARMACIE
„CAROL DAVILA" BUCUREŞTI
ŞCOALA DOCTORALĂ
DOMENIUL FARMACIE

DEZVOLTAREA ŞI EVALUAREA UNOR SISTEME TERAPEUTICE SOLIDE

REZUMATUL TEZEI DE ABILITARE

CANDIDAT:

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Disciplina Tehnologie farmaceutică și Biofarmacie

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ABSTRACT

The habilitation thesis entitled "The development and the evaluation of some solid therapeutic systems" comprise an important part of my academic achievements realized after obtaining the Ph.D. title, in 2011. It is organized into four main chapters, according to my achieved educational, professional and scientific activities.

The **first chapter** describes my educational accomplishments in the Pharmaceutical Technology and Biopharmacy discipline, which include the teaching activities for the Faculty of Pharmacy students in the first, third, fourth and fifth years of study, my involvement in the students' scientifical and practical activities, coordination of undergraduate theses (185 theses in total), organizing and supporting courses for first-year residents in the General Pharmacy specialization, and tutorial activities for the students and residents. I participated, as a co-author, in developing several specialty books that are addressed both to students and residents, as well as to professionals in pharmaceutical practice. Some of the published books were awarded at different pharmaceutical events. Between 8 and 12 May 2017, I was an invited professor at the Faculty of Pharmacy in Belgrade, Serbia, by being awarded a CEEPUS Mobility Grant at the University of Belgrade, Faculty of Pharmacy, Department of Pharmaceutical Technology, within the FREEMOVER 104260 program, to teach specific courses in the field of cyclodextrins for students, Ph.D. students and teachers of the Department of Pharmaceutical Technology.

The **second chapter** is dedicated to my professional preoccupations in the pharmaceutical community. I developed and supported 2 postgraduate courses with annual frequency, starting from 2008, ("Bioavailability of drugs" - period 2008 - 2016 and "Formulation and evaluation of pharmaceutical preparations containing inclusion complexes of various active ingredients in cyclodextrins" - from 2017 to the present) addressed to the graduates of the faculty of pharmacy, regardless of the field in which they exercise their activity: community pharmacy, hospital pharmacy, pharmaceutical industry, analytical laboratories and even the university environment, as well as doctors, chemists or biologists. During the activity, I participated in the scientific and organizing committees of several congresses and national conferences, and I presented several oral presentations of great interest to the entire pharmaceutical community. The professional pharmaceutical activity plan also included the publication of some scientific articles addressed to

professionals in the pharmacy field and those in the medical field, with which we want to strengthen an interdisciplinary relationship.

The **third chapter** presents my scientific achievements in three of the main research directions based on the most relevant publications.

The *first research direction* is dedicated to obtaining, identifying and characterizing inclusion complexes of different active ingredients in several types of cyclodextrins. The objectives of the studies in this scientific field are the preparation of inclusion complexes by different methods: in the solid or liquid state, confirming the formation of inclusion complexes, respectively establishing the degree of inclusion, partial or total, characterization of the complexes obtained by comparison with a simple physical mixture prepared in the same molar ratio, using the following methods: scanning electron microscopy (SEM), IR spectroscopy (FT-IR), differential microcalorimetry (DSC) and X-ray diffraction, selecting appropriate cyclodextrins to achieve meaningful inclusion, establishing the most effective method of obtaining, which ensures the achievement of a higher degree of inclusion. The research carried out within this direction was concretized in 8 ISI-indexed articles, of which I am the main author in 7.

The *second research direction* exhibits the tablets' preformulation and formulation studies. The analyses include 1) the evaluation of particle size distribution that provides valuable information on the flow and compression behaviour of the powder and also influences the content uniformity and disintegration ability of the tablets; 2) the determination of flowing time, angle of repose and flow rate, essential properties for complete die filling, inherent for uniform tablet dosage, and also relevant for predicting manufacturing problems; 3) the assessment of volumetric characteristics, needed to appreciate the behaviour of a material in the compression process and provide useful information on powder flowability and cohesiveness; 4) the measurement of the moisture content which influences the physical properties of the substance such as: weight, density, viscosity, refractive index, electrical conductivity and others. The research carried out within this direction was concretized in 11 ISI-indexed articles, and I had the quality of the main author in all of them.

The *third research direction* shows the development and evaluation of different solid pharmaceutical forms, and is divided into three subdivisions: 1.) orodispersible tablets; 2.) Fast-release tablets based on solid dispersions obtained by hot extrusion; 3.) Mucoadhesive oral films. Each section provides data regarding the manufacturing process and the results of the specific

quality control performed. The research carried out within this direction was concretized in 12 ISI-indexed articles, and I had the quality of the main author in all of them.

The **fourth chapter** displays my future university career plans, following the three main activity domains: scientific, educational and professional. Regarding the research topics, I plan to cover innovative themes such as: 1) new technologies for obtaining inclusion complexes in cyclodextrins and their incorporation into pharmaceutical forms (e.g. loading of cellets with solutions of inclusion complexes); 2) improving the process of drugs 3D printing; 3) obtaining gels that present different structural characteristics depending on the temperature; 4) development of semi-solid and solid therapeutic systems with the S-form of ibuprofen; 5) formulation and preparation of new micro- and nano-encapsulated pharmaceutical forms.