

**"VICTOR BABEȘ" UNIVERSITY OF
MEDICINE AND PHARMACY TIMIȘOARA
DOCTORAL SCHOOL
PHARMACY DOMAIN**



**EVALUATION OF BIOLOGICAL ACTIVITY,
CHEMICAL CHARACTERIZATION AND
DEVELOPMENT OF MODERN PHARMACEUTICAL
SYSTEMS FOR TOPICAL DELIVERY OF SOME
SYNTHETIC AND NATURAL BIOACTIVE
COMPOUNDS**

ABSTRACT

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The habilitation thesis entitled **"Evaluation of biological activity, chemical characterization and development of modern pharmaceutical systems for topical delivery of some synthetic and natural bioactive compounds"** provides insight into my academic, scientific and professional career, revealing in brief the most important scientific research and teaching activities in the field of Pharmacy carried out at "Victor Babeș" University of Medicine and Pharmacy after successfully defending my Doctoral thesis (in February 2010) entitled *"Contributions to the toxicity study of substances by means of quantitative structure-activity relationships"* - scientific advisor Prof. Ph.D. Kurunczi Ludovic, Romanian Academy Timișoara branch, and obtaining the title of *Doctor in sciences*, by the Order of the Minister of Education and Research no. 4542/28.07.2010. The habilitation thesis is structured in accordance with the National Council for the Recognition of University Degrees, Diplomas and Certificates recommendations and the legislation in force, being divided into four sections: Scientific achievements, Academic achievements, Professional activity, and Academic and Scientific Perspectives.

The first chapter of this habilitation thesis describes in a synthetic manner the most relevant postdoctoral Scientific achievements, which were focussed on three research directions, each of them being presented in separate subchapters.

The first direction of scientific research entitled "Applications of QSAR/QSPR studies in chemical risk assessment and drug discovery", was a continuation of doctoral studies on the basis of the expertise accumulated during this period. This scientific direction addresses the development of QSAR/QSPR models with predictive ability both for environmental and industrial risks/toxicity assessment, as well as for optimization and development of new bioactive compounds, by performing several studies of quantitative structure-activity/property relationships (QSAR/QSPR) in different series of organic compounds. Several molecular descriptors, such as compressibility and ovality van der Waals descriptors, were used to obtain QSAR models that accurately describe the aquatic toxicity of aliphatic ester and amine compounds, and respectively QSPR models predicting the vapour pressure of saturated hydrocarbons. Also, some molecular, constitutional and topological descriptors proved to be useful to the development of QSAR models for predicting the activity of novel bioactive compounds in several classes of drugs, namely sertindol derivatives as atypical antipsychotics, tri-substituted thiazoles as antimicrobics and camptothecins derivatives as anticarcinogenics. The results were published as *in extenso*

articles in three ISI indexed journals and presented as poster or oral presentations (7) at national pharmaceutical congresses and conferences. Also, I have contributed as co-author to two book chapters published in this field of research by international publishers.

The second research direction approached during the postdoctoral period was focussed on chemical characterization and valorization of therapeutic potential of some natural products and reveals also my interest and engagement for professional collaborations, since the respective studies were performed by interdisciplinary working groups from Faculty of Pharmacy of the "Victor Babeş" University of Medicine and Pharmacy Timișoara. These studies were aimed to determine the content of bioactive components (ie. flavonoids, polyphenols, terpenes, adamantan derivatives, piperidine derivatives, etc.) of different herbal preparations (mainly ethanolic extracts) obtained from various natural products or medicinal plants, as well as their biological/therapeutical activity. Some of the studies have also investigated the content of natural elements/contaminants of different medicinal and aromatic plants of interest for human health. Further, the potential use of a beta-cyclodextrin hydrophilic derivative for the encapsulation of complex extracts (ie. propolis ethanolic extracts) was studied in order to increase the hydrosolubility and chemical stability of their specific bioactive components. The scientific results were disseminated through 9 ISI-indexed papers, for five of them I am the main author.

The third research direction has been focussed on formulation design and characterization of topical semisolid preparations containing synthetic and natural bioactive compounds, targeting modern strategies to improve drug solubility and dermal penetration/permeability, and biocompatibility/safety of preparations. Within this direction, the research activity was carried out together with colleagues from our faculty, in form of a long-term scientific collaboration based on complementarity in terms of skill and knowledge. The results of these studies were published in ten ISI indexed articles, for five of them I am the main author, and also presented as numerous posters or oral communications at national and international scientific events and published in abstracts volumes.

The second chapter of this habilitation thesis presents my Academic achievements covering 24 years of teaching activities at the Faculty of Pharmacy in the field of Toxicology, Analytical Chemistry, Organic Chemistry and Technical-medical products for the pharmacy students in their second and third years of study, as well as for the pharmaceutical assistants students in their first and second years of study. I have also been involved in the student's scientific activities, as scientific advisor for 35 undergraduate theses and several student's scientific works. Moreover, I have organized and supported

courses and practical activities for postgraduate students, including the residents in the *Pharmaceutical Laboratory* specialty (currently named *Medical-Pharmaceutical Laboratory Analysis* specialty) as coordinator, the first-year residents in the General Pharmacy specialty and the students at *OTC drugs, dietary supplements, cosmetics* Master program. The transfer of high quality knowledge to both undergraduate students and postgraduate students has been the main goal of this activity, which is supported by the six teaching materials elaborated as co-author. It is also to be mentioned my involvement in the postgraduate educational activity by proposing continuous professional training courses for pharmacists and by supporting the doctoral students in their scientific activity as member of several guidance committees. It can be also considered an academic achievement the expertise I acquired as a result of my participation in admission and graduation exams, and in competitions for filling teaching positions in higher education, as member of admission/competition committees, as well as through my activity as President of CEACE and as member of the Faculty Council, of the Department Council and of standing faculty committees.

The third chapter of the habilitation thesis, concerning the professional activity, illustrates my professional career, which includes obtaining the title of specialist pharmacist and primary pharmacist in the specialty of *Pharmaceutical Laboratory*, as well as the master's diploma upon graduation from the master's university study program *Pharmacotherapy Management in the Elderly*.

The career development plan, which covers my professional, academic and scientific research activities, is summarised in the fourth chapter of this habilitation thesis. The objectives and strategies of the career development plan established to improve these activities include: continuous training, which involves the acquisition of new skills and the accumulation of new specialty knowledge by participating in scientific events, accessing to postgraduate courses and programmes of internships for scientific training; attracting funds by submitting projects to national and international competitions; building long-term partnerships/collaborations with other disciplines/universities or economic agents; continuing ongoing studies and addressing new research topics; improving continuously the quality of educational activities by updating and developing educational resources and using new teaching methods.

This habilitation thesis concludes with a list of bibliographical references used in the writing, followed by a list of the titles for 10 representative scientific papers.