

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



**NEW HORIZONS IN ANTI-INFECTIVE
TREATMENT: FROM ANTIBIOTIC RESISTANCE TO
NEW COMPOUNDS WITH ANTIMICROBIAL ACTIVITY**

ABSTRACT

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My name is Delia Muntean and I graduated from “Victor Babeș” University of Medicine and Pharmacy Timișoara in 1999, afterwards I continued my education and research activity starting as PhD student at the same university, the main research field being related to the bacterial resistance in hospital acquired urinary tract infections.

The habilitation thesis describes my scientific, academic and professional achievements from 2007 (the year when I defended my PhD thesis entitled *The importance of interpretive antibiogram and genotyping in assessing the resistance profile to anti-infectious chemotherapy of isolated bacterial strains in urinary tract infections* - under the coordination of Prof. Dr. Roxana Moldovan) to date, as well as my plans and perspectives for the next years.

The thesis *New horizons in anti-infective treatment: from antibiotic resistance to new compounds with antimicrobial activity* has been written according to the recommendations of the Ministry of Education and Research (Order 3121/27.01.2015) as well as the Guideline of how to write and to structure the Habilitation Thesis in "Victor Babeș" University of Medicine and Pharmacy Timisoara based on CNATDCU recommendations.

This paper is structured in four parts: (i) the first part is dedicated to scientific activity, (ii) the second part is dedicated to academic activity and academic achievements, (iii) the third part is dedicated to professional activity and (iv) the last part includes the academic career development plan.

After completing my doctoral studies, I started working on various projects and participated as an investigator in five clinical trials. I won a research project through competition and participated as a member in two other projects.

My research work was published in 43 papers indexed in Clarivate's Web of Science (40 in extenso papers and 3 proceeding papers or meeting abstracts), 14 of these articles being awarded by UEFISCDI. In May 2021 I had a Hirsch Index of 11 in Web of Science, having a total of 533 citations and an index of 13 in Google Academic, with 1458 citations. My research results were published in 24 distinct journals (18 indexed in Clarivate's Web of Science) with high impact on the scientific community, this statement being demonstrated by the fact that the cumulated impact factor of the published papers in which I was the main author is 36.082 (16 articles).

All of the research work was done in multidisciplinary teams, mainly including pharmacists, intensive care specialists, internists, surgeons, dentists, biostatisticians, biochemists, biologists from “Victor Babeș” University of Medicine and Pharmacy Timișoara, Banat’s University of Agricultural Sciences and Veterinary Medicine “King Michael I of România”, Polytechnic University of Timișoara, Polytechnic University of Bucharest, The National Institute of Research and Development for Biological Sciences Bucharest and Department of Natural Sciences, Middlesex University London. Currently, my research activity unfolds into two advanced research centers: *Multidisciplinary Research Center on Antimicrobial Resistance (MULTI-REZ)* and *Pharmacotoxicological Evaluations Research Center (FARMTOX)* of “Victor Babeș” University of Medicine and Pharmacy Timișoara.

I was involved in scientific research in the areas of hospital acquired infections and antimicrobial resistance and, at the same time, investigating various bioactive molecules for their antimicrobial activity. The main purpose of my entire activity was to increase the efficacy of the anti-infective treatment, being carried out in two main research areas: investigation of bacterial multidrug resistance and evaluating the antimicrobial activity of some new compounds.

In the first stage of my postdoctoral research activity I studied the molecular characterization of extended spectrum beta-lactamase producing *Escherichia coli* and *Klebsiella pneumoniae* strains isolated in Western Romania, as part of the project named *Study of the molecular determinants of the multiresistance of the nosocomial and community bacterial strains in South-Western Romania*.

Another approach to the topic of antibiotic resistance was to assess the use and costs involved, from both medical and economical point of view.

Bacterial multidrug resistance is particularly common in Gram-negative bacilli, with important clinical consequences regarding their spread and treatment options. For this reason I assessed the risk factors for acquired multidrug resistance, I evaluated the local trend in terms of multidrug resistant Gram-negative bacilli and I investigated a novel method for rapid detection of these bacteria's resistance.

Other research line was represented by the study of the antimicrobial activity of some natural or synthetic compounds. Over the last 6 years (2014-2020), I have been

studying the antimicrobial activity of some new compounds, looking for standards, testing methods and improving methodology with each new study. Among the studied compounds were: the isoflavonoid genistein; a benzylamide derivative of maslinic acid (natural compound belonging to the group of triterpenes, included in the class of oleananes); chamomile, parsley, celery alcoholic extracts; different meso-porphyrin derivates; polyurethane nanostructures incorporating pentacyclic triterpenes and essential oils.

In the second chapter I presented academic achievements describing the career development from associate assistant professor to associate professor, detailing the duties I had, from Microbiology lectures for students to other educational activities such as coordinating dissertation and diploma thesis of students or involvement in the organisation of "Medis" International Congress for Medical Students and Young Doctors. The courses for students and resident physicians, books dedicated to antimicrobial resistance and postgraduate courses having as main topic the treatment of infections caused by multidrug-resistant bacteria have been mentioned in this part of thesis.

Furthermore, I'm involved in the academic publishing activity, being currently reviewer for 17 journals, from which 13 indexed in Clarivate's Web of Science. At the same time, I'm a member in four editorial boards of scientific medical journals. In addition, in this year, I accepted MDPI proposal and I am Guest Editor for Symmetry (an international and interdisciplinary scientific journal indexed in Clarivate's Web of Science, IF 2.713), for the Special Issue: *Microbiology, Human Pathogens and Antibiotics – an Asymmetric Challenge*.

In parallel with the academic activity, I am a medical doctor, specialized in Laboratory Medicine and Medical Microbiology. I am currently a primary doctor in the Bacteriology Department of the Central Laboratory of "Pius Brînzeu" County Clinical Emergency Hospital Timișoara and member of the Committee for Prevention of Healthcare Associated Infections in the above mentioned hospital.

In the last chapter I presented the envisioned development of my academic and scientific career, emphasizing the importance of team work and multidisciplinary

involvement on research projects. I also intend to use my skills for the development of future teams of dedicated researchers.

In the long term, in line with the research topics presented, I will continue my work based on the framework established within Microbiology Department, as well as in the research group of the „Victor Babeş” University of Medicine and Pharmacy, Timișoara.

The reference list and the list of ten representative scientific papers ends this habilitation thesis.