

UNIVERSITATEA TITU MAIORESCU DIN BUCUREȘTI

ȘCOALA DOCTORALĂ – DOMENIUL MEDICINĂ

**BIOCHEMICAL AND
ANTIMICROBIAL INSIGHTS INTO
LACTIC ACID BACTERIA AND
PATHOGENIC MICROBIAL
SPECIES**

**HABILITATION THESIS
SUMMARY**

CANDIDATE

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Habilitation thesis entitled **"Biochemical and antimicrobial insights into lactic acid bacteria and pathogenic microbial species"** represents most part of my scientific, professional and academic researches after PhD was finished. This thesis is based on interdisciplinary studies to biochemistry and molecular approaches of lactic acid bacteria related to the resistance and virulence capacity of some pathogen microbial species as well as those regarding the antimicrobial potential of some non-steroidal anti-inflammatory drugs.

The topic is of particular importance in the current context in which some pathogenic and potentially pathogenic microbial species may present a remarkable virulence and an increased resistance to specific antimicrobial treatment.

The habilitation thesis is structured according to the recommendations of CNATDCU and includes three sections in which aspects related to scientific, professional and academic achievements from the moment of obtaining the title of PhD in Biology to the present are presented, as well as the plans for the development of the academic, professional and scientific career.

1. The scientific, academic and professional activity

In 1997 I graduated from the Faculty of Chemistry of the University of Bucharest, specializing in Biochemistry. The PhD period (2006-2009) was dedicated to the advanced research topic **"Molecular and taxonomic studies on some species of pathogenic yeasts *Candida albicans*"** under the coordination of Prof. PhD Călin Tesio from the Doctoral School of Biology of the University of Bucharest.

I am currently associate professor in the Department of Preclinical Disciplines at the Faculty of Medicine of the Titu Maiorescu University of Bucharest, with teaching activities in Biochemistry for students in the Medicine and Dentistry programs. So far I have been involved in various interdisciplinary research areas and have collaborated with colleagues from different medical specialties such as pulmonology, gastroenterology, anesthesiology, infectious diseases, laboratory medicine, microbiology, genetics, gynecology.

The sustained scientific research activity that I have continued after the PhD thesis until now has materialized through: **publication of 39 articles in ISI Web of Science journals** as main or co-author, **3 articles in ISI indexed journals, 20 articles in BDI indexed journals and Hirsch Index -12.**

2. Research topics

During the last years I was involved in interdisciplinary research studies and a part of them are found in this thesis. The most important studies were regarding to:

2.1. Antibacterial potential of some lactic acid bacteria species

One of the alternatives to conventional treatments in the case of microbial infection is the use of probiotic products. The antimicrobial activity of lactic acid bacteria on selected pathogenic strains was tested and it was found that most of the lactic acid bacteria analyzed showed high antimicrobial activity against both bacterial and pathogenic yeast strains. This was mainly correlated with the production of organic acids, and the biosynthesis of bacteriocins.

2.2. Biochemical characteristics of resistance and virulence patterns of some pathogenic microbial species

Our results suggest the isolated strains from the hospital environment and from patients with surgical wound infections harbour multiple drug resistance and virulence determinants, raising the need for the implementation of screening and intervention measures for the prevention of infections with MDR (multi-drug resistant) and virulent strains occurred in hospitalized patients. The results showed incidence and antibiotic drugs resistance of bacterial strains in hospitalized patients with urinary tract infections. Most of these belong to *Escherichia coli* species and have a great resistance to antibiotic drugs. To avoid enterocolitis caused by *Clostridium difficile* species, it is recommended to limit the long-term administration of antibiotics which determine an imbalance of the normal intestinal flora.

2.3. Non-steroidal anti-inflammatory drugs and *Candida albicans* species

The antimicrobial activity of some anti-inflammatory drugs (diclofenac, ibuprofen) was investigated, and results have shown that sodium diclofenac and ibuprofen in association with fluconazole and ketoconazole induced growth inhibition of *C. albicans* strains. In the case of oropharyngeal infections, most of the *Candida* isolated species were resistant to ketoconazole, itraconazole and fluconazole and in the case of isolated species from vaginal infections the resistance was increased in the case of fluconazole, itraconazole and ketoconazole, in different percentages compared to oro-pharyngeal site. Some species of fungi are naturally resistant to different types of antifungal medication. Anti-inflammatory drugs in association with azole compounds exhibited a strain specific effect of a *C. albicans* strain which became more sensitive to fluconazole and ketoconazole in the presence of some non-steroidal anti-inflammatory drugs.

3. Scientific, professional and academic development plans

My vision of scientific research is shaped along several fundamental directions: publishing specialized books, publishing scientific articles in prestigious journals, active involvement in research activities of the Faculty and the Doctoral School of Medicine identification of research opportunities and active participation in various peer teams or inter/transdisciplinary teams. In the future, I wish to continue to develop professionally in the field of Medicine, regarding Clinical Biochemistry. My future research plans involve some research studies about lipids and lipoprotein metabolism in sepsis and brain-gut axis related to probiotic microbial species in which I intend to involve my future PhD-students.

From a professional and academic point of view, one of my priorities will be to participate in as many refresher courses as possible, because the teaching profession requires keeping up to date with the latest developments in the field. The current teaching approach is to promote student-centered education through the application of interactive teaching and learning methods. I aim to co-opt students and PhD students into the Faculty's interdisciplinary research circles. I will also coordinate undergraduate students in the development of their dissertations and PhD students in research studies.