

ABSTRACT of HABILITATION THESIS

The habilitation thesis includes the most important scientific achievements after the doctoral thesis. The studies presented in this thesis were carried out within 2 ERA-NET research projects and 3 other projects funded by UEFISCDI. The scientific activity includes studies in the field of experimental medicine, but also the testing of innovative treatments on various experimental pathology models performed on laboratory animals and *in vitro* models. Most studies are in the field of experimental models of infectious diseases, but there is also a chapter of contributions in the field of bone regeneration.

The thesis is structured in two parts, *the first part* includes a selection of the most relevant research directions, also presenting the teaching, research and professional recognition activity, and *the second part* presents the scientific, professional and academic development plan.

The first part is structured into three chapters.

Chapter 1.1 "Scientific and professional achievements" includes:

Subchapter I entitled "*Bone tissue regeneration and contributions to the osseointegration of innovative medical devices*" includes the results obtained within the international project called "*Antimicrobial nano-functionality of peptide-enriched silk fiber matrices to prevent bone infections and enhance implant osseointegration in orthopedics and dentistry*" (acronym ANNAFIB), funded within the EuroNanoMed III Joint Translational Call research consortium. The aim of the project was to develop and verify nanofunctionalized structures based on fibrin and small amounts of antibiotics loaded on dental implants. Verification of their efficacy was done *in vitro* and *in vivo* on animal models of osteomyelitis and peri-implantitis. The Cantacuzino Institute team, with me being responsible for the project, created experimental animal models and analyzed the effectiveness of the treatment. The main experimental directions were the evaluation of the reproduction of intramedullary and intratrabecular osteomyelitis in rabbits using a bacterial strain of *Methicillin-resistant Staphylococcus epidermidis* (MRSE), osseointegration studies of the Zimmer Dental Metal implant, the evaluation of innovative treatment in the prevention of acute osteomyelitis and in the treatment of chronic osteomyelitis induced by MRSE in rabbits, and the evaluation of nanofunctionalized antibiotic treatment in peri-implantitis induced by oral contamination with *Aggregatibacter actinomycetemcomitans* (A.a) in sheep.

Subchapter II entitled "*Animal models for bone infections and the establishment of preventive and curative measures to enhance the phenomenon of bone regeneration*" includes results obtained within the research projects - *Complex projects carried out in CDI consortia PN-III-P1-1.2-PCCDI-2017-0728 Integrated project for the development of technologies dedicated to advanced medical treatments, TERAMED, 2018-2021 and Exploratory Research Projects - PCE-2011 call PN-II-ID-PCE-2011-3-0953 "Evaluation of an original alternative for the treatment of osteomyelitis using an experimental animal model, 2011-2016*. In both projects I was a member of the project and the coordinator of the animal testing activity. The chapter describes the validation of the reproduction of osteomyelitis in rabbits using a human *Methicillin-resistant Staphylococcus aureus* (MRSA) strain and the evaluation of the effect of treatment with Immunoglobulin Y and copper ions in the human osteomyelitis model reproduced at rabbits.

Subchapters III entitled "*Animal models for testing the efficiency of biomaterial-coated implants and innovative materials in bone regeneration processes*", describe the creation of animal models for testing biomaterial-coated implants that enhance bone regeneration and evaluating the efficiency of various biomaterials to increase bone regeneration capacity. All activities included the creation of animal models, the application of biomaterials, then the evaluation of their efficiency through clinical, imaging and histological evaluation. The scientific activity was carried out within the research projects *Joint Applied Research Projects - PCCA-2011 call, Type 2, PN-II-PT-PCCA-2011-3.2-0885 Bioactive injectable macroporous biomaterials for bone regeneration, 2012-2016, SMART BIO-BONE, Joint Applied Research Projects - PCCA 2013 - call PN-II-PT-PCCA-2013-4-0855, Improving the properties of biomedical implants through surface nano-architecture and antibacterial protection, ALNANOACT, 2014-2017 and Complex projects carried out in CDI consortia PN-III-P1-1.2-PCCDI-2017-0728 Integrated project for the development of technologies dedicated to advanced medical treatments, TERAMED, 2018-2021.*

Subchapter IV entitled "*Creation of new animal models for the evaluation of nanopharmaceutical products against bacterial infections in central nervous system*" describes the results obtained within the research project "*Developing novel nanopharmaceutics against bacterial infections at center nervous system - COFUND-ERANET EURONANOMED 3-ANTINEUROPATHO – 2022-2025*" where as Project Director/Partner Responsible together with the team of researchers from Cantacuzino Institute I created models of bacterial meningitis induced by *Neisseria meningitidis* and neuroborreliosis induced by *Borellia bavariensis*. I analyzed the bacterial strains involved in the project in creating the models, I tested *in vitro* and *in vivo* the efficiency of the treatments proposed by the consortium colleagues, their biodistribution and toxicity.

My main research directions were:

- Creation of experimental models for *in vivo* studies
- Studies of the effectiveness of various medicinal products on experimental animal models
- Biocompatibility studies for various medical devices, dental implants, various biomaterials
- Preclinical studies for various medicinal products in the testing phase
- Biology, pathology and welfare of laboratory animals
- Ethics of animal experimentation

Chapters 1.2 and 1.3 describes my teaching, research, professional development activity as well as professional recognition/prestige.

My teaching activity took place within the "Spiru Haret" University, Faculty of Veterinary Medicine, and the USAMV Bucharest, Faculty of Veterinary Medicine.

Within the "Spiru Haret" University, Faculty of Veterinary Medicine, starting with the 2017/2018 academic year, I teach the course "Professional Ethics and Deontology" as the course holder. The discipline is mandatory, and within it I teach both the seminar papers and the course.

Also since the 2017/2018 academic year, I have been teaching at the "Spiru Haret" University, Faculty of Veterinary Medicine, the discipline "Biology, breeding and pathology of laboratory animals", a discipline that was mandatory until last year and optional this year. I carry out both the course and the laboratory activity.

Within the USAMV Bucharest, Faculty of Veterinary Medicine, I taught the course and practical works in the discipline "Biology and pathology of laboratory animals" in the Romanian

language section in the 2022/2023 academic year. The course was optional, and the practical activities were carried out within the Experimental Medicine Center of the Faculty of Veterinary Medicine.

The books and teaching materials developed as a single author or in collaboration are 10 in number (3 course textbooks, 4 practical work guides, a monograph and 2 specialized books). I have also published 2 chapters in an international bioethics handbook.

Integrated with the teaching activity, I coordinated practical activities of students, experimental activities in 8 doctoral theses, I participated in doctoral committees and professional competitions.

The research activity was carried out within the framework of national and international competitive research projects, as project director/partner responsible or project member in 7 international projects (3 project director/partner responsible), 33 national projects (3 project director/partner responsible). I have participated and participate in other types of research projects such as national projects such as NUCLEU (9 grants awarded by the Ministry of Research), national projects such as PSCD (3 sectoral research-development projects - grants awarded by the Ministry of National Defense), research-development contracts, etc.

The research activity is embodied in a number of 29 articles/studies published in ISI indexed/quoted journals (with a cumulative impact factor of 78.32), of which 12 as lead author, 67 articles/studies published in internationally journals indexed in other international databases and in national journals recognized by CNCSIS, 151 studies (presentations/abstracts) published in volumes of scientific events recognized in the country and abroad (with/without ISSN or ISBN), of which 3 in Conference Proceedings and 22 in ISI indexed volumes/journals., 3 patent applications.

As a professional recognition, I mention that the articles in which I am lead author or co-author have been cited in 140 ISI-indexed articles, 37 citations in articles published in BDI journals, 32 citations in doctoral theses, dissertations, book chapters.

h-index is 7 in Web of Science and 10 in Google Scholar.

I am a member of several editorial boards and I constantly evaluate manuscripts of ISI indexed journals.

I am a member of several national and international scientific associations and a member of the scientific and organizing committees of national and international congresses/workshops/seminars/courses.

The second part of the thesis is intended for the academic development plan on the two essential didactic and scientific components.

In the didactic plan, in addition to the continuous improvement of teaching activity, I will pay special attention to postgraduate education, by participating in continuing education programs.

Scientifically, I will continue the current collaborations, but I will also try to develop new collaborations, especially at the international level, in order to increase the quality and visibility of the scientific activity of the department in which I work. I will continue to participate in national competitions for funding research projects, but I will try to integrate into international teams to access European projects. I will contribute to the development of the material base and the optimization of the activity of the Center for Experimental Medicine within the Faculty of Veterinary Medicine in Bucharest.