UNIVERSITATEA DE MEDICINĂ ŞI FARMACIE
„CAROL DAVILA” BUCUREŞTI

ŞCOALA DOCTORALĂ

DOMENIUL MEDICINĂ

NEW PERSPECTIVES IN THE STUDY OF BRAIN FUNCTIONS – FROM THEORETICAL CONCEPTS TO EXPERIMENTAL MODELS

ABSTRACT OF THE HABILITATION THESIS

CANDIDATE:

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The habilitation thesis with the topic "Changes in brain function - from theoretical concepts to experimental models" includes the scientific, academic and professional achievements that I made after completing my doctoral studies and defending my thesis entitled "Changes of the nervous function induced by anesthesia depth", at the University of Medicine and Pharmacy "Carol Davila" in Bucharest, in October 2014, as well as the evolution and development plan of my academic, professional and scientific career. The changes in brain function induced by anesthesia as well as the mechanisms involved in the maintenance of anesthesia are far from being understood and further research in this field will contribute to the understanding of the mechanisms and effects of anesthesia as well as the optimization of clinical practice by implementing new personalized therapeutic strategies. The thesis is structured in four chapters as follows:

Chapter 1 of the thesis covers the main scientific activities and achievements (studies/research topics, research projects, publications, other elements of recognition of scientific and research work) achieved through the work I have carried out since graduation from the PhD, within the Laboratory of Neurosciences of the Discipline of Physiology and Neurosciences, Department of Functional Sciences of the Faculty of Medicine, “Carol Davila” University of Medicine and Pharmacy and in the framework of collaborations with IBENS, Paris, France and the Center for Medical and Military Scientific Research. The first chapter is structured in the following sub-chapters.

General presentation of the field in which the scientific activities and achievements, studies and research projects that I have coordinated or in which I have been involved, the development of the research group and the research themes within the Neuroscience Laboratory as well as the collaborations that I have initiated with other research institutes.

Study of the effects of claustrum stimulation in anesthesia. The working protocols, the types of electrical stimulation used and the anesthetic agents used are described. The novelty of the studies and the differences and similarities with studies in the same area of interest are presented. Results are published or in progress in peer-reviewed journals. Our research clarifies some of the many unknowns of anesthesia.

The study of the effect of xenon on cortical connectivity is of real interest because xenon has the characteristics of an ideal anesthetic but not many aspects are known about its mechanism of action and impact on cortical connectivity.

Study of changes in frontal intracortical field potential activity during slow-wave isoflurane anesthesia and burst-suppression state. Our observations converge towards the idea that during suppression state we are dealing with a non-burst state, because we have activity and during the burst state the cortical connectivity between the deep and superficial layers of the cortex increases.

The study of the effect of oxytocin administration on perinatal asphyxia-induced brain injury was performed on three batches of rat pups. The study showed that prior exposure to oxytocin prevents the number of seizures and decreases the expression of S-100β protein in the hippocampus.

This subchapter presents the main results of clinical research as well as the results of collaborations with the Centre for Medical-Military Scientific Research. In an attempt to better estimate the severity of burns, especially in those who also present with airway burns, we conducted retrospective studies on patients and evaluated the prognostic character of markers such as procalcitonin, presepsin, C-reactive protein or TNFα. Included are studies in collaboration with the Center for Medico-Military Scientific Research in which the antibacterial effect of the patient's serum after antibiotic administration using different administration protocols was followed.

In this subchapter we have included the elements of recognition of scientific and research activity mentioning the number of articles published as main author (first/last author, coordinating/co-responding author) - 11 and co-author - 8, the number of citations (186) and the Hirsch index (6). Research projects I was part of, awards obtained and involvement in the organization of various scientific events were included.

Chapter 2 presents the didactic activity starting with the practical work as a PhD student since 2008, then as an assistant professor since 2011 and as a supervisor since 2019. Also in this chapter are mentioned the didactic materials elaborated within the discipline both before and after the PhD thesis. I have also mentioned the Diploma Work for which I have been coordinator or supervisor, coordination of students for participation in competitions. Finally, I listed my participation as a member of the examining committees for the filling of teaching positions in “Carol Davila” University of Medicine and Pharmacy and my participation as an examiner in the medical entrance exams, the licensing exam and the residency exam.

Chapter 3 presents the professional path after graduation from doctoral studies both from a teaching and clinical point of view. Research internships at IBENS, Paris, France and the scientific conferences I was involved in organizing are presented. The clinical activity is

presented since the beginning of the residency in the specialty of Anesthesia and Intensive Care, the internships, the awards obtained, the national and European exams in the specialty of Anesthesia and Intensive Care and the hospitals where I have worked. I have been involved in the formation of multidisciplinary research teams and have also obtained two certificates of complementary studies.

Chapter 4 briefly presents a plan for the evolution and development of the academic career, starting with the educational activity addressed to students, residents and PhD students followed by the description of the own vision of research development based on the results and collaborations had so far. We continued with proposals for the development of scientific research at local, national and international level. I believe that obtaining the right to coordinate PhD students will help me to achieve these goals. The priorities will be to increase the professional level, for a didactic, educational and research activity as harmonized as possible with the current requirements in the field of Physiology and Neurosciences, with emphasis on integrative aspects and clinical applicability, especially as these two fields are currently undergoing unprecedented development.

I will continue to participate in both national and European competitions to obtain research projects and at the same time I will try to establish new collaborations with research institutes in the country and abroad. The aim is to raise funds for the initiation of new research topics and the development of the existing infrastructure in the laboratory as well as ensuring increased academic mobility for future PhD students.

I intend to continue to coordinate the research group made up of students, residents and PhD students and young people in order to develop the field of fundamental and clinical neuroscience in Romania and to increase the visibility of our group as well as of our university by publishing articles in ISI listed journals with a higher impact factor.

By combining teaching, research and clinical experience, I wish to contribute to the increase of the educational and scientific level as well as the visibility of our university.

29.XI.2023 Senior Lecturer Bogdan Pavel