

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



**MEDICINE IN THE DIGITAL AGE: THE EVOLUTION  
OF DIAGNOSIS FROM ANATOMICAL LANDMARKS  
TO ARTIFICIAL INTELLIGENCE**

**ABSTRACT**

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## ABSTRACT

My habilitation thesis with the title **"Medicine in the digital age: the evolution of diagnosis from anatomical landmarks to artificial intelligence"** presents in a documented way the professional, scientific and academic achievements of my postdoctoral activity. I graduated from the Faculty of Medicine of the "Victor Babeș" University of Medicine and Pharmacy in Timișoara (UMFT) in 2005, I am a primary care physician specializing in pathological anatomy since 2015, and in 2010 I defended my doctoral thesis entitled "Morphological variety and evolutionary prognosis of salivary gland tumors correlated with their immunohistochemical profile", under the coordination of Prof. Univ. Dr. Lazar Elena, within the UMFT. Throughout the 14 years of postdoctoral activity, my research has focused on involvement in multidisciplinary scientific activities. I started my university career in 2006 when, through a competition, I took the position of university trainer at UMFT, within the Morphopathology Discipline. In 2009, I graduated through a competition to the degree of University Assistant Professor in the same discipline. In 2015, I supported and promoted the competition to obtain the didactic degree Lecturer in the discipline of Anatomy and Embryology, and in 2021 I obtained the didactic title of Associate Professor in the same discipline. The results of my scientific work have been published in journals indexed in various databases (Clarivate Web of Science, Scopus, Index Copernicus, medline, open access) quantifying 35 full-length articles, indexed WOS, with a Hirsch index of 8 and 154 abstract papers presented at national, national and international congresses and symposia.

I believe that today the study of human anatomy to be effectively understood must combine elements of anatomy with clinical aspects. In my work as a pathologist the skills to make correlations between normal anatomy, anatomic variations and microscopic aspects have proven to be essential to formulating a complete diagnosis based on scientific evidence.

The habilitation thesis is written according to the guidelines for the qualification thesis published by CNATDCU and legislated in the UMFT methodology and is structured in two parts.

The first part is dedicated to the succinct presentation of its content, and the second details my academic evolution and perspectives in a documented way from the viewpoint of published works, teaching activity and the impact that scientific achievements have had for the medical field.

In the 2nd part, in the first chapter entitled **"Professional and academic scientific achievements"** I presented the evolution of the postdoctoral scientific activity highlighting the main achievements and the future development strategies. I thus continued the research on salivary gland tumors started in the doctoral thesis with the evaluation of the results obtained in a new context. I deepened the analysis of the microvascularization of these tumors with the objective of identifying some potential molecular targets useful for their therapy, but also the analysis of the development of some tumor subtypes from the perspective of their ontogenesis. I also additionally investigated some aspects regarding their proliferative potential. The obtained results were published in specialized articles and detailed in the habilitation thesis. I continued my study by exploring the anatomical region of the head and neck through dissection, but also by analyzing data from the literature. The study of the anatomy of this region resulted in the publication of two course manuals in English, both published in e-book format, easily accessible by consulting the "V.Babeş" UMF website. I also addressed topics regarding the dental organ and its associated pathology. In parallel, I continued researching the microscopic aspects of head and neck lesions by evaluating the proliferative activity of thyroid nodules, but I developed my concerns regarding histopathological aspects, vascular microdensity and the significance of the expression of tumor proliferation markers by studying their immunohistochemical expression in hepatocellular carcinoma and in lung cancer. I also analyzed the morphological lesions of the hepatic ducts in patients with hepatitis. I continued the analysis of the morphological aspects of the digestive, genital and reno-urinary system with numerous published studies that focused on their pathology.

In the second chapter entitled **"The main areas of development and the results obtained"** I analyzed in detail each direction of research that I followed, highlighting the results that I obtained and their impact in the context of the most recent data from the literature. In the first two sub-chapters I emphasized the importance of the microscopic examination in investigating the normal morphology of the human body and its pathology. In the 3rd subchapter I analyzed immunohistochemical markers with a potential role in developing prognosis and treatment options. I thus studied the immunohistochemical expression of markers such as Ki-67, p53, PCNA or Her2 in tumor and non-tumor lesions presenting the results obtained in relation to studies that addressed these aspects. I then addressed topics like tumor angiogenesis in salivary

gland neoplasias and hepatocarcinomas, emphasizing at the same time the role that angiogenic factors can have in therapeutic decisions for these conditions.

In sub-chapters 4, 5 and 6 I continued the exploration of therapeutic perspectives through the lens of the latest diagnostic and treatment techniques, techniques involving the use of artificial intelligence and nanoparticles. I dedicated a subchapter to the microbiome because a series of current studies of great scientific interest document the connection between some microbes and tumors. We thus conducted studies on the activity and influence of the microbiome, in various pathologies, both malignant and non-malignant.

In the third chapter entitled "**Professional evolution**" I exemplified the stages of my scientific and academic development by chronologically listing the scientific events in which I participated as a student or lecturer, the grant projects and the publications that resulted from my activity as a doctor and that of a researcher.

Chapter 4: "**Academic and scientific perspectives**" emphasizes the three important areas: teaching activity, research activity and, last but not least, clinical activity. I believe that my personal and professional development is based on a set of values: feedback, transparency, personal responsibility, openness and receptivity to new things, communication and teamwork.

I aim to build an academic career and an excellent professional reputation that will ensure the success and increased visibility of the Discipline of Anatomy and Embryology. I will promote the use of modern teaching and interaction resources and methods. I have as a goals to constantly encourage discovery learning, cooperation, problem-solving techniques, and the ongoing support of students (including PhD students).

Research directions developed so far will be continued, deepened and exploited, and new directions addressed will be linked to current ones. So my proposal is to continue the studies started by analyzing aspects of microscopic anatomy and by integrating the results obtained with analyzes that involve the use of computer algorithms. Digitization is a constantly evolving process. In this context I believe that future studies in any field of medicine must also include a part that uses artificial intelligence techniques.

The last two chapters include the bibliographic references related to the studies mentioned in the habilitation thesis and the list of representative publications.