



**OVIDIUS UNIVERSITY OF CONSTANȚA
DOCTORAL SCHOOL**

DOCTORAL FIELD: DENTAL MEDICINE

**ABSTRACT OF THE HABILITATION
THESIS**

USE OF STATISTICAL PROCEDURES FOR
CONCEPTUALIZATION, ANALYSIS AND VALIDATION OF
MEDICAL STUDIES

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Use of statistical procedures for conceptualization, analysis and validation of Medical studies

This habilitation thesis is an overview of the professional achievements obtained starting with my debut in higher education until now, both in the field of scientific research and in the field of teaching, activities carried out in the Laboratory of Biophysics, Medical Informatics and Biostatistics of the Faculty of Dentistry, but also in collaboration with the Research Centers of the "Ovidius" University of Constanța.

The habilitation thesis was drafted respecting the provisions of the Order of the Ministry of Education and Scientific Research, 3121/21.01.2015; Regulation of the "Ovidius" University of Constanța, 141/16.05.2016 regarding the organization and development of the process of obtaining the habilitation certificate and consists of three parts.

I have presented in the first part my personal scientific, professional and academic achievements.

The scientific research activity started in my last year of college when I received through a contest a training internship (Tempus grant) at the Huygens Laboratory, Leiden University, The Netherlands, a grant that represented the basis for writing the Diploma Thesis, with the title "*Study of the absorption of aggregate species of chlorophyll-A at room temperature and at low temperatures*" (1994).

In 2004 I defended my doctoral thesis entitled "*Study of human hemoglobin and its derivatives by biophysical methods*" (O.M. No. 3876/19.05.04). The research activity continued with drafting and defending in 2013 of the master's thesis in the field of Applied Mathematics and Biostatistics, entitled "*Statistical methods used in the exploratory study of enamel and dentin hardness*", as well as papers that were presented in national and international events, respectively published in specialized journals: 16 books published in national publishing houses, 1 book chapter in national publishing houses, 3 book chapters in international publishing houses, 9 practical workbooks, 90 articles published in specialized journals: (46 in ISI listed journals, 27 in BDI indexed journals, 17 in national journals), 64 papers communicated at international conferences and congresses whose abstracts appeared in "volumes of abstracts" of the congress/conference, 10 papers communicated at conferences and national congresses.

During this period, I have actively participated in several research teams as a member (22) but also as director (2) of national (22) and international (2) projects. I am currently carrying out my research activity at the *Center for research and development of the morphological and genetic studies of malignant pathology* (CEDMOG) of Ovidius Constanța University, *Electron Microscopy Laboratory*, both on electron microscopy as well as on consulting in statistical analysis of experimental data.

Publications from various International Journals and Journals with scientific impact have accumulated a Hirsch index of 7 in the Web of Science database, 5 in the Scopus database, 7 in the Google Scholar.

The main research directions that I focused and that I presented in this thesis were represented by the hardness analysis of dentin, tooth enamel and photocomposite filling materials for dentin/frontal restorations, the influence of general risk factors and local in the occurrence of periodontal disease, but also the impact of exposure to environmental factors on infectious pathology. The entire research activity so far has involved the use of statistical procedures in order to conceptualize, analyze and validate studies in the medical field and especially in the field of dentistry.

The second part of the thesis presents the main plans for professional, scientific and academic career development, as well as future research perspectives and directions.

The main objective of my activity will be to achieve a high level of excellence in research by applying biostatistical methods in the field of medicine, at the same time training the next generation of health researchers in an interdisciplinary and highly competitive research environment.

Future research should focus not only on promoting and improving health throughout life but as well on improving health outcomes in areas of major medical disease, especially oncological and infectious pathology. Further, in order to optimize the research activity I propose certain directions, which aim not only at the significant enrichment of knowledge, but also at practical applications in my field of competence, materialized by implementing an active program involving translational science in order to improve health and clinical practice in the management of the diseases mentioned above.

I intend to develop new methods and strategies to involve PhD students to maximize research results and to facilitate their translation into medical practice. In this regard, the development and use of digital infrastructure and medical research platforms becomes a priority. In addition to the teaching activity, the educational mission is strengthened by a dynamic research activity. This robust research activity must also be

supported from a financial point of view, and in this sense, I propose in the future to win, together with future doctoral students, new research grants.

I will continue research on the structural analysis of dental hard tissues by activation with fast neutrons. This analysis technique will provide extremely accurate results on the hard dental structure, and in this respect, I would like, together with future doctoral students to take and analyze dental samples from patients with various systemic pathology, whose drug therapy influences the status of hard tissues, in order to facilitate the understanding of the biophysical and chemical processes to which the dental organ is exposed in this context. Moreover, based on the experience I gained from studies on risk factors in the occurrence of periodontal disease, I would like in my future research to go deeper into the issue of risk factors and the development of other oral pathologies, such as premalignant lesions. In this regard, I propose that together with PhD students to develop an application based on mathematical algorithms that assign relative weights to known risk factors in the development of oral premalignant pathology, to generate the risk profile of the examined patient and with the help of specialists in oral and maxillofacial surgery to develop interventional and monitoring therapeutic alternatives.

Another research direction I want to develop is based on the activity carried out within the *Center for research and development of the morphological and genetic studies of malignant pathology* (CEDMOG) from the "Ovidius" University of Constanța, Electron Microscopy Laboratory. In Romania, there is not much research on the genetic factors involved in the occurrence and development of oral cancer. Considerable progress has been made in recent years in understanding the genetic basis of the development of oral squamous cell carcinoma. Cancer progression is due to gene modification with a role in regulating proliferation, apoptosis, genome stability, angiogenesis, invasion and metastasis. Future research efforts should focus on identifying the genetic changes that are responsible for the evolution to invasive carcinoma. Genetic markers with predictive value were identified that allowed the initiation of personalized chemoprevention therapies. Based on genetic studies and integrating biostatistical methods, I want to propose a progression model for the development of oral squamous cell carcinoma.

I aim that the coordination activity of doctoral students to be based on the approach of a current and interdisciplinary research topic. I want, in the current context of the pandemic generated by SARS-CoV-2 virus infection, to use statistical methods to quantify oropharyngeal clinical manifestations in patients in the Dobrogea area, following to compare the results obtained with other groups of patients from different regions of

Romania and other states, in order to understand the peculiarities of the infectious disease Covid-19.

In the last part of the thesis are listed all the cited bibliographical references.

This thesis is the result, on the one hand, of professional experience and, on the other hand, of the results of research work, which was achieved through transparency, adaptability, collegial and team spirit and, last but not least, through a lot of dedication and perseverance.