

**“VICTOR BABEȘ” UNIVERSITY OF MEDICINE AND PHARMACY
TIMIȘOARA
DOCTORAL SCHOOL
DENTAL MEDICINE**



HABILITATION THESIS

DIGITAL AND INTERDISCIPLINARY ADVANCES IN ORTHODONTICS

HABILITATION THESIS ABSTRACT

ASSOC. PROF. CAMELIA ALEXANDRINA SZUHANEK

University of Medicine and Pharmacy „Victor Babeș” Timișoara

2019

My name is Camelia Alexandrina Szuhanek and I was born in Timisoara in 1975. In 1994 I graduated the National College "C.D.Loga" and in the same year I was admitted to the Faculty of Dental Medicine.

During the 6 years of faculty, I began to participate in research projects and I had presentations at student congresses. In 1998, under the supervision of Dr Mirella Anghel, I began a research in collaboration with the Timișoara Politechnica University. The results of my research activity were presented and rewarded with prizes at student congresses.

I was attracted to orthodontics even since I was a child, being an orthodontic patient for many years. When Prof Dr Elisabeta Bratu asked me to join her research team I was delighted and started to work in this direction. My work was rewarded with the 1st Prize at the International Dental Students Congress, which took place in Malta in August 2000.

I graduated the Faculty of Dental Medicine in 2000 and started the PhD thesis in the same year. My thesis "Periodontal Implications in Dentomaxillary Anomalies" was presented in 2006 under the scientific coordination of Prof Dr Elisabeta Bratu and was confirmed by the Order of the Minister of National Education No.30 from 23.04.2007.

This Habilitation thesis is structured in 3 parts, according to the academic standards: an abstract (introduction), the first part is dedicated to my postdoctoral scientific, professional and academic performance, the second part is allocated to my career plans and academic evolution, while the third part is assigned to the references.

After finishing my PhD thesis I began working in different research projects. I won by competition two projects as a grant director, the first one was CNCSIS: 1738/2008-2011(IDEI), the other one was an UMFBVT internal grant 8849/5.10.2009. I also participated as a team member in many other projects. In 2008 I won the first prize for poster in the European Congress of Lingual Orthodontics, for a research on biomechanical aspects of lingual orthodontics.

I have actively participated presenting my scientific work at international dental and orthodontic meeting in Romania and abroad – USA, Italy, Finland, Argentina, United Kingdom, Singapore, Poland, Spain, Turkey, Greece, Belgium, Slovenia, Austria, Serbia, Germany, France, Malta.

I am an active member of American Orthodontic Association, World Federation of Orthodontics and European Orthodontic Society.

The results of my studies were published in over 200 articles and short presentations, among which 43 ISI indexed articles, 38 with impact factor and with a HIRSCH-index 6 according to Web of Science platform. Together with my team, I have been awarded 21 international and national awards for scientific publications and congress presentations.

I coordinated 42 student graduation thesis, most of them awarded with the maximum mark, and 10 papers presented by students and residents at scientific competitions, among them many have been rewarded with prizes. As a result of my research activity in the orthodontic field, three patent certificates by OSIM have been awarded.

My main research themes are biomechanics in orthodontics, digital investigations and virtual treatment planning, anchorage with implants, interdisciplinary surgical-orthodontic approach of the patients with skeletal malocclusions. I also included studies regarding the mechanical and chemical characteristics of the orthodontic devices and a more recent research on the cytotoxicity evaluation of some orthodontic materials on human oral fibroblasts.

The first part of my postdoctoral research is dedicated to numerical analysis of dento-alveolar reactions to biomechanical orthodontic forces and the evaluation of implant anchorage during orthodontic treatment. The unlimited possibilities of evaluation recommends the finite elements method as a powerful tool for investigating dental and alveolar characteristics during orthodontic treatment. Some of the results of the biomechanics research have been submitted to the American Journal of Orthodontics and are in minor revision process.(5-years impact factor 2.333).

The research continues with the evaluation of material characteristics of orthodontic archwires and the determination of microelements in orthodontic implants using the flame atomic absorption spectroscopy method.

Another part of my thesis is dedicated to considerations on digital investigations and virtual treatment planning, with a special emphasis on hybrid maxillary expansion

and 3D surgical guide planning. The digital treatment planning in orthodontic aligners therapy is also described.

The Interdisciplinary orthodontic and surgical approach in patients with Class III skeletal malocclusions chapter includes a study on digital cephalometric investigations of class III orthodontic patients and the Interdisciplinary orthodontic-surgical treatment of class III malocclusion in skeletal anomalies of adult patients.

The last study of the research part is dedicated to *In vitro* applications using human primary gingival fibroblasts and keratinocytes. The partial results of my collaboration with the research team of the Toxicology Department from the Faculty of Pharmacy were published in an ISI journal with a 3.06 impact factor. On the basis of these promising results, my future experiments will be focused on: the assessment of orthodontic materials impact on healthy oral cells (fibroblasts and keratinocytes) after longer exposure times in terms of cytotoxicity, proliferation and migration capacity and cellular morphology. All these data will be correlated to other molecular evaluation in order to estimate their particular safety and toxicity characteristics.

The second section is allocated to my future scientific, professional and academic future development plans. My future aim is also to develop an excellence research training center in orthodontics and to access projects with a strong research team, with emphasis on the following directions: biomechanics of orthodontic movement, digital investigations, virtual treatment objectives planning, 3D printing and interdisciplinary orthodontic-surgical therapy. I will also continue to expand the research on cytotoxicity effect of different orthodontic materials on human fibroblasts.

In the future, my aim is to continue the development of the quality of graduate and postgraduate training in orthodontics offered by our university. I will continue to introduce the digital aspects in orthodontic diagnosis and treatment planning and to increase the level of interactivity in all areas of orthodontic education.

By this habilitation degree, our university will be able to offer the future PhD students the opportunity to fulfil their thesis in the Orthodontic Department.

This research activity will involve national and international students, academic staff and residents and will result in ISI articles that will increase the international visibility of our department, faculty and university.