ABSTRACT

The habilitation thesis, entitled „***New Approach to Orthodontic Diagnosis and Therapy***" presents synthetically the results of my scientific, teaching and professional achievements after obtaining my Ph.D. degree, as well as the development plan of my scientific, didactic and professional career, based on gathered and proven experience in the field of **Dentristry**.

In the **first part** of the thesis, structured in five chapters, I've presented a retrospective of my research activity, and in the second part, I've described the perspectives of didactic and research activity development, describing the directions I want to address in the future.

In all these ten years, which followed my Ph.D. degree, my concerns were mainly focused on assessing and preventing the risks of fixed orthodontic treatment mainly regarding the marginal periodontium and dental enamel. In the context in which a large proportion of orthodontic patients are children and adolescents, with a body constantly adapting and growing, with tissue structures specific to these age-groups, I consider that any attempt to create tissue damage as a result of the orthodontic attachment bonding is unacceptable. This was the reason why I continued to study these changes even after Ph.D. degree, choosing the most eloquent diagnostic methods: molecular biology examinations, immunohistochemical studies or thorough clinical examinations throughout the whole period of fixed orthodontic treatment.

In the *first subchapter*, I described the changes in the composition of the subgingival plaque, which can be anticipated and are still occurring in the first phase of the orthodontic treatment. Increasing the prevalence of parodontopathogenic bacteria in patients' subgingival biofilm at 4-7 weeks after bracket or tube bonding or in the case of orthodontic bands vs. directly collable tubes have been proven by molecular biology examinations. Histological, immunohistochemical and clinical studies have shown that due to fixed orthodontic attachments placement, variable lesions of the epithelium and gingival connective tissue can appear, affecting their constituent elements. After removal of the fixed appliance, a regression of the inflammatory phenomena can be observed due to the regenerative capacity of the young organism on one hand, and the improvement of the oral hygiene on the other hand.

In the *second subchapter* there are presented the enamel changes after 37% phosphoric acid etching, the duration of the acid attack being different, the comparison of the different materials used for preparation of the enamel surfaces before bonding, the diagnosis of the incipient enamel caries lesions in patients treated with fixed orthodontic appliances using the laser fluorescence method and a study of the efficiency of the ICON resin infiltration method in the early enamel caries lesion treatment. By including the studies designed for the research of the effectiveness of different materials used in the direct bonding technique, I've presented our shear bond strength studies of the materials used in the current practice and the quantity of remnant adhesive material through the ARI index.

In the *third subchapter*, we presented our results on the study of intraoral corrosion of Ni-Ti alloys and the effect of different methods of cleaning and sterilization of orthodontic mini-implants. For the sake of thorough examinations, we examined the surfaces with scanning electron microscope.

The *last subchapter* presents studies on the importance of morphometric and radiological examinations in the orthodontic complex diagnosis. Most of these studies were based on fruitful collaboration with colleagues from the Department of Tooth Morphology and on our access to the Image ProInsight morphometric software, with which we made these measurements. The study of mono- and bizygomatic twins tries to emphasize the importance of genetic factors in the etiology of dento-maxillary malocclusions, showing that arch shape or certain dental dystrophies can be of genetic nature and the sequence of the dental eruption in the lateral segments is mostly influenced by hereditary factors.

The **second part** of the thesis consists of two sections in which the perspectives of professional, scientific and academic development are synthesized and the proposals for improving the didactic activity and the research directions that I want to address in the future are presented.

Thus, from a scientific point of view, I propose to continue the research on the genetic substrate and dento-alveolar and skeletal changes associated with non-syndromic dental hypodontia. The team of this research project, the modern material base we have at the department, faculty and institutional level, and last but not least, the constant support of our faculty leadership, are the elements that I rely on in achieving these goals.

As I have done so far, I will try to maintain a balance between my priorities - to carry out my own work with high quality standards, and to set up, for my younger students, colleagues and Ph.D. candidates, an open mentor, who, through her acquired experience and information accumulated throughout her career, can help them in professional, didactic and scientific training.

In the **third part** of the thesis bibliographic references are included from the two sections of the paper.