

ABSTRACT OF THE DOCTORAL THESIS

The effects of laser therapy on periodontal tissue in adult patients
undergoing orthodontic treatment

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Orthodontic treatment has become more and more requested by adult patients in recent decades. This is due to the aesthetic demands of modern society and the technological advances made in the field of orthodontics.

The correction of dento-maxillary anomalies has beneficial local effects, by improving the morphological and functional balance of the dento-periodontal structures, but it also improves the comfort of the individual and has a positive role in increasing the quality of life.

On the other hand, besides its benefits, orthodontic therapy can present a number of complications and risks. Wearing a fixed orthodontic appliance will make it more difficult to maintain oral hygiene, and pain is the most common complaint of patients with fixed orthodontic treatment.

Laser therapy is increasingly used in dentistry due to the advantages it offers: anti-inflammatory and antimicrobial action, activation of regeneration and healing processes, pain management.

Considering the observation that the majority of patients undergoing fixed orthodontic treatment present at some point inflammatory changes in the periodontal structures, in this doctoral thesis we aimed to evaluate the advantages and limitations of the use of laser therapy on the periodontal status, during orthodontic treatment.

The general part of the thesis is structured in three chapters, which provide current information on the topics addressed, based on extensive documentation in the specialized literature: *the structural elements of the periodontal tissue, the evaluation of the periodontal health status and the applications of the laser in dentistry.*

In the **Personal Contribution**, after the **Working Hypothesis/objectives** and the **General Methodology** are presented, the doctoral research is structured in four studies.

In the study **Implications of orthodontic treatment in adults on periodontal health and quality of life**, by distributing a questionnaire we evaluated the perception of a group of adult patients wearing orthodontic appliances on the changes that may occur in the periodontal structures and the way they maintain their oral hygiene. The

motivation of this research is related to the fact that the application of orthodontic appliances in the oral cavity leads to the appearance of surfaces that contribute both to the development of biofilm and to the multiplication of cariogenic and periodontopathogenic bacteria, in conditions of inadequate oral hygiene.

Since pain is the most frequent complaint of patients and reason for abandoning orthodontic treatment, we evaluated through a clinical study **the effects of laser therapy on pain in adult patients with fixed orthodontic treatment**. Laser therapy was applied to one hemiarch (HL), left or right, randomly for each patient. On the other hand, the control hemiarch (HC) was subjected to the same protocol, but without active light. Patients rated the pain they felt on a scale from 0 to 10 (VAS scale).

In chapter 5 of the personal contribution, **the effects of laser therapy on periodontal health in adult patients with fixed orthodontic treatment**, a clinical study is presented. We evaluated the effects of laser therapy on periodontal status during orthodontic treatment by recording the plaque index (PI), bleeding on probing (BOP) and probing depth (PD). An element of originality of this study is the use of the dark field microscope to evaluate the bacterial flora at the level of the periodontal structures, with the aim of quantifying the bacterial load and increasing the patient's compliance with oral hygiene measures.

In the in vitro study presented in Chapter 6 **Effects of Laser Therapy on Mesenchymal Stem Cells and Osteoblasts**, we assessed cell viability, proliferation, and activity by applying laser therapy to osteoblast cultures. This study was carried out in collaboration with the Department of Immunology of CCAMF, within UMFST "George Emil Palade" Târgu Mureş and has as originality elements the obtaining of osteoblast cultures from bone explant harvested from the maxillary bones and their exposure to laser therapy.

Chapter 8 includes the **General conclusions** resulted from the studies carried out within the doctoral research, extremely concise, clearly and logically formulated. These are consistent with the results obtained, having importance, practical applicability and value.

The **References**, including articles and books from specialized literature, are presented at the end of the thesis, in the order of their citation in the text.