



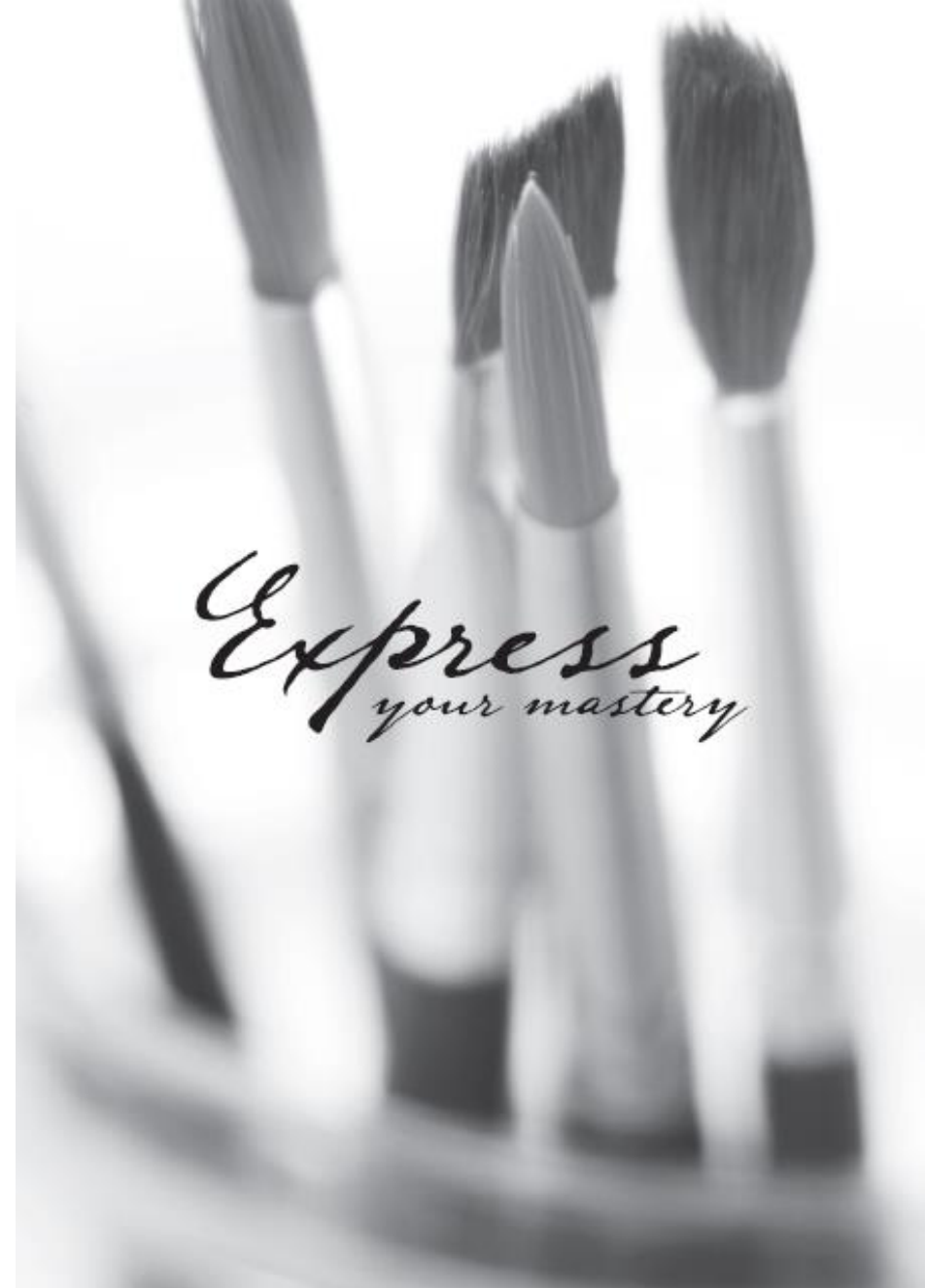
**Macedonia**





# ER:YAG LASER - ADVANTAGE FOR PATIENTS WITH CHRONIC PERIODONTITIS

**Prof. d-r Ana Minovska**



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# ER:YAG LASER -ADVANTAGE FOR PATIENTS WITH CHRONIC PERIODONTITIS

**1. INTRODUCTION- WORKING WITH NEW TECHNOLOGY,  
WHY?**

**2. WHAT IS ESSENTIAL ABOUT WORKING WITH THIS  
WAVELENGTH? SLAJD11**

**3. OUR CLINICAL STUDYS WICH SUPORTED THE  
BENEFITS OF USING ER:YAG . sl.17**

**4. CASE PRESENTATION**

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# **CLINICAL DENTISTRY IS UNDERGOING A PARADIGM SHIFT THANKS TO ADVANCED LASER TECHNOLOGY<sup>1</sup>**

**THIS IS PARTICULARLY DUE TO THE ERBIUM FAMILY OF LASERS.**

- Working with light energy in dentistry is still our choice.  
In future it will be a must – **THE PATIENTS DEMAND RISES.**
- Dental laser applicable in so many dental procedures is a new level of dentistry:
  - Are we “better” I practitioners???
  - Do the cases look differently done with laser???

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1. Colluzzi DJ. Lasers, Types of Lasers and What Your Practice Needs: Laser Dentistry Made Easy and Profitable, [www.dentaleconomics.com](http://www.dentaleconomics.com). 2007 April, 1-3.

# CAN ALL AGREE THAT .....

- 1. DENTAL EDUCATION RELIES UPON THE CONCEPTS OF CLASSICAL NEWTONIAN MECHANICS.**



- 2. Dentists are generally familiar with how things move, the forces that move them, and the thermodynamic consequences of these forces. These are accurate explanations for everyday clinical experiences in dentistry.**

The foundations of quantum mechanics were established during the first half of the 20th century by Max Planck, Niels Bohr, Werner Heisenberg, Louis de Broglie, Arthur

- 3. IN THE SCIENCE OF LASER-TISSUE INTERACTIONS, HOWEVER, THE CLINICAL CONSEQUENCES ARE THE RESULT OF AN ENTIRELY DIFFERENT SET OF LAWS CALLED QUANTUM MECHANICS.**

**DENTISTS USING LASERS NEED TO BE AWARE OF THESE DIFFERENT QUANTUM RULES**

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# Er:YAG dental lasers



**Energy is transferred from Laser photons to molecular water in tissue , vaporizing the water (heat)**

**Vaporized water causes an immediate volumetric expansion (pressure) in a confined environment (tooth/tissue) producing work-ablation**

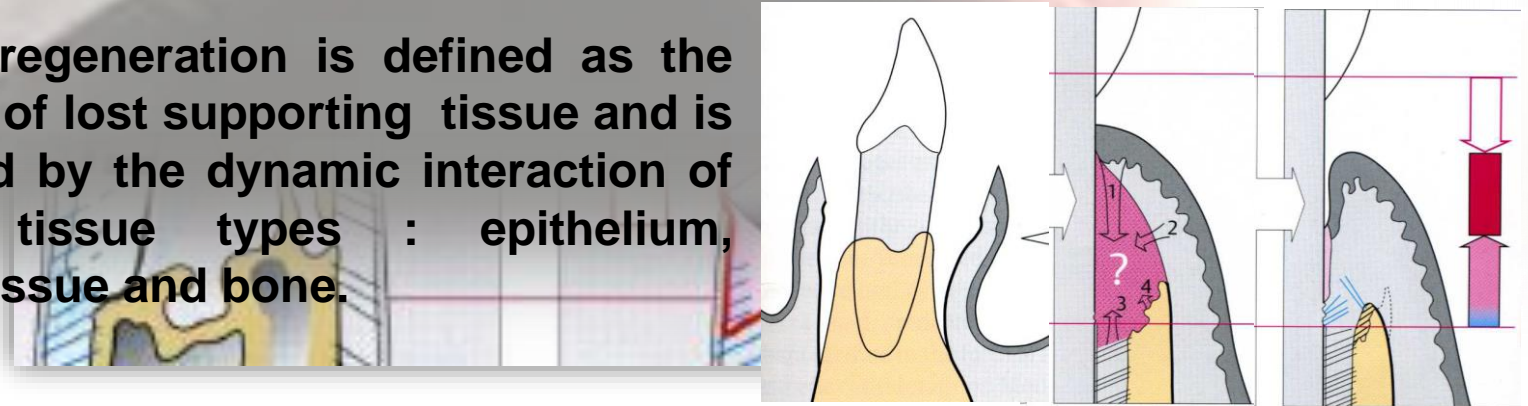
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## WHAT IS ESSENTIAL about working with this wavelength?

Unlike the Nd:YAG laser, which relies on significant penetration into the soft tissue to achieve the desired results, the Er:YAG laser ablates soft tissue by selectively removing a few cell layers at a time.

Therefore the Er:YAG laser allows successful results that had been previously accomplished only by using more aggressive surgical techniques.

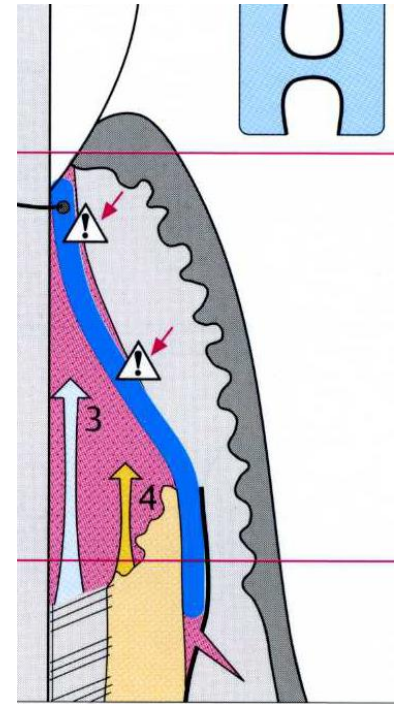
Periodontal regeneration is defined as the replacement of lost supporting tissue and is characterized by the dynamic interaction of the three tissue types : epithelium, connective tissue and bone.



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It has been shown that the protective nature of epithelium causes it to travel much faster to repopulate a healing periodontal wound than the other two tissue types.

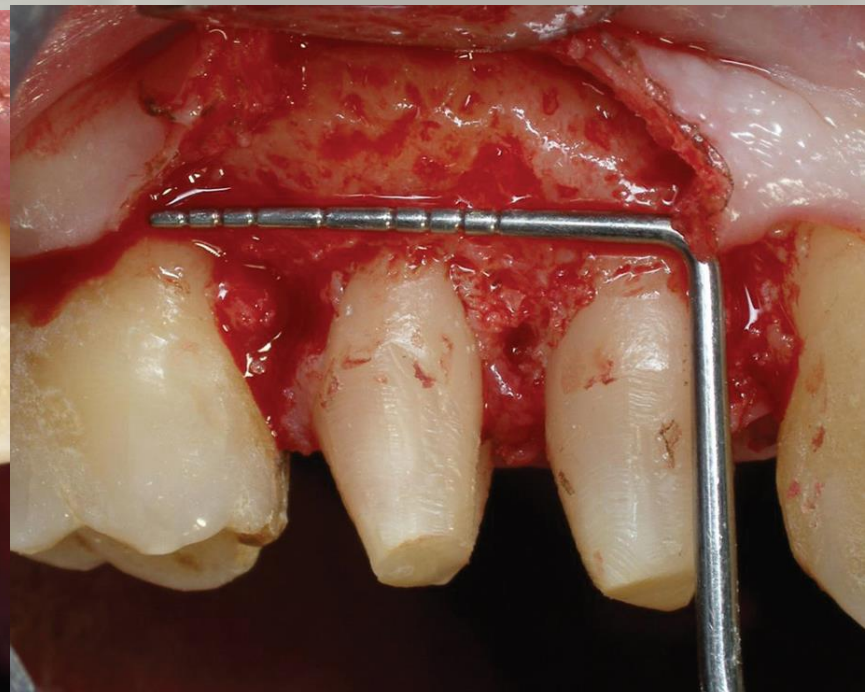
Epithelium is clearly the “enemy” of a periodontal therapist as it relates to the healing that occurs following conventional treatment of periodontitis. If epithelial tissue is not properly managed, rapid growth may result in unpredictable periodontal regeneration.



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**THE ERBIUM LASER LIGHT  
CAN BE USED IN THE PERIODONTAL FIELD AS AN  
ADJUNCT TO CONVENTIONAL THERAPY (PHASE I) OR AS A  
TOOL IN PERIODONTAL SURGERY**



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“INITIAL THERAPY”— CLOSED DEBRIDEMENT of PERIODONTAL POCKETS;



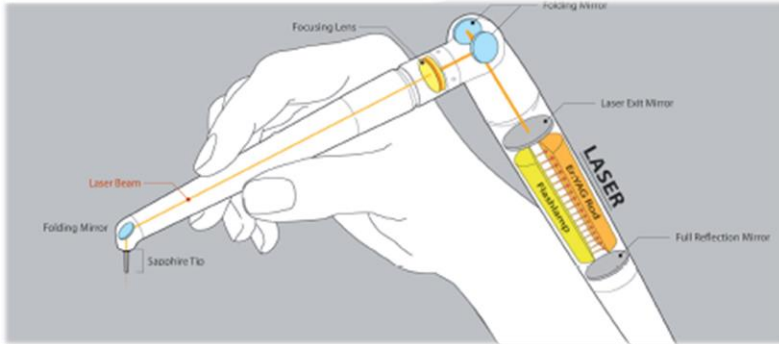
**FOLLOW UP OF CLINICAL INDICATORS FOR SUCCESSFUL TREATMENT AND PERIODONTAL STABILITY AFTER NONSURGICAL THERAPY OF PATIENTS WITH CHRONIC PERIODONTAL DISEASE, USING THE LITETOUCH ER:YAG LASER, VERSUS CONVENTIONAL MECHANICAL-HAND INSTRUMENTATION.**

Plaque index, PBI (papilla bleeding index), PPD (periodontal pocket depth), CAL (clinical attachment level), GR (gingival recession) and BL (bone level) were measured and evaluated

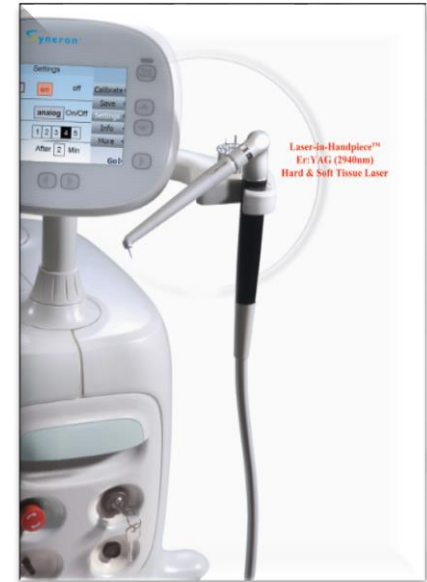


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# LITETOUCH ER:YAG LASER WAS USED FOR LASER ASSISTED GINGIVAL CURETTAGE AND ROOT SCALING and detocsification



Clinical applications for **low-energy setups** (50mJ- 100mJ).



System calculate the optimal require pulse width.

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Pi-plack index

Papilla bleeding index

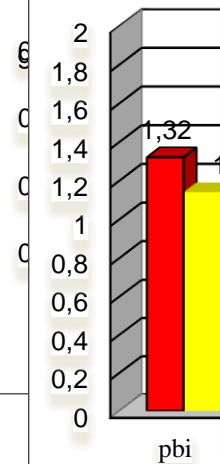
Periodontal probing depth

clinical

Bone

Gingival

Difference



Index/ Treatment	Baseline	3 Months	P value
PI			
Laser	1.25±0.6396	0.89±0.679	P<0.01
SRP	1.4286±0.735	0.6786±0.7653	P<0.01

Our comparative study have demonstrated statistically highly significant difference between laser treated patients (p<0,01) and classically with mechanical debridement for PBI, PPD, CAL and bone level. Our results are consistent with the results of Feist, Schwarz, Folwaczny and Sculean.

Contrary to mechanical treatment with conventional instruments, the excellent ablation of tissue with laser treatment is expected to promote healing of periodontal tissues, ablating the inflamed lesions and epithelial lining of the soft tissue wall within periodontal pockets.

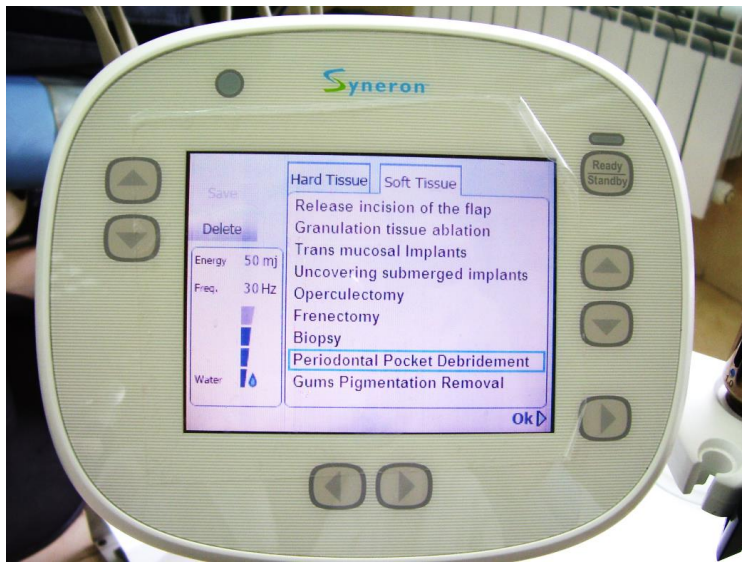
1	P<0.01
6	P<0.01
4	P<0.01
	P<0.01
9	P<0.01
2	P<0.01
	p>0.05
	P<0.01
	P<0.01

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**ACUTE PHASE OF HEALING - LASER  
ASSISTED POCKET DEBRIDEMENT  
VERSUS CONVENTION HAND  
INSTRUMENTATION**



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Recent researches suggests that Er:YAG laser irradiation stimulates the proliferation of cultured HGFs and indicates that the **low-level Er:YAG laser irradiation may be of therapeutic benefit for wound healing.**<sup>1</sup>

**Low-level Er:YAG irradiation**, facilitate or promote the normality of tissue repair, and thereby enhance the sequence of events that take the tissues from their injured to their 'normal' state.



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1. Akira Aoki et al. Photobiomodulation Laser Strategies in Periodontal Therapy. Lecture Notes in Electrical Engineering. 2008, Volume 12, V, 181-190,

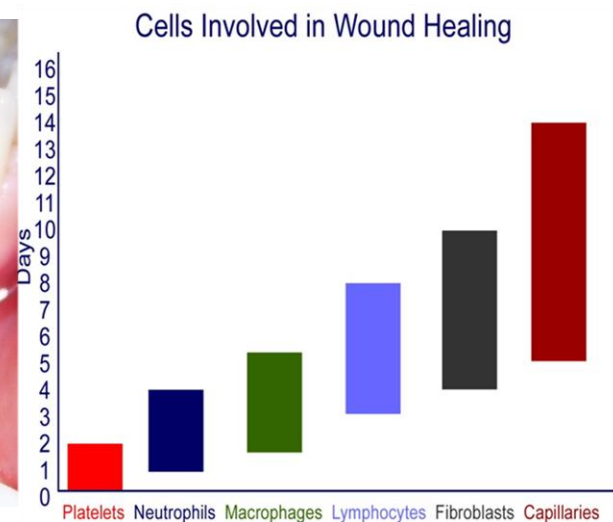
**The purpose of this study** was to show the immunohistochemical and histomorfometryc analysis of the initial phase of tissue healing after laser assisted pocket debridement compared with classical manual instrumentation

A SPLIT-MOUTH DESIGN; ATTACHMENT LOST  $\geq 5$  mm ON ONE ASPECT OF THE TOOTH

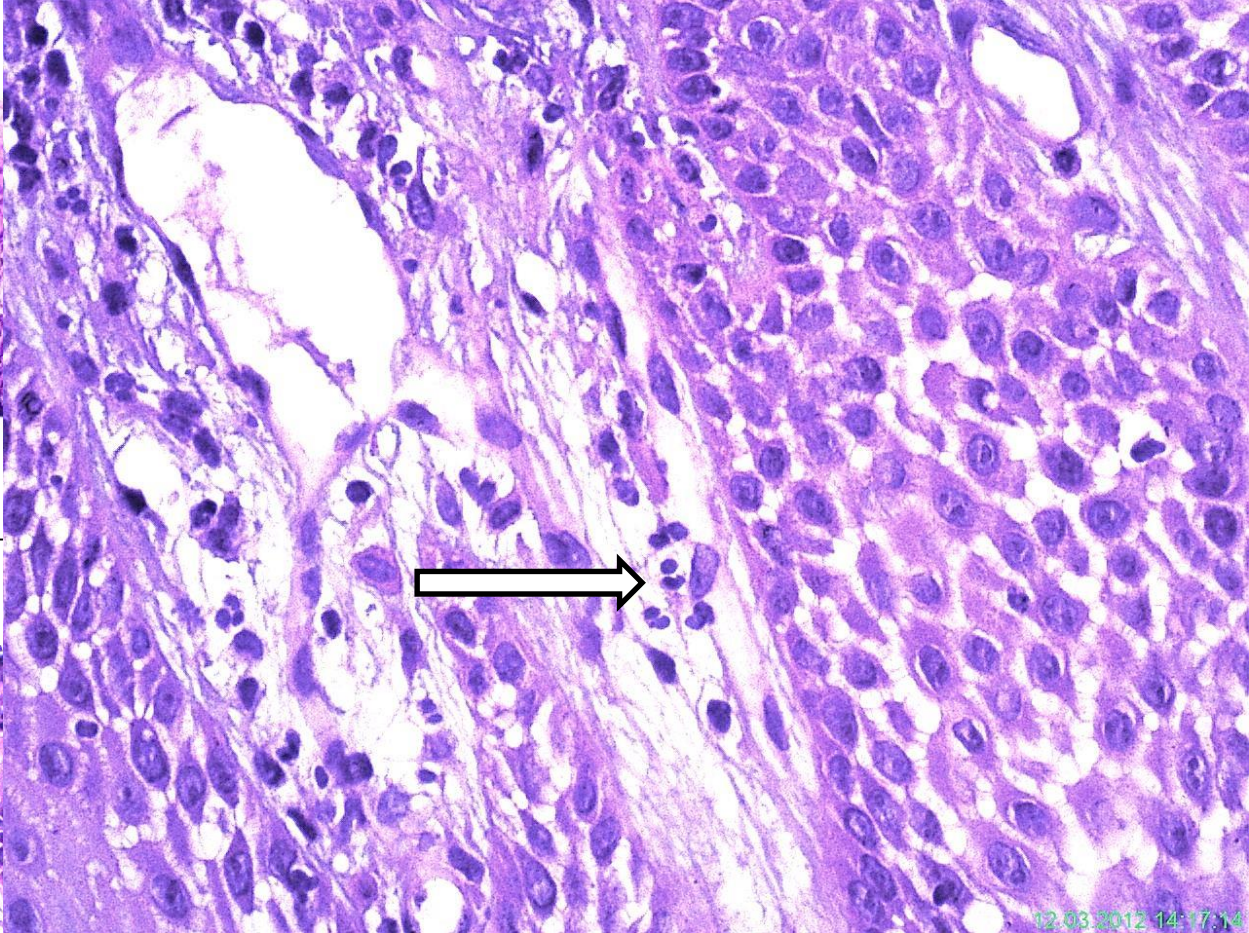
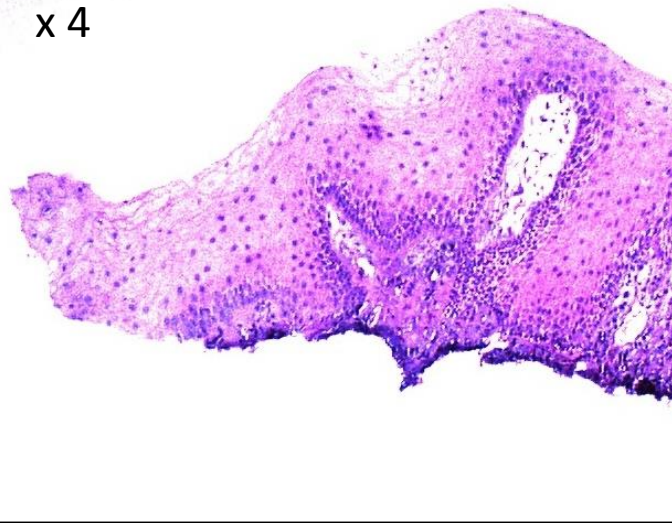
POCKET TISSUE BIOPSY WAS PREFORMED 24 AND 72 HOURS AFTER PERIODONTAL TREATMENT.



**DETECTION OF: Myeloperoxidaza, CD68 , CD3, CD20, Vimentin, CD34.**

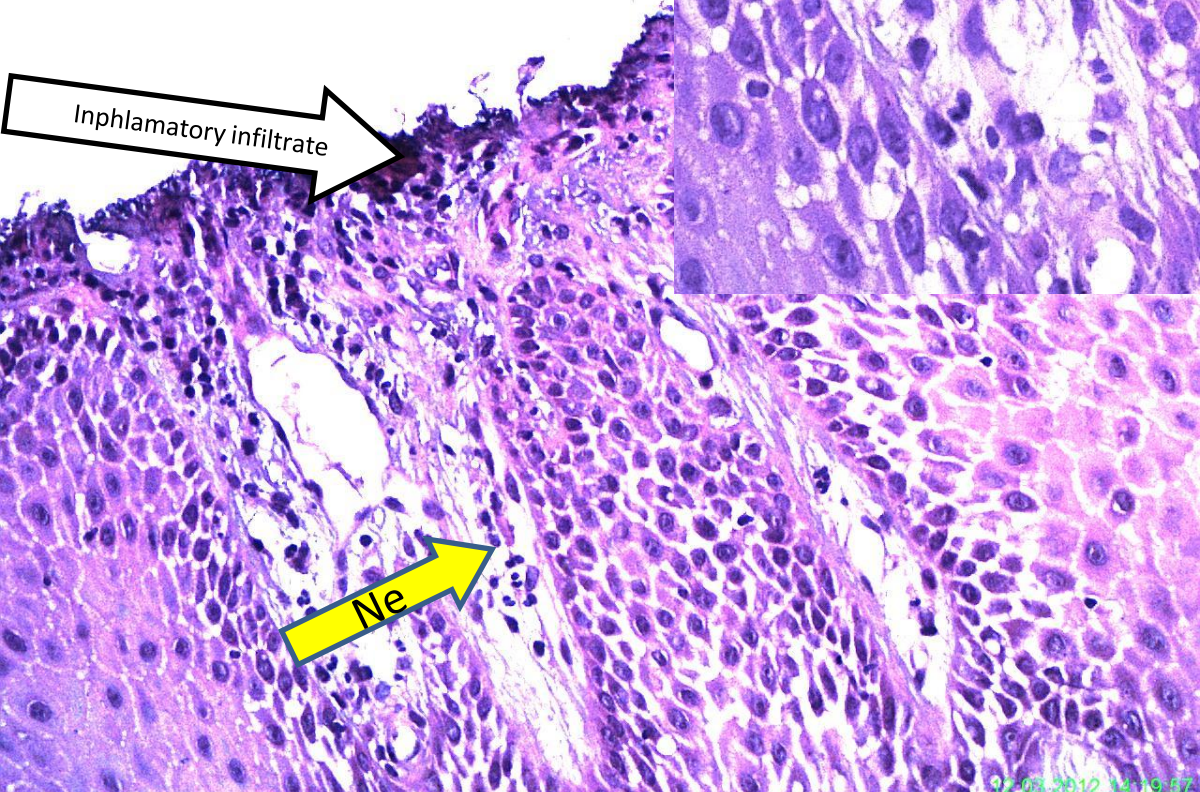


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x 20



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72 hours after treatment with **Er:YAG laser**. (the epithelium is removed). No evidence of thermal damage. Slight increasing of PMN cells count and neovascularization is observed.

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**THESE FINDINGS CAN BE ADDRESS TO LASERS TRANSFER OF ENERGY TO SURROUNDING TISSUES IN THE FORM OF HEAT ABLE TO INDUCE A HEAT SHOCK RESPONSE AND MUCH LESS TRAUMA.**

**FURTHER RESEARCH IS STILL REQUIRED FOR THE INTERACTION OF THESE IMMUNE CELLS, THEIR SECRETORY PRODUCTS, AND OTHER WOUND ELEMENTS BEFORE OUR UNDERSTANDING OF WOUND HEALING, AFTER LOW -LEVEL ER: YAG IRRADIATION, IS COMPLETE.**

**WE HOPE THAT, IN THE NEAR FUTURE, A BETTER KNOWLEDGE OF THE BIOLOGICAL RULES AND THE MECHANISMS OF LASER LIGHT ON THE HEALING PROCESS WILL CONTRIBUTE TO THE IMPROVEMENT OF PERIODONTAL TREATMENT.**

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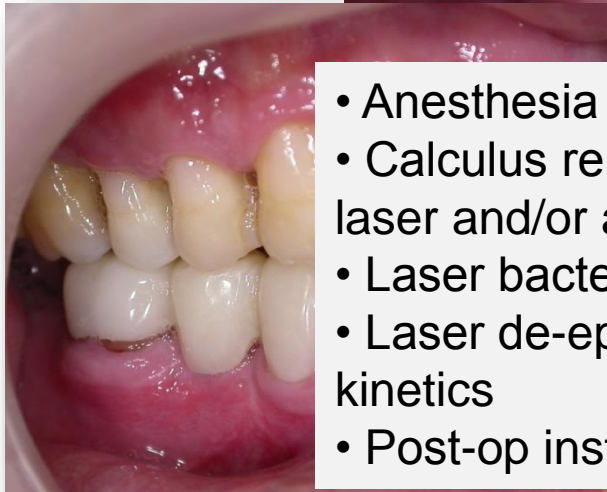
# 4. CASE PRESENTATION

4 years ago



# Periodontology

HT 100mJ/35Hz, ST 50mJ/30Hz, before and after 2 years



- Anesthesia as needed (topical or injected)
- Calculus removal employing an Erbium laser and/or an ultrasonic
- Laser bacterial reduction of soft tissue
- Laser de-epithelization to facilitate cellular kinetics
- Post-op instruction/home care instruction



ETEPHA DENT

УЧЕТАР ЗА ДЕНТАРНО ЗОПРАБЕ

**syneron**  
DENTAL LASERS

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