IMMUNOHISTOCHEMICAL AND HISTOMORPHOMETRIC ANALYSIS OF EARLY PHASE OF WOUND HEALING FOLLOWING LOW INTENSITY LEVEL ER:YAG LASER ASSISTED POCKED DEBRIDEMENT

Prof.dr Ana Minovska
WHY ER:YAG LASER?

Penetration depth of Er:YAG laser of only a few mm allows for precise control of the desired effect on tissue.

When applying a laser pulse energy above the ablation threshold, precise removal of upper layers can be achieved with almost no thermal deposition.

When thermal effects are desired (coagulation, heating of collagen fibers), the laser energy is reduced below the ablation threshold and an increased repetition rate is applied. Heat will be spread into deeper layers by thermal diffusion.

HAVE THE ABILITY TO EFFECTIVELY ABLATE, INCISE AND EXCISE BIOLOGICAL TISSUE: SOFT and HARD THE” ALL TISSUE LASER”.
The steam generated within the hard tissue matrix is associated with a volumetric expansion and greatly increased pressure within the matrix, this in turn produces microevaporative explosions that result in a thermally driven, mechanical ablation of the tooth structure.\(^6\)

AS THE ENERGY OF THE **ER:YAG PHOTONS** IS ABSORBED BY THE CHROMOPHORE (MOLECULAR WATER), IT IS **CONVERTED TO VIBRATIONAL AND ROTATIONAL ENERGY** WITHIN THE TARGET MOLECULES, WHICH IS THE MOLECULAR **BASIS FOR HEAT**.

It is this transfer of energy (to water) that will cause expansion and pressure in a confined environment (the tooth), leading to the explosive “**THERMAL-MECHANICAL ABLATION**” of tooth structure.\(^7\)

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The periodontium is a connective tissue organ that is protected by epithelium.

**Chronic periodontitis** is defined as inflammation of the gingiva extending into the adjacent attachment apparatus. The disease is characterized by loss of clinical attachment due to destruction of the periodontal ligament and loss of the adjacent supporting bone.

1. Hand instruments treated group after 24h versus 72h
T-test for Dependent Samples
Marked differences are significant at p < .05000

Tab.1

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After hand curettage the underlying connective tissue was disorganized with pronounced surface irregularities.

Fig. 1 (Magnification x40) Inner periodontal pocket area treated with curette.

There significant differences on all parameters between 24h and 72h in tested SAMPLES.
WE BELIEVE THAT RELATIVELY LOW POSTOPERATIVE CELLULAR INFLAMMATORY RESPONSE SEEN IN LASER TREATED GINGIVAL TISSUE COMPARED TO HAND INSTRUMENTATION CAN BE ATTRIBUTED TO THE VERY NARROW ZONE OF THERMAL DISRUPTION AND TO THE MINIMAL INVASIVE INSTRUMENTATION OF POCKET WITHOUT LEADING TO MAJOR TRAUMA OF THE SOFT TISSUES.

IN THE STUDY WE FOUND HIGHER CD34 EXPRESSION FOR LASER TREATED GROUP, WE HYPOTHESIZED THAT THESE FINDINGS CAN BE ADDRESSED TO LASERS TRANSFER OF ENERGY TO SURROUNDING TISSUES IN THE FORM OF HEAT ABLE TO INDUCE A HEAT SHOCK RESPONSE WHICH MIGHT HAVE AN IMPACT ON ENDOTHELIAL CELL MIGRATION AS ESSENTIAL TO ANGIOGENESIS AND REPAIR.