# New Developments in Minimally Invasive Endodontics using PIPS

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The advancement of dental technology has resulted in improved laser interaction on dentinal walls, the smear layer, bacteria and biofilm. In particular, the lowering of the single micro pulse duration of an erbium lasers to 50 microseconds (FOTONA LigthWalker 2940nm) and the using of sub ablative energy (from 20 to 5 mJ) have made possible the reduction of the undesirable thermal effects typically associated with radicular dentin walls. The debriding and bactericidal effect usually associated with thermal erbium laser irradiation showed lack of thermal morphological effects thanks to the photomechanical shock wave produced and the concomitant improvement of irrigants (NaOCl and EDTA) and their effect when used in conjunction with laser activation. The ability to remove smear layer and bacteria associated with biofilm are amplified with the use of erbium lasers and the resulting shock waves have been shown to penetrate not only the lateral canals, but even deep into the dentin tubules. To be shown are results of microbiological testing, analysis of microscopic scanning studies, histological sections, three dimensional confocal imaging and fluid dynamic video capture.

# Laser-Assisted Diagnostic And Treatment Approach in Dentistry

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This lecture presents an overview of the current knowledge in laser-assisted diagnostic related to pediatric dentistry, endodontics and periodontics based on our different research records.

Laser Doppler Flowmetry (LDF) was developed to assess blood flow in microvascular systems. The method was used for testing human pulp vitality and reparatory response of the pulp lesions after laser-assisted pulp therapy and evaluation of gingival response after different laser periodontal procedures.

Using en-face Optical Coherence Tomography (OCT) in endodontics, we have recently proved in real time the thorough evaluation of the quality of root canal fillings after laser dentinal wall treatment.

Moreover the en-face OCT method provides a superior non-invasive and real time investigation method, in diagnosis of secondary caries. Based on the results of this investigation, it may be concluded that Er:YAG laser-assisted cavity preparation leads to reduction of microleakages.