

# Erbium laser for modification dentin surface of the tooth

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**Abstract— Indications for usage of Erbium family lasers in dentistry are increasing. The success of root canal treatment depends on removing bacteria and smear layer for better adhesion of sealer. Usage lasers in endodontic treatment enhancing success for the treatment in long-term follow up.**

**Keywords— Lasers in dentistry, lasers in endodontics, smear layer, anti-microbial properties**

The implementation lasers in dentistry goes very quick. As dentist traditionally get used to think that lasers used only for soft tissues surgeries. In fact, the is more. Erbium family lasers (Er,Cr: YSGG, 2780 nm and Er:YAG, 2940 nm) are successfully used for hard and soft tissues as well. Chromophores for these wavelengths are water and hydroxyapatite. The unique feature for Erbium lasers is possibility to use it on the surfaces of the teeth and bones where exist hydroxyapatite (that is chromophore for erbium laser). For example, for caries treatment and as a first step in adhesive protocol for modification the dentin surface, as well as erbium lasers successfully used for endodontic treatment (root canal treatment).

Diodes lasers (semiconductor lasers) as well-known in dentistry as «soft tissues» lasers are used for working on the soft tissues due to targeting chromophores such as melanin and hemoglobin.

Until our days the problem of finding the most effective method for root canals instrumentation and chemical irrigation is still open. Researchers are trying to find easiest and simplest way to perform endodontic treatment and most important it should be effective in long term follow up.

There are different techniques to use lasers during endodontic treatment. One concept is to activate irrigation

solution (Sodium hypochlorite or EDTA) – it is called laser activated irrigation (LAI). Another technique is to use distillate water as irrigation solution and 2 wavelengths: combination of Erbium and diode lasers. Erbium lasers are used for removing smear layer to open dentin tubules and diode lasers in dry root canal for anti-microbial effect.

Erbium lasers effectively removing the smear layer during working regarding caries and non-carious lesions treatment and before final obturation in endodontic treatment.

In our research from 2019 Er:YAG showed high anti-microbial potential during endodontic treatment [1]. Research of Razumova S. et al. (2021) showed effectiveness of Er:YAG lasers in removing smear layer during endodontic treatment.

Due to laser selectivity and targeting only chromophores depending on the wavelengths of laser used we could speak about minimal invasive dentistry is a one page of modern biological dentistry. However, a lot of evidence-based research of usage lasers in dentistry is needed.

## REFERENCES

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