

عنوان مقاله:

A Roughness Study of Ytterbium-Doped Potassium Yttrium Tungstate (YB: KYW) Thin-Disk Femtosecond Ablated Dentin

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Abstract Introduction: The aim of this study was to evaluate the morphological changes and quantitatively assess the roughness of dentin after the ablation with a Ytterbium-Doped Potassium Yttrium Tungstate (YB: KYW) thin-disk femtosecond pulsed laser of different fluences, scanning speeds and scanning distances. **Method:** Twelve extracted human premolars were sectioned into crowns and roots along the cementum-enamel junction, and then the crowns were cut longitudinally into sheets about 1.5 mm thick with a cutting machine. The dentin samples were fixed on a stage at focus plane. The laser beam was irradiated onto the samples through a galvanometric scanning system, so rectangular movement could be achieved. After ablation, the samples were examined with a scanning electron microscope and laser three-dimensional profile measurement microscope for morphology and roughness study. With increasing laser fluence, dentin samples exhibited more melting and resolidification of dentin as well as debris-like structure and occluded parts of dentinal tubules. **Results:** When at the scanning speed of 2400 mm/s and scanning distance of 24 µm, the surface roughness of dentin ablated with femtosecond pulsed laser decreased significantly and varied between values of dentin surface roughness grinded with two kinds of diamond burs with different grits. When at the scanning speed of 1200 mm/s and scanning distance of 12 µm, the surface roughness decreased slightly, and the surface roughness of dentin ablated with femtosecond pulsed laser was almost equal to that grinded with a low grit diamond bur. **Conclusion:** This study showed that increased laser influence may lead to more collateral damage and lower dentin surface roughness, while scanning speed and scanning distance were also negatively correlated with surface roughness. Adequate parameters should be chosen to achieve therapeutic benefits, and different parameters can result in diverse ablation results.

Keywords: laser dentin morphology

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